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**Upsie: a mobile app on financial
education for teenagers**

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Projeto apresentado ao IADE - Faculdade de Design, Tecnologia e Comunicação da Universidade Europeia, para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Design e Cultura Visual realizada sob a orientação científica do Doutor Edirlei Soares Lima, Professor Auxiliar da Universidade Europeia e do Doutor João Rodrigues dos Santos, Professor Auxiliar da Universidade Europeia.

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keywords

Mobile App; Teenagers; Financial Education; Utility; Gamification; UX/UI Design

abstract

Teenagers live in a world surrounded by technological devices that are constantly connected to the Internet. They are born instinctively knowing how to use these devices and quickly cannot live without them. This constant online presence and open access to social media full of advertisement campaigns, encourage consumerist behaviors at an increasingly early age. However, teenagers often do not know how to manage money or have a critical opinion on their consuming habits. This problem motivated a research project with the goal of creating an educational and serious mobile app, using gamification elements, to help teenagers manage their financial expenses, as well as educating their consuming habits towards more conscious and informed decisions. Upsie is a mobile app that can be used on a daily basis, and where gamification elements are used to generate more engagement in users. From user interviews to interface design and usability testing, the entire process of creating the app is covered, until reaching a final interactive prototype.

palavras-chave

Aplicação *mobile*; Adolescentes; Educação Financeira; Utilidade; Gamificação; UX/UI Design

resumo

Os adolescentes vivem rodeados de dispositivos tecnológicos que estão constantemente ligados à Internet. Os jovens nascem a saber como usar estes dispositivos quase instintivamente e rapidamente não conseguem viver sem eles. A constante presença *online* e o acesso a redes sociais repletas de campanhas publicitárias, estimulam comportamentos consumistas numa idade cada vez mais precoce. No entanto, os adolescentes muitas vezes não sabem como gerir o seu dinheiro ou não têm uma opinião crítica sobre os seus hábitos de consumo. Esta questão motivou um projeto de investigação com o objetivo de criar uma aplicação de telemóvel séria e educativa que ajuda os adolescentes a gerir as suas despesas financeiras, para além de educar os seus hábitos de consumo, promovendo decisões mais conscientes e informadas. Upsie é uma aplicação que pode ser usada no dia-a-dia, e onde os elementos de gamificação vêm gerar mais motivação nos utilizadores. Desde entrevistas a utilizadores, até ao desenho da interface, passando pela realização de testes de usabilidade, todo o processo de desenvolvimento desta app é apresentado, até chegar ao protótipo interativo final.

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List of Abbreviations

DGE – Direção-Geral de Educação (Directorate-General for Education)

HCI – Human-Computer Interaction

IDF – Interaction Design Foundation

NN/g – Nielsen Norman Group

OECD - Organisation for Economic Co-operation and Development

PISA - Programme for International Student Assessment

SUS – System Usability Scale

UCD - User-Centered Design

UI – User Interface

UX – User Experience

Chapter 1

1. Introduction

One in four students, from the 20 countries that participated in the latest Organisation for Economic Co-operation and Development (OECD)'s PISA report, are unable to make simple everyday spending choices (OECD, 2020a). While only one in ten students performs at the highest level of financial literacy. The socio-economic background of a student is the main factor that influences how a student performs in financial matters. Portugal sits in the middle of the table, with an average score, while Estonia has the best performance, followed by Finland (OECD, 2020a).

The lack of information about financial management in schools' curriculums in Portugal was the main motivation for this work. Although, in the last few years, more programs regarding these subjects have started to emerge in school's curriculum. Children and teenagers often do not know how to manage the money their parents give them. They also do not know how they can contribute to a better world, ecologically and socially, by each purchase they make. In this context, it is important to face each purchase one makes, as a vote to a more sustainable and balanced world and how each product or service contributes to this cause. In addition, tolerant social interactions and a critical opinion on how products are sold through advertising campaigns are also important subjects to take into consideration when addressing financial management topics with teenagers.

Design is a discipline that only makes sense if it serves other disciplines, promoting a wide access to education and information. Design also works as an intermediate that translates complex theoretical themes into visually appealing systems, that help to create a more tolerant, conscious and aware society.

The design thinking process and user experience design step in to offer a method to create a digital and educational tool to help teenagers manage their financial expenses as well as educating their consuming habits into a more conscious and informed process. Being that the main goal to be achieved, there are a series of questions that immediately emerge.

First, it is important to learn how do teenagers relate with economy, finances and consumerism, what do these subjects mean to them and how do they manage their financial expenses.

On a second hand, how can a digital tool help to change their view on what finances and economy really matter in their everyday lives? How will this tool help teenagers manage their financial expenses, as well as controlling their savings, by reflecting upon healthier consuming habits?

These questions motivated this research project with the goal of creating an educational tool to bring young people's awareness into their consuming habits towards more conscious and informed decisions. The tool consists of a mobile application in which the users will be able to insert their expenses as well as evaluating their buying choices. By helping them in the process of managing their monthly or weekly allowances, the application is intended to strengthen the teenagers' awareness regarding topics like health, sustainability, consumerism and environmental issues. In order to engage a younger audience, the application contemplates a series of gamification elements, such as points, medals, rewards and ranking systems.

Teenagers will benefit from this application by learning new ways of managing money and making more sustainable consuming choices. At the same time, parents will be able to track the progress in their children's financial consciousness. In addition, teachers will have a new tool to discuss about economy, finances and consumerism in the classroom environment, stimulating debates about these topics. More than a mobile application to be used individually, it will be an educational tool for the whole family, friends and teachers.

1.1. Objectives

The main goal of this thesis is to create a digital tool to help teenagers with their financial choices, bringing awareness on how money can be spent responsibly. This main goal can be divided into more specific objectives:

- a) Understand young people's concerns and doubts about financial and economic matters;
- b) Use design as a multidisciplinary subject to create educational and digital tools targeted at teenagers, exploring all its strands from graphic design to experience and interface design;
- c) Implement gamification elements to generate an engaging experience that motivates users;
- d) Create a mobile app that can be used in everyday life to help teenagers with making spending choices, promoting autonomy as a learning method.

1.2. Structure

The structure of this work follows the methodology presented in chapter 2, where all the process used to implement the app is described. The methodology was created in Nielsen Norman Group, by a group of specialists in User Experience Design, and can be implemented in all types of design products and services.

The chapter 3 offers an overview on the most important studies related to this work, which includes the study of teenagers as an “overlooked population”, their constant smartphone usage, the definition of financial literacy and how this specific audience relates with this topic, and some guidelines on designing for teenagers. This third chapter finishes with a brief look on gamification, education and utility, followed by some related work, that consists of mobile apps which goals match the ones of the app proposed by this project.

The next chapters are organized according to the course this project took, from a simple idea to a complex and structured mobile app. On chapter 4, the research begins with interviews to potential users and the description of the initial idea for the app. Chapter 5 is focused on the creative development behind the project, from building personas, defining a site map and setting the gamification elements to be implemented, passing through wireframes until an interactive prototype. This chapter also contemplates the usability tests performed with users and the analysis of their feedback.

The work finishes with chapter 6, where the main conclusions reached with this work are exposed, as well as the limitations and future investigations that can be made regarding the subjects addressed.

Chapter 2

2. Methodology

There are lots of different methodologies possible to implement when developing a User Experience project – being it a Product or a Service. Choosing a method depends on budget, time or context, therefore it must be chosen according to the specifications of the project in hand. This chapter presents the methodology implemented during the course of this project.

Any methodology implemented in a design project must follow the principles behind Design Thinking, because these principles influence how a designer should think and project their ideas in a product or service.

This need to understand the aspects behind the design process comes all the way from the 1960s, but nowadays the Hasso-Plattner Institute of Design at Stanford developed a Design Thinking model based on a five-stage process: *Empathise* (crucial to human-centered design); *Define* (the problem); *Ideate* (generate ideas); *Prototype* (produce possible solutions) and *Test* (getting feedback from users) (Dam & Siang, 2020).

These stages are intrinsically behind every design project because a designer follow these steps even if he/she does not use the same terms. This is a non-linear process, because it allows the designer to go back and forward from each step to another. For example, when the final level is reached (*Test*), it may be necessary to perform new changes on the product, which means that the designer has to retreat to the *Ideate* phase, and pass through the *Prototype* once again (Dam & Siang, 2020).

The methodology used in this project follows the principles of Design Thinking adjusted to User Experience Design on Products or Services.

2.1. The UX Research Method for Product & Service Design

According to the Nielsen Norman Group (NN/g), “at every stage in the design process, different UX methods can keep product-development efforts on the right track, in agreement with true user needs and not imaginary ones” (Farrell, 2017).

NN/g is a consulting company trusted by international leading organizations, that share research findings regarding UX to improve designers’ and teams’ perceptions of their users’ experiences. From research reports to conferences or seminars, their goal is to spread valuable knowledge, including research-based and user-centered information.

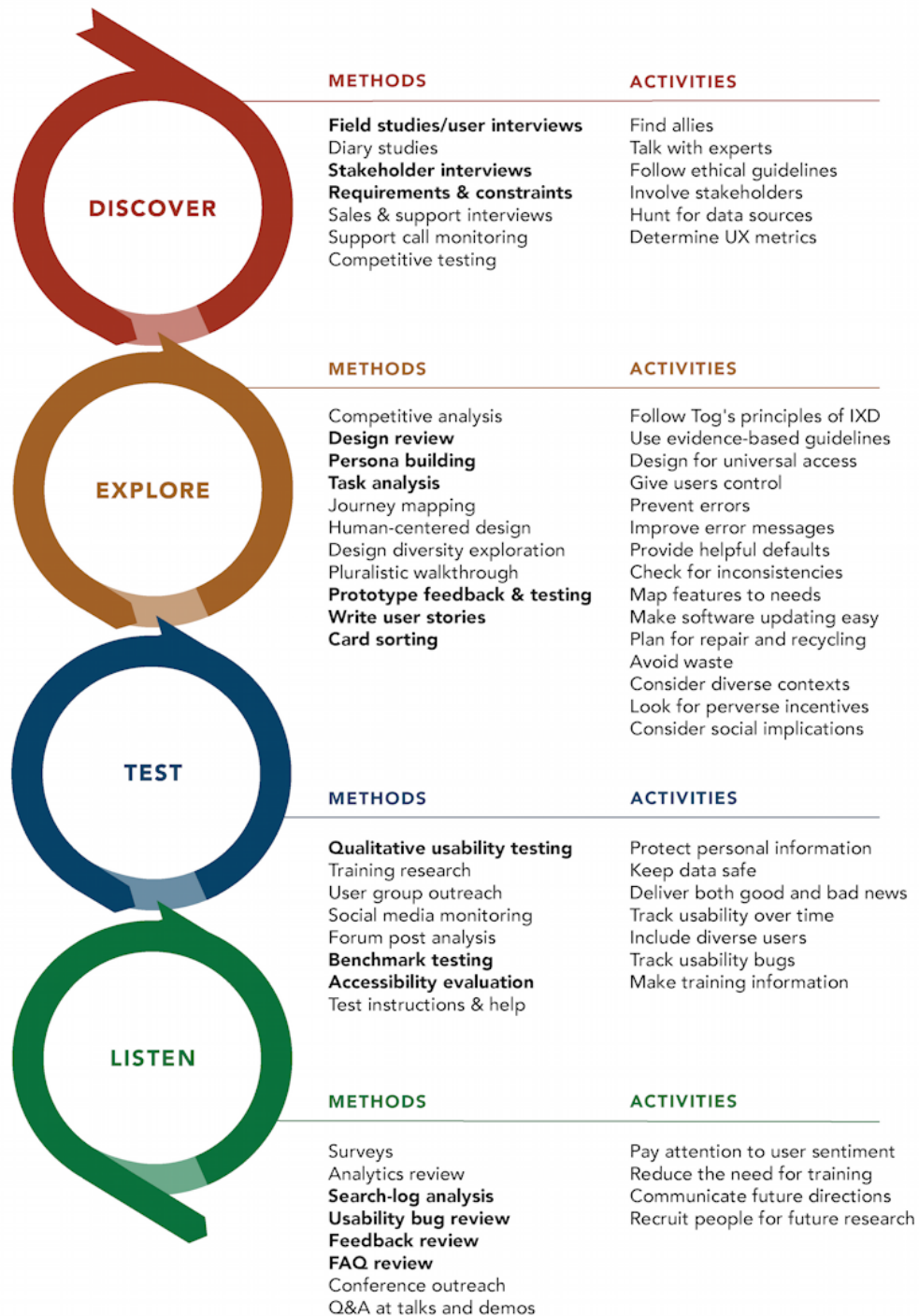
NN/g developed a flexible design methodology, based on a “UX Research Cheat Sheet” (Figure 1). This sheet describes the various methods and activities available in different project stages. The methods can and should be applied at any stage of the product design, taking special consideration into user research. Farrell (2017) states that “the earlier the research, the more impact the findings will have on your product, and by definition, the earliest you can do something on your current project (absent a time machine) is today.” User research is a very useful tool when designing a product. By constantly inquiring the users and listening to their concerns, the design team can improve the product to better respond to daily needs.

Figure 1 shows that the process of developing a product is dynamic and connected between phases that complement each other. However, these steps are not strictly divided, they are interconnected and should be implemented as the team finds the need to resort to a certain method or step. The stages displayed can be related to qualitative or quantitative research methods, that is why this is a very complete overview of the UX Research process.

The diagram lists potential UX research methods and activities that can be done as projects move through stages of design. Think of this as a menu of recommended options. Your process will vary and may include only a few things on this list during each cycle. The most-frequently used methods are shown in bold. (Farrell, 2017)

There are four big groups of stages where the designer is free to choose which are the most valuable steps to take during its own project: *Discover*, *Explore*, *Test* and *Listen*. These big four groups contemplate different activities that will be implemented throughout the course of the present project.

UX ACTIVITIES IN THE PRODUCT & SERVICE DESIGN CYCLE



Bold methods are some of the most commonly used.

NNGROUP.COM **NN/g**

Figure 1. UX Activities in the Product & Service Design Cycle (Gibbons, 2017)

The chapter 4 of this document corresponds to the *Discover* phase and, as the name indicates, it is a stage destined to assess and collect as many data as possible regarding user's concerns and goals. In this way, the designer will discover new ways and perspectives from the viewpoint of the audience. This is a stage focused on user research, important to execute before jumping into creating any experience or interface, avoiding building a product based on wrong pre-concepts and assumptions (Farrell, 2017).

In the present project, user interviews are the most valuable method to be conducted. In this way, it is possible to assess users' concerns and inquire them about their relationship with economics, finances and smartphones. This is also a way to find out whether it makes sense to do the project at all. Six teenagers with the desired age were selected and interviewed. Only their voice was recorded, after their parents signed a consent form. These interviews were not aiming at obtaining statistics data, because to create a credible database regarding teenagers and financial literacy that would take a larger sample and more time to develop the studies.

According to Maxwell (2009, p. 246), the interview is a qualitative research method that allows the researcher to have a better understanding of the subjects' opinions as well as their concerns. The interview allows to establish a conversation, collecting richer and specific information from a small number of people.

The method based on interviews was selected because it allowed a better understanding of the teenager's opinions, behaviours and experiences with their financial expenses, as well as their consuming habits. With open-ended questions, it was possible to assure that there were no right or wrong answers. The goal of the conversation was only to collect in-depth information about teenager's concerns regarding the topic.

Apart from that, there are also limitations to this method. For example, when it comes to the data analysis, the information gathered is very wide and extended in contrast to what happens in a survey with close-ended questions. However, an interview enables a sharing of thoughts that can be later applied to the final product – in this case, the mobile application for financial management.

The second phase, called *Explore*, is where the team/designer begins to experiment which are the best design solutions according to users' needs. In order to perform this step, the user research

interviews, done in the previous step, will be crucial to build *personas* that will work as an archetype of the users the app wants to reach. After building personas, a user journey will be designed, based on a task flow map. It is also in this stage where begins the process of brainstorming ideas in order to identify the best design elements to include. After this, the first interactive prototype is created and tested with users. Farrell (2017) suggests to watch people use the prototype and note how they complete tasks, letting them show where problems exist. After this, it is important to redesign and test again.

The third phase is called *Test*, and this is an important word when designing products. Testing is an important resource that serves the designer's needs of validating their design and understanding if the system is running well, receiving feedback from potential users.

Conducting qualitative usability tests is a way to discover any incidents that users might encounter while using the product. That is why it is important to listen to the users and always be in contact with them to perform any important changes to the system. It would also be interesting to conduct diary studies where the system is used over time, and incidents are tracked and registered.

The *Explore* and *Test* phase are addressed in Chapter 5, where the development of the user experience and the interface design are interleaved with usability tests with a few of the same users that participated in the interviews in Chapter 4.

Two usability tests were performed, in person, with the investigator supervising and exchanging opinions with the user testing the app (Figures 2 and 3). The voice was recorded as well as the screen where the user tested the app.

While watching people use the prototypes, they will be asked to fill a questionnaire based on the System Usability Scale (SUS). It consists of a 10-item questionnaire where each question is followed by a 5-point Likert scale, ranging from Strongly Agree to Strongly Disagree, that will allow the designer to assess users' opinions. The SUS covers a wide variety of aspects related to system usability, from the interface to the complexity of the experience itself. The SUS will be used in the two tests performed. The first test will be implemented after the user experiences the medium fidelity prototype and the second one, after the high-fidelity prototype. Sub-chapters 5.5.2. and 5.6.4. cover these tests.

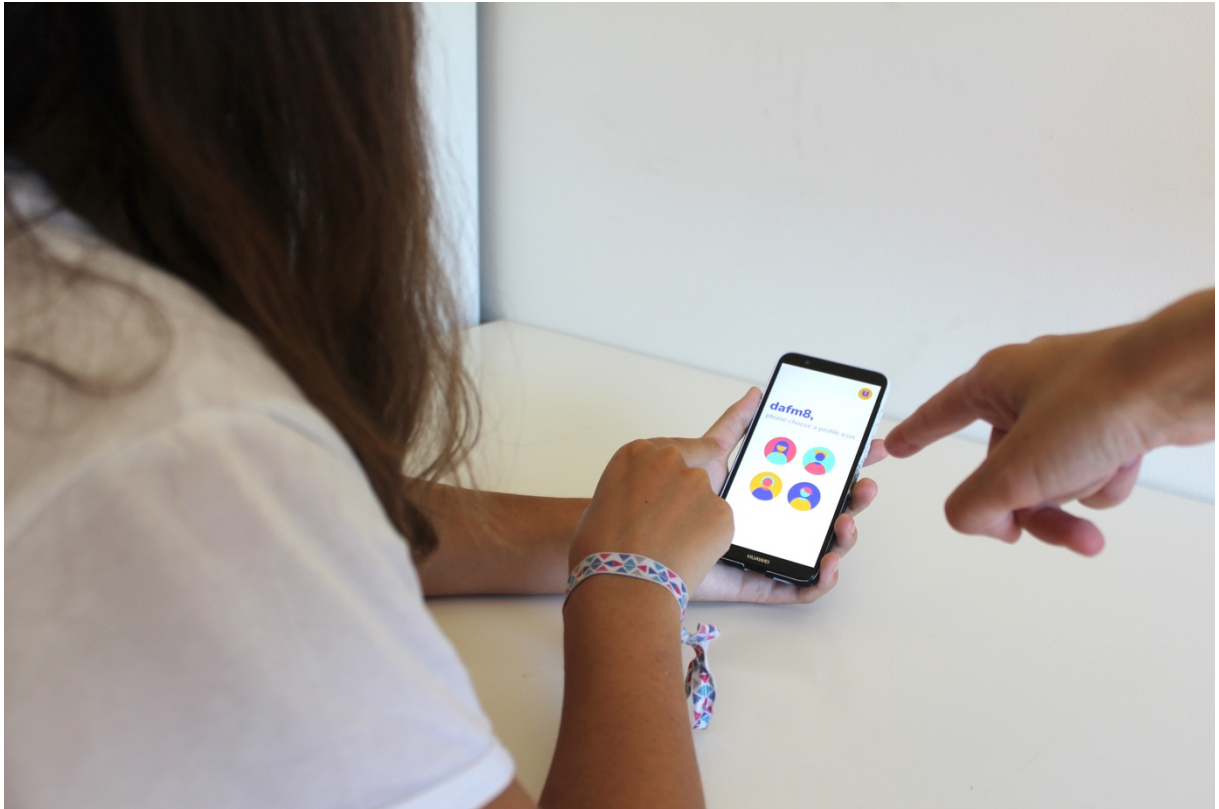


Figure 2. The tests were performed side by side with the users.

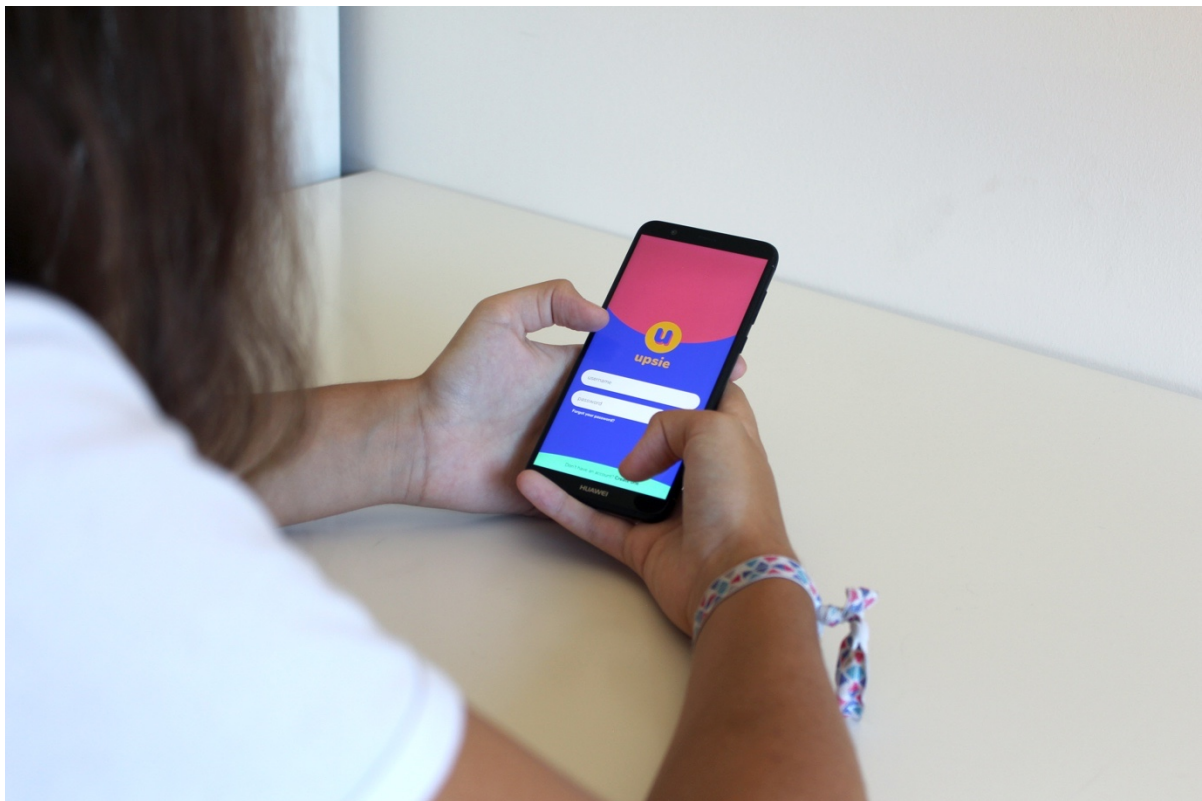


Figure 3. The users performed a set of tasks to experiment the app.

The System Usability Scale has a particularity related to the statements in the questionnaire. The common response to half of the items is strong agreement, while the other half is strong disagreement. “This was done in order to prevent response biases caused by respondents not having to think about each statement; by alternating positive and negative items, the respondent has to read each statement and make an effort to think whether they agree or disagree with it.” (Brooke, 1996)

Four users participated in the first usability test and five participated in the second usability test. According to Nielsen (2000), “the cost-benefit analysis of user testing provides the optimal ratio around 3 or 5 users, depending on the style of testing” (Nielsen, 2000).

Testing a single user would never be enough to collect meaningful insight, because “there is always a risk of being misled by the spurious behavior of a single person who may perform certain actions by accident or in an unrepresentative manner”. However, three users “are enough to get an idea of the diversity in user behavior and insight into what's unique and what can be generalized” (Nielsen, 2000).

After the third user, some insights will begin to overlap, and the same things will happen multiple times. After the fifth user, these same findings are observed repeatedly which means there is no valuable insight being produced and it starts to be a waste of time and resources (Nielsen, 2000).

Three types of prototypes were developed. First, a low fidelity prototype, based on rough sketches and paper models, was created in order to “test rapidly and cheaply and explore a wide range of options”, and “use them as a proof of concept model to test out and rapidly present ideas in tangible form” (Dam & Siang, 2019).

Secondly, a medium fidelity prototype was created with more details and refinements. It consists of wireframes that resemble more closely the final product, giving the user “a better sense of what the solution or part of the solution might look like” (Dam & Siang, 2019).

Sub-chapter 5.5. shows the development of this medium fidelity prototype as well as the results of a usability test implemented with some users. This prototype already has some interactive features, but it only consists of the skeleton of the app.

Then, the interface is fully completed and a high fidelity prototype is built. This is the last prototype before jumping into the development of the app. They allow “an accurate representation of what the solution might look like with fine details; better still, they may include much of the expected functionality” (Dam & Siang, 2019).

In sub-chapter 5.6, the complete interface design is presented. The graphic elements were established: the logo; color palette; naming of the app; the typeface; and the visual elements that will compose it. It was built in Adobe XD and also tested by users. “High-fidelity prototypes are excellent for the final selling of ideas when funding decisions need to be made, or when potential markets are being approached for feedback” (Dam & Siang, 2019).

Listen, a stage where the product is continuously tested in order to look for any new issues. This phase was replaced by a final usability test with users (covered in 5.7.1.). The *Listen* phase asks for a complete implementation of the app, making it available on app stores, so that any person can have access to it. After this, customer surveys, monitoring analytics and metrics to discover trends and anomalies, can be implemented by the designers and developers. Running booths at conferences where the users can volunteer information to improve the product created is also an opportunity to get to know the users’ experience with the app (Farrell, 2017).

This is an important stage when the product is implemented in the real world, and it is possible to collect users’ data and opinions. In the present project and with time and technical restrictions, it was not implemented because this is destined to gather a commercial view of the product, gathering data that monitors patterns or trends.

This was the methodology chosen to implement in the present project, because it is flexible enough to let the designer choose the steps to use as the project moves along. Being flexible also allows to have a more dynamic workflow without a rigid set of phases required to go through.

Chapter 3

3. Literature review

In this chapter, the most important studies regarding the themes of the present project are presented, discussed and compared. The data presented is mostly based in the Portuguese reality, although a few themes do not have studies aimed specifically at the teenager population from Portugal.

At first, there is an overview at “Teenagers” and the characteristics of this specific population, that is the target audience of this project. Their constant and permanent use of smartphones make them feel at ease when accessing internet to look for information or stay in touch with their family and friends. It is exposed some data about the relationship between teenagers and money or finances, what is financial literacy and how schools address this theme. Additionally, there are some guidelines regarding designing digital products for this very special audience.

Gamification, education and utility are concepts that will help to build the conceptual structure behind this project and are briefly presented in the following sub-chapters. This chapter ends with related work that share some similarities with the final product this project aims to accomplish.

3.1. Teenagers: an over-looked population

When designing any product, being it digital or physical, it is mandatory to define which type of audience will use the said product. There are lots of features, when talking about demographics, that can be considered, being it: age, race, or sex.

For this project, the most important feature that defines the app’s audience is the age. Setting an age range will define the specific group of people for which the app is targeted. In this case, the future of our generations - teenagers.

Jean Piaget (1896-1980) was a Swiss psychologist and genetic epistemologist, known for his Theory of Cognitive Development based on children’s intellectual development during their early life years.

As pointed by the studies of Jean Piaget, there are four stages of cognitive development that have revolutionized the education system and how teachers work with their students. The first *Sensorimotor Stage*, from birth to 2 years old, focuses on appealing to their sensations and achieving “object permanence” (knowing that an object still exists, even if it is hidden). The *Preoperational Stage*, from 2 to 7 years old, is characterized by “intellectual egocentrism” (the child has difficulty taking the viewpoint of others) and has the ability to think about things symbolically. The *Concrete Operational Stage*, from 7 to 11 years old, marks the beginning of “logical or operational thought”, where they can perceive things internally in their head. And, finally, the most relevant for this study, the *Formal Operational Stage*, from 11 years old to adulthood, where they begin to perceive and understand abstract concepts as well as logically test hypotheses (McLeod, 2018).

At the ages of 12 to 16 years, children reach adolescence, during which they are able to develop complex reasoning, disregarding what is real, and defining their own ideas about the world. Teenagers begin to think and formulate arguments before reaching any conclusion (this is an important aspect when it comes to starting to have an economic awareness as a consumer, and to be able to evaluate the utility of their purchases), as well as to define effective learning strategies. It is also an age in which teenagers begin to form a personality and identity more sharpened and where the concerns with their inclusion in adulthood begin to emerge.

Although, teenagers may have these common features in cognitive and development terms, each generation have to deal with different cultural, social or economic stimuli, that shape their way of thinking, being and socializing. This project is aimed at a very special generation, shaped by the technology that surrounds them.

3.1.1. Born with Internet access at their fingertips

In 2016, all Millennials have stepped out classrooms around the world, giving space for a new generation to come: Generation Z. The young people that are now occupying our schools, learning and growing to become the future, are a generation like no other.

These individuals are more accepting and open-minded like no other, they are exposed to different cultures and perspectives and are more willing to accept and embrace their differences. Apart from

that, the most important skill this generation has is their online presence and their ability to work and learn with new technologies.

According to the Pew Research Center (2019), people that were born between the years of 1997 and 2012 are considered Generation Z. Technology is the major generation-shaping consideration that distinguishes Gen Z from others. While Boomers grew up with television, Generation X lived the computer revolution and Millennials witnessed the internet empowerment, Generation Z was born while all of the technology the others saw growing, was already implemented in every household.

This technology-based society in which Gen Zers were born into, have implications in how this generation behaves. Both positive and concerning habits, attitudes and lifestyles, in which these young people live, may have lasting generational imprints that will become more muted until they reach adulthood. It is important to track young people's behaviours over time and as soon as possible, to prevent psychological or mental problems that may surface because of all the technology available, contrasting with their low levels of critical conscience (Dimock, 2019).

The usage of mobile devices worldwide has been increasing since 2014. The data presented by Statista (2016) shows that, in 2014, around 38 percent of all mobile users were smartphone users, and by 2018 this number would grow over 50 percent. In 2016, 62.9 percent of the population worldwide already owned a mobile phone. This number would grow to 67 percent by 2019. The increasing popularity of smartphones is expected to grow the number of smartphone users worldwide by one billion in a time span of five years. By 2019, almost 2.7 billion people will own a smartphone.

When speaking about the Portuguese reality, and according to Statistics Portugal (INE - *Instituto Nacional de Estatística*) (2019), 80.9 percent of households had internet access at home (1.5 percent more than in the previous year), this is more frequent in families with children up to 15 years old (94.5 percent) than those who do not have children (73.2 percent). 76.2 percent of the resident population, between 16 and 74 years old, use the internet: 99.6 percent are students, 96.9 percent of those finished high school and 98.7 percent finished University. Also, in 2019, 84.1 percent of internet users, use internet on the go, that is, outside their homes, at their workplace or in portable devices. 82.5 percent of these internet users prefer the smartphone.

Smartphone usage will continue to increase worldwide, as the supply of smartphone models also increase, and people will have even more devices to choose from. The commodity of having a smartphone has changed the way of living and experiencing the internet, which is shaping a whole new generation.

3.1.2. *Teens and money, money and teens*

3.1.2.1. *What is Financial Literacy*

Financial literacy may improve citizens’ financial resiliency, thereby preparing them to manage and weather such unexpected shocks. Many 15-year-olds face financial decisions and are already consumers of financial services. They are likely to face growing complexity and risks in the financial marketplace as they move into adulthood (OECD, 2019, p. 36).

General literacy is usually associated to a person’s ability to read and write. The International Adult Literacy Survey developed a standard definition of literacy as “using printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential” (Murray et al., 1998, p. 17).

As Huston (2010) suggests, literacy consists of understanding symbols or words and having the ability to use them, creating meaningful relations. The concept of Literacy has been applied to particular skill sets, for example “computer literacy”, “health literacy” or “financial literacy”. Each type of literacy measures how well a person can understand and use information regarding a certain subject.

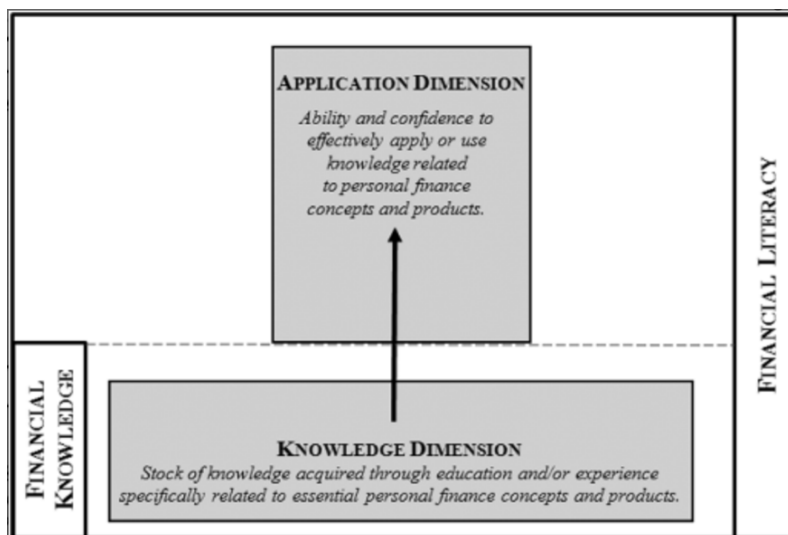


Figure 4. *Concept of Financial Literacy* (Huston, 2009)

Financial Literacy could be conceptualized as having two dimensions: the “Knowledge dimension” and the “Application Dimension”. The first is related to personal finance knowledge and the second to personal finance application. Figure 4 shows a visual representation of these concepts, defining financial literacy as measuring how well an individual can understand personal finance-related information (Huston, 2010).

Nowadays, Generation Z is mostly constituted by children and teenagers. Growing up, and entering adulthood, many questions pop into their minds. Questions that are forced by their constant online presence and by the way media interacts with them, encouraging them to follow trends and question themselves about: How to save money? How to open a bank account? How to manage expenses? How to contribute to a healthier and sustainable world? At schools, these subjects are often addressed, although the classes do not take an in-depth approach to the topics.

3.1.2.2. School’s curriculum in Portugal

In 2011, Banco de Portugal, the Portuguese Securities Market Commission and the Portuguese Insurance and Pension Funds Supervisory Authority, launched *The National Plan for Financial Education*. A plan targeted at all age groups, with a special focus in schools, which aims to increase the level of financial knowledge, promoting the adoption of financially responsible behaviours and contributing to the population’s well-being and the stability of the financial system. This plan covers different topics of financial education: learning to use digital financial services, supporting financial inclusion and promoting the responsible use of credit (OECD, 2020a, p. 40).

In 2013, it was established *The Core Competencies for Financial Education*, where guidelines were provided for the implementation of financial education into all stages of education, from kindergarten to 12th grade. In 2014, a teacher’s training program was launched, to prepare teachers for this new subject. In 2015, there were workbooks available, that approached financial education through a story-telling approach and practical exercises (OECD, 2020a, p. 42).

Since 2018, in the Portuguese schools’ curriculum of basic education, especially in the 2nd and 3rd cycles (from 5th grade to 9th grade), the subject of Education for Citizenship has opened a space for debate and reflection on various topics that are not addressed in the other subjects.

The Class Director¹ is responsible for teaching this subject, coordinating the discussions and promoting critical thinking, tolerance and teamwork.

According to the Portuguese Directorate-General for Education (DGE):

School provides an important context for the learning and exercise of citizenship and it reflects concerns that also matter to society and that involve different dimensions of Citizenship Education, for example: human rights education; environmental education/sustainable development; road safety education; financial education; consumer education; entrepreneurship education; education for gender equality; intercultural education; education for development; education for defense and security/peace education; volunteering; media literacy; European dimension of education; health and sex education. (DGE, 2013)

Citizenship Education classes hold a variety of formats, encouraging interaction among students in the classroom in autonomous and creative ways. The topic of Financial Education seeks to educate and raise young people's awareness for financial issues. Thus, in the future, the decisions regarding financial expenses and consumerism will be taken in a more conscious and responsible way. The Consumer's Education is also an important topic to take into consideration, because it is directly related to financial and economic decisions. The common good and sustainable development are responsibilities that need to be deepened and discussed, especially in the classroom (DGE, 2013).

Education for Citizenship and, more precisely, Financial Education, are presented in the school's curriculum since 5th grade until the 9th (from 10 to 14 years-old), and this is a relevant topic that should be in children and teenagers' social concerns.

Another subject that introduces terms regarding economics and finances, is Geography. Apart from studying and analyzing maps, graphics, images and text, students from the 9th grade begin to interact with concepts related to social or economic growth and human development. Gross National Product (GNP), Gross Domestic Product (GDP), Human Development Index (HDI), Gender Inequality Index (GII), Multidimensional Poverty Index (MPI), are a few of the indicators that measure countries development and are also related with economy and finances (DGE, 2018).

When reaching the 10th grade, students choose which field they are more interested in following. When choosing a Scientific-Humanistic Course, they get four options: Sciences and Technologies, Socioeconomic Sciences, Languages and Humanities and Visual Art. The ones who choose

¹ The Class Director is responsible for handling issues related to the class he/she is assigned to. He/she deals with the parent's questions regarding their children's performance at school.

Socioeconomic Sciences begin to develop a more detailed knowledge regarding economics and finances, because the course is focused on these themes. Mathematics A, Economy, Geography A and History B are a few of the disciplines in the curriculum of the course (DGE, 2012).

3.1.2.3. OECD's PISA reports

The Organization for Economic Co-operation and Development (OECD) developed a program that aims to assess the best education systems in the world, and how other countries can improve their own systems by learning from them. This program is known as PISA (Programme for International Student Assessment) and it is focused on 15-year-old teenagers and their knowledge in various subjects.

PISA introduced an “innovative concept of ‘literacy’”, which refers to students’ capacity to apply their knowledge and skills in key areas, and to analyze, reason and communicate effectively as they identify, interpret and solve problems in a variety of situations” (OECD, 2019, p. 26).

The assessment consists of computer-based questionnaires, lasting up to two hours, with a mixture of multiple-choice questions and long-answer questions. The questionnaires seek information about the economic and social background of the students and their families; habits of their life; quality of the school’s environment and learning aspects such as motivation and engagement. In PISA 2018, five additional questionnaires were presented regarding “computer familiarity” when it comes to Information and Communications Technologies; “well-being” questionnaire on student’s perceptions of health; “education and career” which regards the preparation for their future careers; “parent” questionnaire focusing on parental support at home and the “teacher” questionnaire regarding teacher’s practices (OECD, 2020, p. 29).

Apart from Science, Mathematics or Reading, and how they can apply what they learn in school in real-life situations, a new and optional subject was added: Financial Literacy.

On May 7th, 2020, the Volume IV of the “PISA 2018 Results” was launched online, under the name “Are Students Smart about Money?”. This is the third time PISA assesses students’ ability to deal with financial issues and decisions. This volume is focused on 15-year-old students’ experiences with money in the 21 countries and economies that participated. It assesses their competencies in reading and mathematics and their socio-economic status. The results are shown as an overview of

how financial education is addressed in schools from different countries and economies, and how well they prepare their students for real-life situations.

Almost 117 000 15-year-olds took part in the test. They were evaluated regarding their knowledge and skills, when it comes to money matters and personal finance. Dealing with bank account, debit cards, interest rates on a loan, or choosing mobile phone plans were some of the topics assessed (OECD, 2020b).

This report begins with exposing how the economies assessed, introduce “financial literacy” to their students:

A growing number of countries teach financial education in schools, even though provision remains limited. To minimize curriculum overload, countries typically integrate financial literacy into other subjects and existing courses, rather than introducing an additional subject into an already crowded curriculum. Before formally introducing elements of financial education into the national curriculum, some countries have developed financial education pilot programmes in a selected number of schools, in order to identify the most appropriate approach. (OECD, 2019, p. 39)

This excerpt is related to what is exposed in 3.1.2.2, where the Portuguese School curriculum introduces financial literacy and education as a part of another subject.

One in four students, in the 20 countries that took part in the latest PISA report, and one in seven students in the 13 OECD countries and economies, are unable to make even simple everyday spending choices. Only one in ten students performs at the highest level of financial literacy, and these financial decisions they are able to make, will only become relevant to them later in life. Estonia had the highest average score, followed by Finland.

In addition to Estonia, Finland and the Canadian provinces, two other countries – Poland and Australia – performed above the OECD average in financial literacy. The mean performance in three countries – the United States, Portugal and Latvia – was not statistically significantly different from the OECD average. Finally, 12 countries – Lithuania, Russia, Spain, the Slovak Republic, Italy, Chile, Serbia, Bulgaria, Brazil, Peru, Georgia and Indonesia – performed below the OECD average in financial literacy. (OECD, 2020a, p. 53)

Portuguese students’ performance in the PISA studies, when it comes to financial literacy, matched the same score as the OECD average - 505 (OECD, 2020a, p. 17).

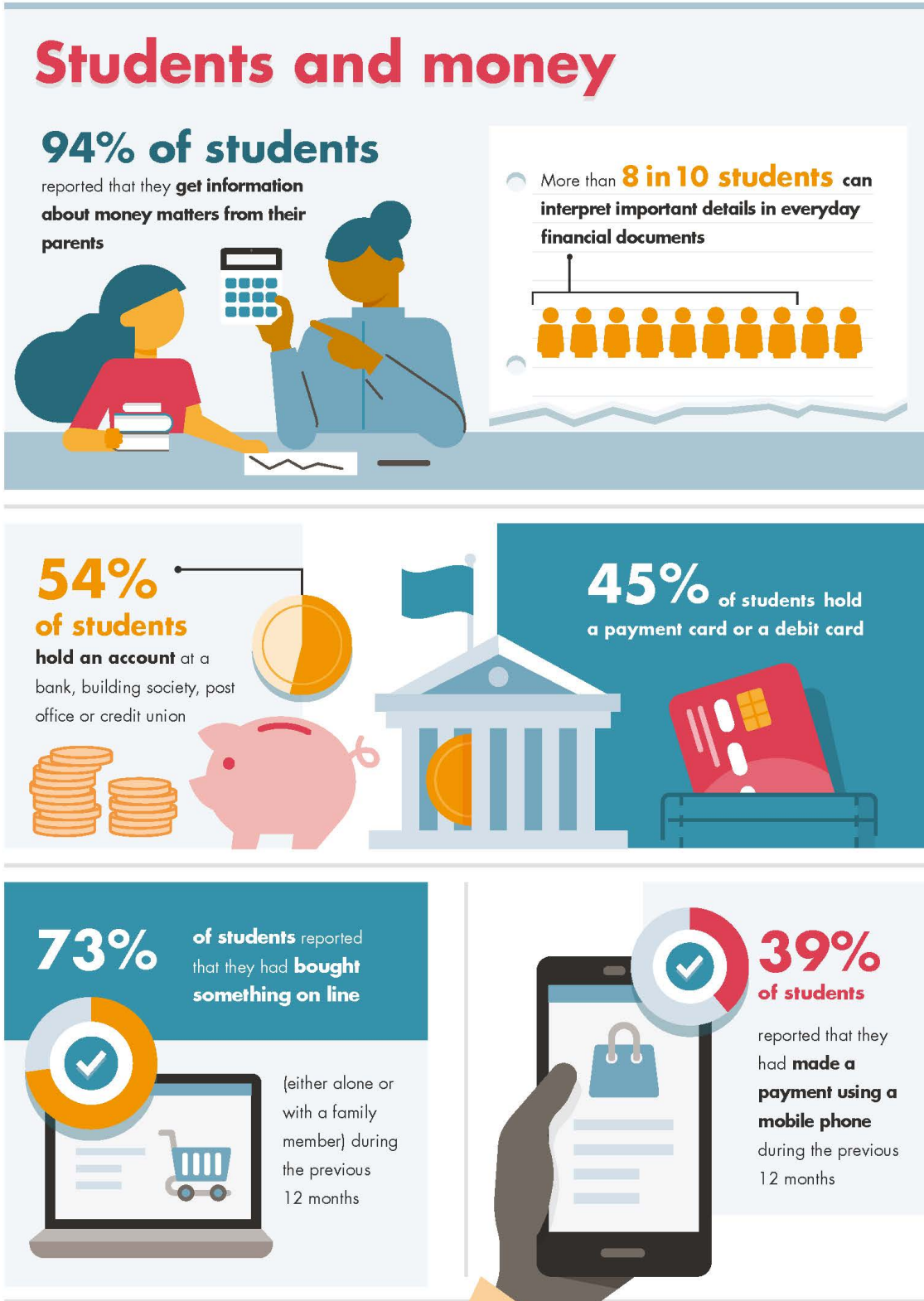
In PISA 2018 report, findings from earlier PISA assessments, were still confirmed. For example, there is only a small gender gap in performance, attitude and behaviors; and the socio-economic

background of a student, influences positively how they performed in financial literacy. Therefore, a more advantaged student in a more stable family structure has a higher performance when it comes to learning about finances. Apart from that, across OECD economies, one in two students hold an account at a financial institution, or even a payment or debit card. However, only one in three students are skilled enough to interpret and evaluate a bank statement (OECD, 2020b).

PISA 2018 tests went further than the previous that were made. In 2018, the focus was on examining various money-related aspects of students' lives, especially in describing their money-related attitudes and examining their digital financial activities (Figure 5).

Almost three in four students had purchased something online over the course of the twelve months prior to the assessment, either alone or with the help of a family member. Also, two in three students reported being confident in paying with a debit card and keeping track of their balance, instead of always using cash. Nine in ten students say they check if the change is correct when they buy something, and three in four students compare prices between shops when they think about making a purchase. All of these activities were associated with a stronger performance in the assessment (OECD, 2020b).

These findings show the importance of developing tools that are educative but that can also be used in everyday life. Helping to make choices and building a sense of consciousness about money and its finitude, but also the important concepts that surround financial matters. Young people are the future of our planet and they are the ones that should be addressed in order to clarify their doubts and help them make better and more sustainable life choices.



All data are OECD average, unless otherwise indicated, and were collected in 2018; PISA students are 15 years old

Figure 5. PISA 2018 Financial Literacy (OECD, 2018)

3.1.3. Designing for astute users

At first, various stereotypes surround this very specific group of people and, often, overlooked population. According to Joyce & Nielsen (2019), “teens are not technowizards who surf the web with abandon”, they have expectations and want to be entertained, while mostly their entertainment comes from texting and social media.

Methods in human-centered design were mostly designed and implemented with adults in mind, however, teenagers hold specifications in their personalities and their use of technologies, that do not correspond to the same expectations that adults have. UX design and HCI is proficiently aiming to address increasingly more and more specific types of audiences when designing new products, understanding their quirks and expectations when using digital products. (Rose, Björling, Kim, & Alvarez, 2018)

Read et al. (2011), present a series of reasons to explain why teenagers are usually a difficult target audience to study. First, the field of design can be quite difficult to understand for this population; second, the access to students is usually intermediated by rigid school structures and third, teenagers inhabit “worlds” that are quite secretive and difficult to access, being it physical or psychological.

Apart from these reasons, Joyce & Nielsen (2019) also present other guidelines for engaging teens and making sure they feel comfortable using a product. Teens can be similar to adults when performing certain tasks, these both groups expect sites and products to be easy to use and goal-oriented; usability is important to both of them, because they do not surf aimlessly through the web, but expect to easily accomplish the tasks they want and need to perform. In this research, composed by usability testing, field studies, interviews and focus groups, the participants were born between 2001 and 2005, therefore all participants grew up with access to computers. The amount of time spent using technologies have increased over the last 15 years, which reflects on the dexterity and effectiveness teenagers have when using technologies. Although they feel confident online, this is a group of people that often makes mistakes and quickly gives up, which means they are less cautious than adults and make snap judgments, leading to fewer successfully completed tasks. This low performance may be explained by the fact that teens have “insufficient reading skills, less sophisticated research strategies and dramatically lower levels of patience”.

Developing tools for this very specific population demands special methods which better suit their needs and wishes. Teenagers have complex abilities like abstraction and empathy but are, at the same time, diverse and individualized, which makes it even more challenging to generalize their opinions. Comparing to children, teens have a higher sense of design, which makes them a more valuable source for reflecting and giving feedback about features of a product. That is why, designing for teenagers, also requires them to participate in all of the stages of the design process (Rose et al., 2018).

When it comes to this process of collecting insights, Donker & Markopoulos (2001) performed a study which aimed to assess what is the most effective usability testing method for children. Although this was not specifically targeted at teenagers, the conclusions of the study are important to consider. Three methods were tested: “think aloud”, “structured interview” and a “written questionnaire”. The participants consisted of forty-five children, aged between 8 and 14 years old. According to the study performed, the most effective method was when the children were required to talk more, giving more meaningful feedback. Even though, children may have more limitations verbalizing their thoughts, their motivation compensated that handicap. They are persistent even if they find difficulties along the way.

Giving the freedom to speak and express their thoughts and concerns is an important aspect that is why, for this project, the method used will consist of interviews where the user will have the space to speak and exchange ideas with the investigator.

3.1.3.1. UX/UI for teens

The teens assessed in “Teenager’s UX: Designing for Teens”, reported that they use web and apps mostly for: school assignments, hobbies or learning new skills, entertainment as music, videos or games, news about sports or current events, learning about new topics, talking to friends and also shopping (Joyce & Nielsen, 2019).

Interaction and dynamism are key features that engage teenagers. The interface must be attractive and the communication must be youthful but not childish. So, what works and what does not? “The following interactive features all worked well because they let teens do things rather than simply sit and read: Online quizzes; Forms for providing feedback or asking questions; Online voting;

Games; Features for sharing pictures or stories and Features for creating and editing content” (Joyce & Nielsen, 2019).

The design of the interface itself must also contemplate a few design options that improve teens motivation into using the product. For example, organizing the information in small boxes of text, always assuring there is plenty of white space. This helps students to retain information and returning to the same place they were, as they are constantly being interrupted by text messages or phone calls. Although interactive features should not be overused, this audience is engaged by goal-oriented experiences that teach them something new. Being also a very social population, having a sharing option is a meaningful feature but, it should never be forced (Joyce & Nielsen, 2019).

Facilitate sharing but don't force it. Teens rely on technology for social communication, but they don't want to be social all the time. They want to control what they share and how they share it. Sites that force teens to register and then automatically make their profile public violate trust. Parents and teachers teach teens to protect their privacy at a young age, and one of the things teens learn early is to avoid nosey sites. (Joyce & Nielsen, 2019)

Where do teenagers experience most of their online presence? In the study previously cited, all the teenagers assessed had mobile devices, but not laptops or computers. Teenagers are used to access information in the palm of their hand. Mobile devices are the devices to design for (Joyce & Nielsen, 2019).

When proposing the idea for this project, the goal was to develop a mobile app and not a website that could be used in various formats and screens. Mobile is where teenagers feel comfortable which makes it the best medium to design the app proposed.

Table 1 shows the experience design practices that Children, Teens, College Students and Adults prefer. Clearly, the age differences reflect their preferences when using a mobile device. Looking at the “Teens” column, there are aspects that teenagers instantly repel, for instance: overuse of animation and sound effects; heavy reliance on search; they have low levels on patience, which means they hate waiting for things to load; teenagers also hate pop-ups and are hesitant to enter private information. What teenagers really look for is “age-appropriate content”, not too childish but also not too complex for them to understand. The correct communication and tone of voice, as well as the visual aspect, must respect their age – they are not children, but they are also not adults yet.

Table 1. Age-Group Differences (Joyce & Nielsen, 2019)

	Children	Teens	College Students	Adults
Search	Bigger reliance on bookmarks than search, but older kids do search	Heavy reliance on search; some difficulty formulating search queries; click topmost results in SERP	Heavy reliance on search; some difficulty formulating search queries; click topmost results in SERP	Heavy reliance on search; some difficulty formulating search queries; click topmost results in SERP
Scrolling	Don't scroll (younger); some scrolling (older)	OK scrolling	OK scrolling	OK scrolling
Animation and sound effects	Attend to things that move and make sounds	Might appreciate them to some extent, but overuse can be problematic.	Dislike them; autoplay sound disruptive in dorms	Dislike them; autoplay sound disruptive at work
Patience	Want instant gratification	Hate waiting for things to load or having to close pop ups; easily distracted	Want answers quickly; no patience for complicated interactions; easily distracted.	Want answers quickly, but more likely to wait than college students
Trust & credibility	Want good initial reaction; Credibility less important because goal is mainly entertainment	Difficulty judging credibility	Very critical; quick to judge websites	Less critical of websites than college students; still quick to judge
Tabbed browsing	Not used	Used often; few tabs	Used often; many tabs open at a time	Commonly used; varies depending on technical comfort
Disclosing private info	Hesitant to enter information	Hesitant to enter information	Less 'fear' of technology and therefore (often recklessly) willing to give out personal info	Often recklessly willing to give out personal info on sites they trust
Advertising	Difficulty distinguishing from real content	Like discounts but hate popups	Have a keen eye for ads and don't like being tricked	Mostly avoid ads but appreciate them when they are relevant and unobtrusive
Age-targeted design & content	Crucial, with very fine-grained distinctions between age groups	Want age-appropriate content; prefer sites with neutral graphics rather than childish ones	Want age-appropriate information, but don't want everyone to sound 'hip'	Less critical for most sites

3.2. Gamification and Education: ‘the inseparable two’

3.2.1. Gamification and Human-Computer Interaction

In recent years, computer and mobile software have seen a rapid proliferation into a mass-market status. Therefore, designers found new ways to motivate users into using their software.

It is impossible to address the subject of *gamification* without taking into consideration what is its role within the Human-Computer Interaction (HCI) field, as well as regarding User Experience.

As proposed by the Interaction Design Foundation (n.d.), HCI is a multidisciplinary field of study focusing on the design of computer technology and the interaction between humans (the users) and computers, and, most recently, all forms of information technology design.

The first personal computers increased the need of simplifying digital interfaces, because they became available for a more general consumer. Computers were no longer big structures that filled a room, so it was important to develop a smooth and efficient human-computer interaction for less experienced-users with specific needs and constraints.

In fact gamification occurs in a potentially favourable environment. It is presented by its upholders as being able to open up new perspectives for the creation of human machine interactions which are more engaging, motivating and enjoyable when used in non-game environments such as management, communication, repetitive tasks, teaching, outsourcing, ecology, health or marketing and business to consumer relationships. (Marache-Francisco & Brangier, 2015)

HCI is a relatively new field of study, as well as gamification, and because of that, these are still being explored in other fields apart from the obvious from a few years back, like videogames.

Although, users interact with different types of interfaces, hoping that they will solve their problems. And that is where gamification and UX design come into action. Usually, in the business field, these interfaces are not very appealing and may become obsolete and less intuitive over time.

In one hand, user experience design provides solutions to create a useful system that users can explore intuitively with the fewer possibly constraints, or as Chandler & Unger (2012, p.3) define it: “The creation and synchronization of the elements that affect users’ experience with a particular company, with the intent of influencing their perceptions and behavior.”

However, Tondello (2016) suggests that “it is not enough to have a useful system, one needs to also motivate and engage users in it.” Gamification contemplates a series of elements that can be implemented, when users do not feel motivated to use the interface presented to them. Fun games usually motivate people to play them voluntarily, and generate much more engagement. The UX Design premise that, designing intuitive and easy-to-use systems is the main concern, is not complete proposition. Game design elements can help in generating a more engaging experience, boosting the user’s will to explore more of the digital system presented.

3.2.2. Gamification in non-game contexts

A principal definition of gamification belongs to Deterding, Dixon, Khaled, & Nacke (2011) who characterize it as “the use of game design elements in non-game contexts”.

The app proposed in this project aims to be a serious app, with game design elements that increase the motivation of the user and engages him/her to use the app, learn more and do better financial choices. The goal is not to create a game, but an app that incorporates features from games, in order to generate more engagement.

Non-game contexts “*explicitly* intend to exclude the use of game design elements *as part of designing a game*, since that would simply be game design, not “gamification” (Deterding et al., 2011).

On other hand, Kapp (2012) proposes a wider definition of “gamification”: “a careful and considered application of game thinking to solving problems and encouraging learning using all the elements of games that are appropriate”. In his opinion, “serious games and gamification are both trying to solve a problem, motivate people, and promote learning using game-based thinking and techniques”.

These “gamified” applications only use several design elements taken from games. From the perspective of the designer, gamification and a ‘regular’ entertainment or serious game are different in the sense that the first is built as a system that includes elements from games, but is not a ‘proper game’. From the user perspective, these systems that enact game design elements can be experienced as ‘proper games’, and this reason is what sets them apart. The user feels like he/she is playing a ‘proper game’, however, the system was not designed to be a game, it just uses elements from games (Deterding et al., 2011).

Table 2. *Levels of Game Design Elements* (Deterding et al., 2011)

Level	Description	Example
<i>Game interface design patterns</i>	Common, successful interaction design components and design solutions for a known problem in a context, including prototypical implementations	Badge, leaderboard, level
<i>Game design patterns and mechanics</i>	Commonly reoccurring parts of the design of a game that concern gameplay	Time constraint, limited resources, turns
<i>Game design principles and heuristics</i>	Evaluative guidelines to approach a design problem or analyze a given design solution	Enduring play, clear goals, variety of game styles
<i>Game models</i>	Conceptual models of the components of games or game experience	MDA; challenge, fantasy, curiosity; game design atoms; CEGE
<i>Game design methods</i>	Game design-specific practices and processes	Playtesting, playcentric design, value conscious game design

These authors also present Table 2, with the various levels of Game Design Elements, their descriptions and examples. Experience points, levels, leaderboards, and badges are the elements that are highlighted in the following paragraphs.

Experience points are designed to rank and guide the user. By earning experience points, the user will acknowledge its evolution and perform more tasks that involve the gaining of more of these points. Everything done within the system, will earn her/him more points, that cannot decrease or be redeemed (Zichermann & Cunningham, 2011).

Associated with “experience points” there are the “levels” which indicate progress, and serve to pinpoint the user’s evolution, so they know where they stand in the overall gaming experience.

When it comes to progression through levels, “the best design tips for levels are to make them logical (or easy for the player to understand), extensible (so that you can add levels as needed beyond the initial “boss level”), and flexible. Finally, the levels should be testable and refinable. Level balancing is just as complex as building the game in the first place, and should be tested and retested even as the players are in the game” (Zichermann & Cunningham, 2011).

Progress bars are a graphic element that visually represents the progress a user is accomplishing as well as informing how close he/she is to completing a certain task. For example, to observe in which point of a level the user sits, a progress bar is a good solution to implement.

When it comes to incorporate a more social element into the system, leaderboards are a simple way to provide the user a way to compare his/her own progress with other users or friends. Leaderboards are usually an ordered list with a score, a name and a ranking system.

Apart from leaderboards, badges are another way of encouraging a healthy competition between peers, marking the completion of goals and the progress within the system.

In addition to signaling status, people desire badges for all kinds of reasons. For many people, collecting is a powerful drive. Other players enjoy the sudden rush of surprise or pleasure when an unexpected badge shows up in a gamified system. A well-designed, visually valuable badge can also be compelling for purely aesthetic reasons. (Zichermann & Cunningham, 2011, p. 55)

Badges are an interesting tool that has various levels of engagement. They provide a social status and credibility among other users. They also give the user something that can be collectible and making them work harder to collect more. And apart from those aspects, having a visual and aesthetically pleasing badge on one's profile is always something to be proud of (Zichermann & Cunningham, 2011).

The goal of the app proposed in this project is not to be a “serious game” but a “serious app with gamification elements”. This definition extrapolates the concept of game and takes game elements into a new context: mobile apps. By using elements from games, it is expected to improve the user's engagement, motivation and desire to learn. Therefore, these “game design elements” are implemented as a system to create a more captivating experience, taking into consideration the audience that is being targeted: teenagers.

3.2.3. Teaching through Gamification

In recent years gamification has seen rapid adoption in business, marketing, corporate management, and wellness and ecology initiatives. This is driven by its potential to shape users' behavior in a desirable direction. (Dicheva et al., 2015)

Kapp (2012) begins his book on “Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education” with explaining the importance of talking about gamification in educational contexts. Providing students and young people the “permission to fail”,

“encouragement of out-of-box learning” and “fostering a sense of control” creates richer and more rewarding learning experiences. Adding game elements into the traditional school system aids in retention of information and is more impactful in the learning process.

Gamification and Education go hand in hand more than one may think. Schools have intrinsically built a system based in rewards and grades, according to the student’s performance. Students are rewarded or punished, according to their behaviors, and if they accomplish what is required, they “level up”, that is, they reach the next academic year. However, something about this environment is not so fun how gamification is tended to be perceived. Students usually feel unmotivated and not engaged in the education system (Lee & Hammer, 2011).

Disengagement, cheating or dropping out are some of the outcomes, when the education system fails to engage students. Which means that a “game-like” experience does not necessarily translate to engagement. This is where “Educational gamification” comes in. It “proposes the use of game-like rule systems, player experiences and cultural roles to shape learners’ behavior” (Lee & Hammer, 2011).

Lee & Hammer (2011) suggest three areas in which gamification can serve to improve the education system. First, at a “cognitive” level. By providing “complex systems of rules for players to explore through active experimentation and discovery”, the students feel the desire to beat each level, increasing the difficulty and having clear tasks to perform. Secondly, at an “emotional” level, “games invoke a range of powerful emotions, from curiosity to frustration to joy”. Players or students learn how to cope with negative emotional experiences transforming them into positive ones.

Games maintain this positive relationship with failure by making feedback cycles rapid and keeping the stakes low. The former means players can keep trying until they succeed; the latter means they risk very little by doing so. In schools, on the other hand, the stakes of failure are high and the feedback cycles long. Students have few opportunities to try, and when they do, it is high stakes. (Lee & Hammer, 2011, p. 3)

This environment rewards when more effort is put into accomplishing a task, rather than not having other chances to trial and error. Resilience is the answer to failure, and failure is an essential part of learning.

The third and final area is “social”, where “games allow players to try on new identities and roles, asking them to make in-game decisions from their new vantage points”. Interacting with other players, or even the teacher, they can provide an opportunity to step out the traditional way of learning.

When it comes to prove that gamification really improves students’ motivation in school, there are still lacking studies that shed light on a wider sample of students, schools and education systems, so, for now, it is impossible to securely say that gamification is a tool that improves education strategies.

Even with some limitations to the study, Dicheva et al. (2015) point that “only some game mechanisms and dynamics re-iterate their possible use in educational context, while true empirical research on the effectiveness of incorporating game elements in learning environments is still scarce”. This study focused on “papers that clearly studied the effects of implementation of game elements in educational contexts”, excluding other studies with similar topics but more distant from the focus point of education systems.

It is still missing a proper evaluation of the use of gamification resources into certain educational contexts, however, the majority of authors mutually agree that there is a strong potential in implementing gamification strategies that can improve learning, from the student’s perspective but also from the teacher’s point of view (Dicheva et al., 2015).

Why is this topic important? In the context of today’s information revolution, where there are so much stimuli for young people to control, it becomes extra difficult to filtrate what is important and what is not. The app proposed by this project wishes to promote a sense of consciousness regarding financial matters, and gamification will be a crucial tool to promote progress, evolution and engagement through the joy of learning new ways to save money, organize it and spend it consciously.

3.3. The Principle of Utility in Economics

Utilitarianism is a normative ethical theory, introduced by Jeremy Bentham and supported by Stuart Mill, during the late 18th and 19th century. The two English philosophers and economists defended that an action is right if it tends to promote happiness and wrong if it tends to produce the opposite

of happiness. The happiness must take into consideration everyone affected by the action, not just the performer. Utilitarianism differs from other ethical theories in the sense that the rightness or wrongness of an act depends on its consequences, regardless from the motive behind it (Duignan & West, 2020).

Utilitarianists have been torn between two versions of their theory: Average Utilitarianism and Total Utilitarianism. These versions differ on the importance that is respectively placed on quality and quantity. The Average theory relies exclusively on quality: one situation is better if the average happiness of the ones involved is higher than the happiness in another situation. While the Total theory considers quantity as well: “the average happiness must be multiplied by the number of people in order to get the moral value of the state of affairs” (Hudson, 1987).

Following the same principle, “Utility” is a term in economics that refers to the total satisfaction, usefulness, worth or value received from consuming a good or service. In other words, it refers to how much benefit or satisfaction one gets from a good or service purchase. It is impossible to measure or quantify a consumer’s utility, but it can be indirectly estimated the utility of a good or service employing various models (Chappelow, 2020).

“Marginal utility” is used by economists to determine how many items of a product, a consumer is willing to purchase without losing its utility potential.

The concept of marginal utility arrived from the need to explain the economic reality of price, during the 19th-century. Economists from that time, believed that a product’s utility was behind the reality of pricing. However, this led to a contradiction regarding the significance of value that resulted in “the paradox of water and diamonds”. In “The Wealth of Nations”, Adam Smith, a British philosopher and economist, stated that “water has far less value than diamonds, even though water is vital to human life” (Chappelow, 2020).

Even though diamonds are more expensive than water (because people value them more), it cannot still explain why water is not as valuable, being it an essential good for human survival. Adam Smith was unable to solve this paradox.

Years later, three economists - William Stanley Jevons, Carl Menger, and Leon Walras – explained that economic decisions are made based on marginal utility, which presented an answer to this paradox.

The marginal-utility theory of value resolves the paradox. Water in total is much more valuable than diamonds in total because the first few units of water are necessary for life itself. But, because water is plentiful and diamonds are scarce, the marginal value of a pound of diamonds exceeds the marginal value of a pound of water. (The Editors of Encyclopaedia Britannica, 2020)

Known as the “Austrian School of Economics”, this body of economic theory developed in late 19th-century by Austrian economists, focused to find how to determine the value of a product. Menger believed that value is completely subjective and is found in its ability to satisfy human needs.

In other hand, Karl Marx’s labor theory of value contradicts this idea that value derives from utility. His theory claims that “the value of a commodity can be objectively measured by the average number of labor hours required to produce that commodity”. In his opinion, this theory could explain the value of all commodities, including the one that workers sell in exchange for a wage. Marx called this the “labor power”. Based on principles of classical economics, the value of “labor power” depends on the number of labor hours it takes “society, on average, to feed, clothe, and shelter a worker so that he or she has the capacity to work”. In essence, the wage received depends on the number of labor hours it takes to produce a person fit to work (Prychitko, 2018).

Both theories will be crucial to create a fair system of points in the app proposed by this project. Both sides are valid and should be taken into consideration and, even, extrapolated to other important aspects of contemporary society, like: ecology, sustainability or consumerism.

3.3.1. The Law of Diminishing Marginal Utility

People find the need to buy goods or services because they provide them a useful purpose, benefit or happiness to their lives. However, utility is a subjective concept that cannot be measured as one measures fruit by its weight or calories.

When talking about utility, there are two concepts that should be taken into consideration: “total utility” and “marginal utility”. Yet, being a subjective concept that has not a fixed unit, in order to

represent them visually and mathematically, one can set an arbitrary way of measuring “units of utility” that increases or decreases according to the utility obtained from a certain good or service.

Total utility is the number of units of utility that a consumer gains when obtaining a certain quantity of a good or service. Therefore, these units increase as the level of satisfaction of the consumer also increases. “The higher a consumer’s total utility, the greater that consumer’s level of satisfaction” (Anonymous, 2016).

In other hand, marginal utility typically decreases as you get more units of a certain product, because it depends on the ratio in which the total utility increases. From each incremental unit purchased, the marginal utility decreases – this is called the *Law of Diminishing Marginal Utility*.

Suppose that you are really thirsty and you decide to consume a soft drink. Consuming the drink increases your utility, probably by a lot. Suppose now you have another. That second drink probably increases your utility by less than the first. A third would increase your utility by still less. (Anonymous, 2016)

This tendency to decline explains why the first item of a product is usually the highest in terms of achieved utility, while the following items will decrease in terms of value, until there is no need for additional items.

The marginal utility of one slice of bread offered to a family that has only seven slices will be great, since the family will be that much less hungry and the difference between seven and eight is proportionally significant. An extra slice of bread offered to a family that has 30 slices, however, will have less marginal utility, since the difference between 30 and 31 is proportionally smaller and the family’s hunger has been allayed by what it had already. (The Editors of Encyclopaedia Britannica, 2016)

In Figure 6, it is possible to observe the evolution of marginal and total utility as the number of items purchased rises.

In this case, presented in the “Principles of Economics” (Anonymous, 2016), a certain person is going to the cinema. Panel (a) shows the total utility the person obtains, as the number of movies increases. The total utility rises as the person reaches the seventh movie, where it stagnates. While looking at Panel (b), it constantly decreases as the number of movies rises. When the total utility stagnates, at the seventh movie, the marginal utility reaches zero, which means that the person is not being satisfied or finding any happiness.

When consuming the first movie, he gets 36 of total utility, at the second movie gets 64 units of utility, and so on. Looking at the marginal utility, it corresponds to the difference between the total

utility gained in the first movie and the second. The slope of the curve between movie 0 and movie 1 is 36, from movie 1 to 2 it is 28, from movie 2 to 3 is 22, etc.

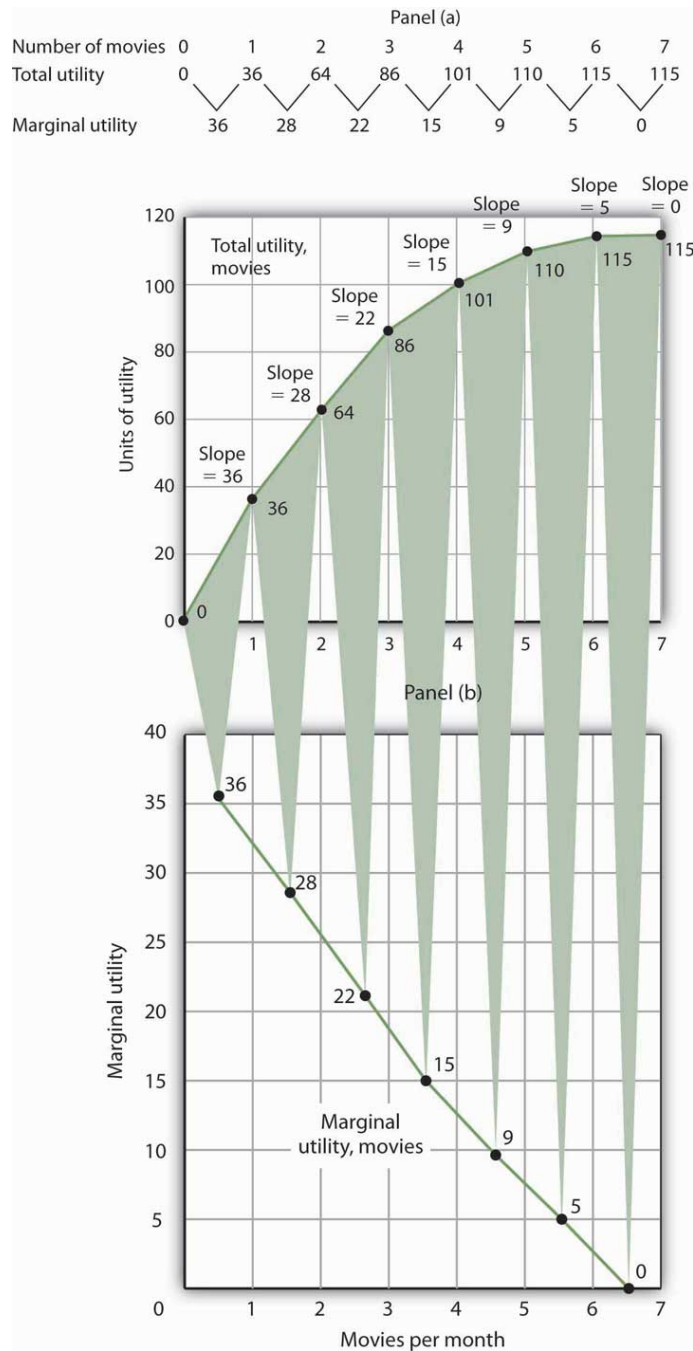


Figure 6. Total Utility and Marginal Utility Curves (Anonymous, 2016)

Note: “Panel (a) shows Henry Higgins’s total utility curve for attending movies. It rises as the number of movies increases, reaching a maximum of 115 units of utility at 6 movies per month. Marginal utility is shown in Panel (b); it is the slope of the total utility curve. Because the slope of the total utility curve declines as the number of movies increases, the marginal utility curve is downward sloping.” (Anonymous, 2016)

In conclusion, marginal utility may decrease until it reaches negative values, which means that it becomes more unfavorable for the consumer to buy any more units of that product. The first unit of a product is typically the highest, while the incremental units of that same product hold less utility (Kenton, 2020).

The Law of Diminishing Marginal Utility explains why there is not a frantic and recurrent consumerism of goods or services. At a certain point in time and after a certain number of items purchased, the consumer begins to not retrieve any satisfaction or value from them.

3.6. Related work

There are mobile applications that share some similarities with the one proposed, apps that have the goal of giving children and teenagers, tools to better understand how to use money and how to spend it consciously.

There are mobile apps created specifically in Portugal, which goal is to help people manage their expenses, allowances and set budgets. MB Way or DABOX are the major examples, although, these are not specifically targeted at young people. These apps were designed as “virtual wallets”, not so much as tools to educate people on financial matters.

On other hand, the recent mobile application Pockee (Figure 7), developed by NetGuru, actually aims to educate children regarding their financial expenses. The application is intended to a wide age range, from 8 to 16 years old, and also has access to a pre-paid card managed by the children’s parents. The parents have a similar application where they can manage and send money to their kid’s pre-paid card. It has some gamification elements (like points and badges) that allow children to earn money rewards by completing tasks and chores in real life. Parents can track and monitor their children’s profile and expenses (Chrzanowska, 2019).

The interface of Pockee is fresh and appealing to these demographics, with fun interactions and a dynamic and complete experience. The app is highly customizable, giving the parents, the ability to choose what is best for them, but the children themselves can also choose their app theme, from a wide variety of themes and cards’ design. Pockee also contemplates quizzes and other mini-games that are focused on teaching financial literacy terms and how they are used in everyday life.

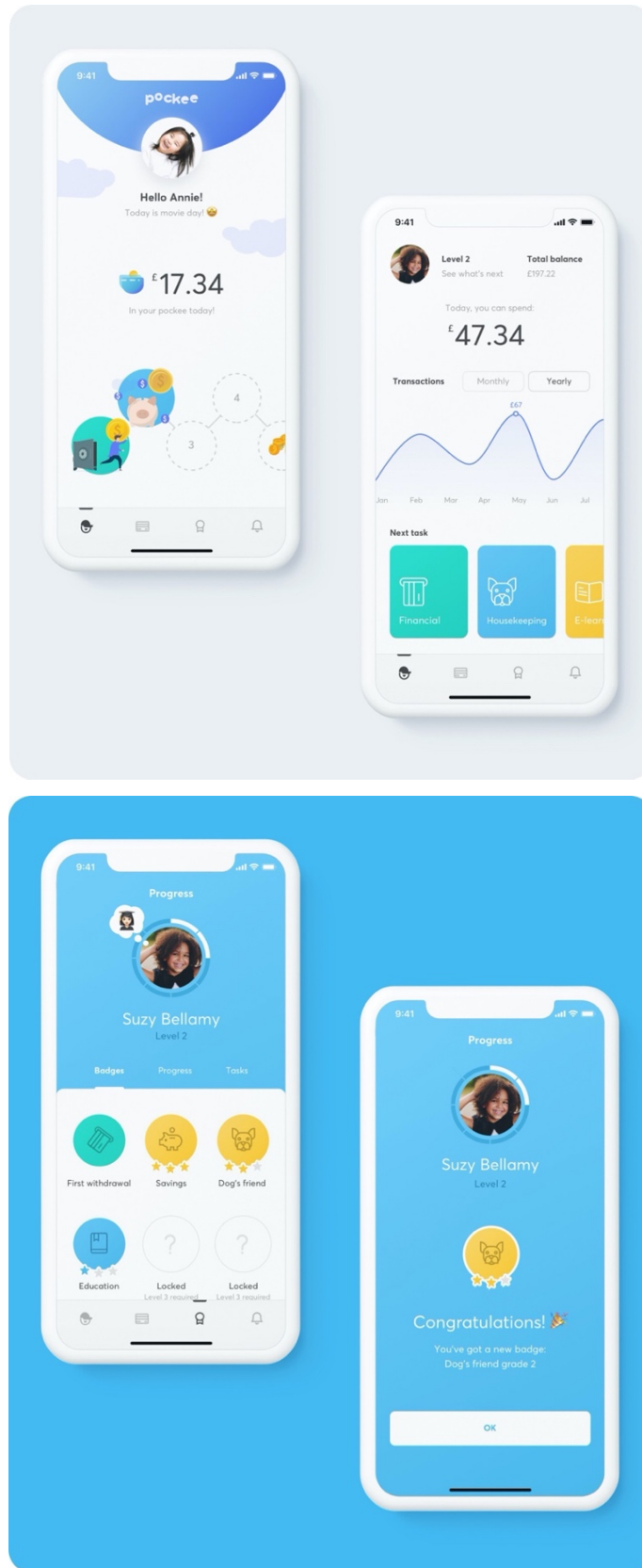


Figure 7. Pockee (Netguru, 2019)

Other applications like GoHenry, Rooster Money, Bankaroo or Osper follow the same premises as Pockee. For example, GoHenry (Figure 8) focuses on family banking for families, with various pricing options. The parents create an account for each of their kids, that they can easily manage through the mobile app. Then, the children get a customized credit card, that comes with parental controls, like controlling how much can be spent with that card, avoiding debt or overdrawn accounts.

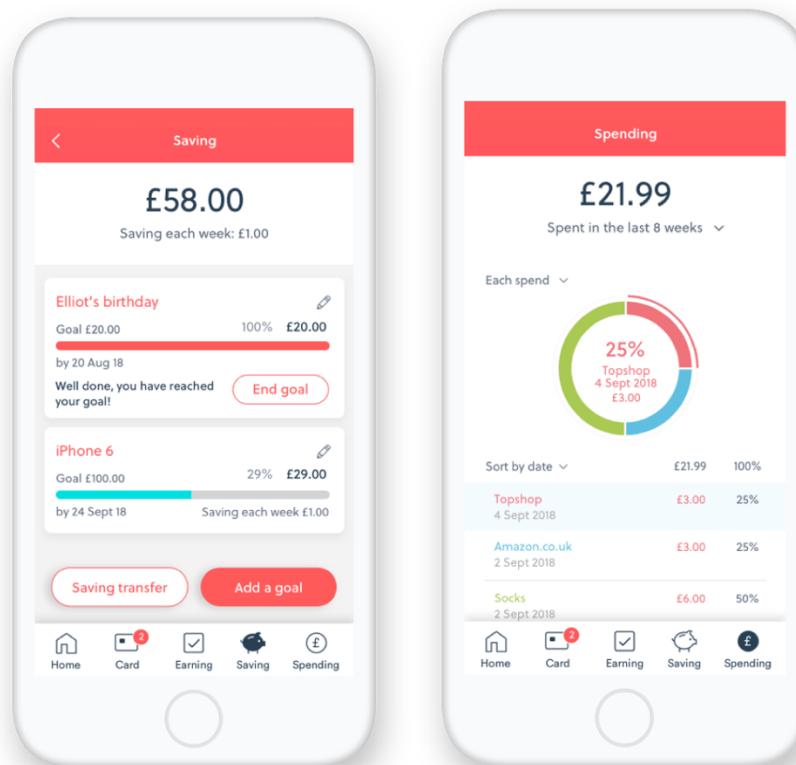


Figure 8. GoHenry (GoHenry, n.d.)

In GoHenry, parents can set a weekly pocket money or spending limits and offer extra money as the child completes other tasks. The app is mostly focused on the parents' experience, as they are the ones responsible for choosing how to encourage their child to have good money habits, by assigning tasks, savings goals and customizing other features (GoHenry, n.d.). From the kid's point of view, they have to complete tasks or chores for extra money, set up saving goals to automatically save a percentage of pocket money, use the VISA card assigned and make online purchases.

Rooster Money (Figure 9) is also designed for the whole family, and specially to help parents manage their children’s allowances. Kids can take responsibility for the decision of buying something, and parents just need to deduct it on the application. An allowance is assigned to each kid, and they manage it while parents get an overview of their children’s accounts, balance, and transactions. It is also possible to upload goals to save money for something. When they reach the desired money to buy a new bicycle, for example, parents can approve and fulfill the goal.

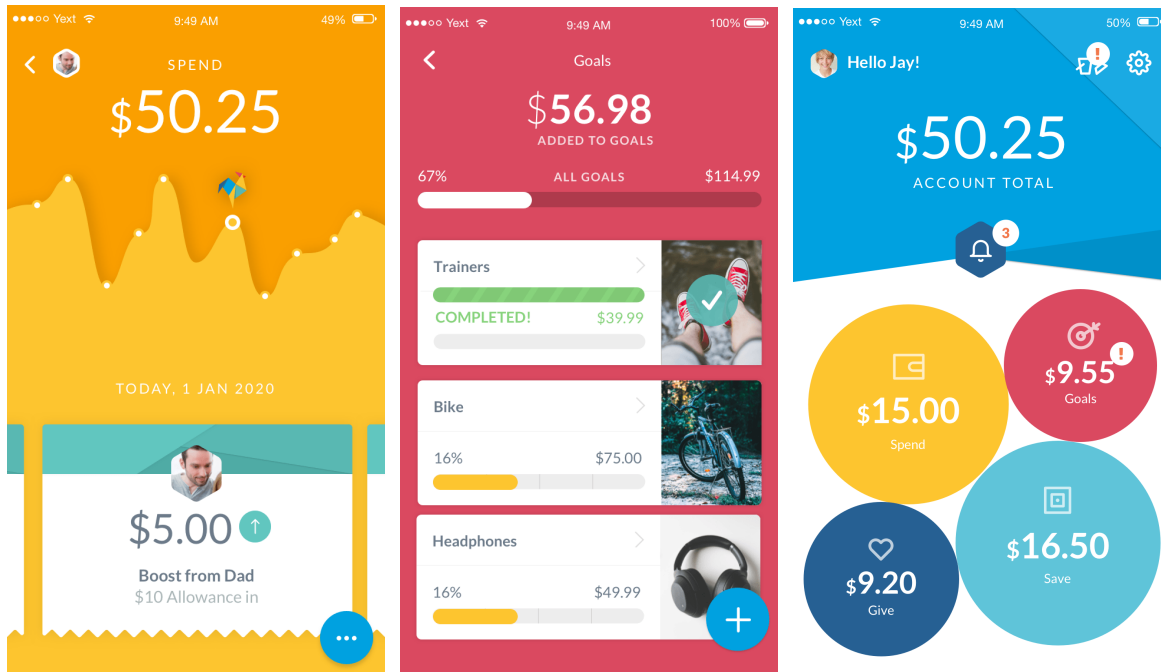


Figure 9. Rooster Money (Rooster Money, n.d.)

Rooster Money has various extra features available, according to the pricing option chosen. The parents can also change the currency to “Stars” that work as points and are equivalent to money. Then children can set their tasks, based on the number of “Stars” they will earn. The “Stars” feature is aimed at children with more than 3 years old, then the parents can add more features that accompany their children as they grow.

Bankaroo (Figure 10) is a “virtual bank for kids”, where they can learn how to establish budgets and save money, all in a virtual environment, with no direct relation to the real world. It helps kids to learn how to save money for goals and spend it responsibly. Parents can also track their kids’ pocket money and how they spend it, giving them a sense of how to set goals and understanding the value of money (Bankaroo, n.d.).

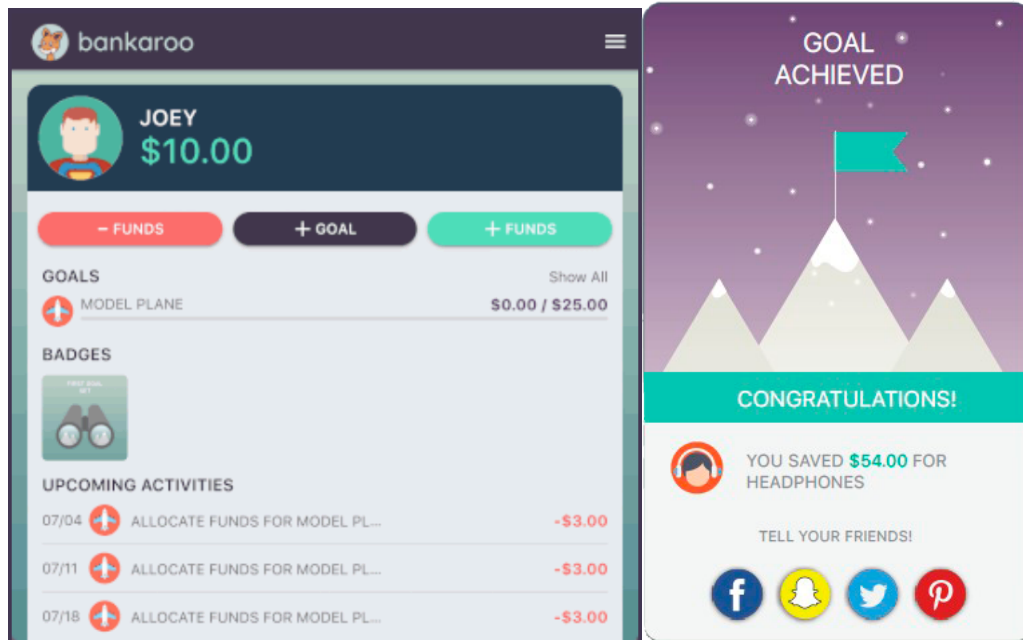


Figure 10. Bankaroo (Bankaroo, n.d.)

Bankaroo is designed for kids with basic reading skills, from 5 to 14 years old. It can be freely used as a web or mobile-web service, although there are also paid versions that are not required to have to use the service. This app aims to improve the communication between kids and parents, regarding financial matters, providing opportunities to take initiative and manage their funds with the help of parents.

Osper (Figure 11) is another application very similar to the ones described before. It is mostly directed towards parent's needs when managing their children's allowances. Parents are able to monitor the spending habits of their kids, as well as passing on good habits. Kids can view their balance and latest transactions, check allowances and receive money as a gift. Parents can set up an allowance associated to a pre-paid card, view the card's balance and lock the card in case of loss.

Parents order Osper cards for their kids and then, activate the app. This is targeted at kids from 8 to 18 years old, and they do not need to own a smartphone because they can use their parent's device. Parents can instantly load money to their children's debit card, monitor their expenses marking spend limits, set up an "automatic Osper allowance" to encourage budgeting or lock functions on their card (it is a debit card, not credit, which means they can only spend the money that has been loaded) (Osper, 2017).

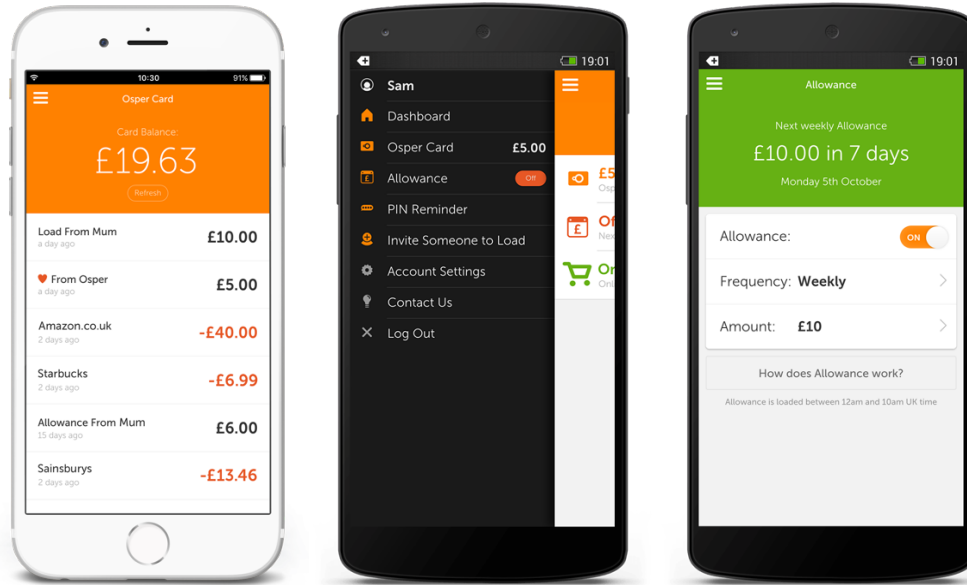


Figure 11. *Osper* (Osper, n.d.)

The applications presented above are managed by startups in Great Britain or in the United States. Therefore, the research studies carried out to develop the applications, only answer the needs of British and American families (considering aspects such as culture, education and children’s habits). These are all serious app, with gamification elements, which are mostly focused on the parents rather than the kids. This characteristic can enhance a communicative distance between parents and children, because parents insert chores and tasks for their children to perform, while giving rewards through the app and not in person. The app proposed by this project aims to develop a more autonomous learning process where teenagers learn by themselves, but also discuss financial matters with their parents and at school, with teachers and friends. This allows a more independent learning method but also promotes discussions and debates, regarding these topics.

3.6.1. *Comparing apps*

Using as reference, the competitor analysis² performed by Netguru when designing Pockee, Table 3 shows an overview of all the important features each of the apps in section 3.6. present. However, the features assessed are customized according to the app this project aims to develop (the last column shows the features, this app’s project, will have).

² The competitor analysis is available at <https://medium.com/netguru/family-banking-application-that-helps-your-children-learn-about-money-meet-pockee-69226904ec5d>

Table 3. Comparing apps

	Pockee	GoHenry	Rooster Money	Bankaroo	Osper	[This project]
Mobile App	●	●	●	●	●	●
Online Account	●	●	●	●	●	●
Credit Card Access	●	●	1	●	●	●
Built with parents in mind	●	●	●	●	●	●
Parent's Control	●	●	●	●	●	2
Autonomy and self-taught strategy	●	●	●	3	●	●
Gamification Elements	●	●	●	●	●	●
Introduction to financial literacy	●	●	●	●	●	●
Pricing	●	●	●	4	●	●
Interface attractiveness	●	●	●	●	●	○
Illustrations	●	●	●	●	●	○
Usage in everyday life	●	●	●	●	●	●

1 Only available in the UK, but not mandatory to use the app

3 It is designed for kids and schools, but parents still have control

2 The focus is on the teenager, although the parents have some control over expenses

4 Bankaroo is free, Bankaroo PLUS has a cost associated

Note: Chart comparing the most relevant features in each of the apps described above. The green dots mean the app has the feature in the system, the yellow ones mean it has or does not have according to a certain condition and the red dots mean it does not have that feature implemented.

Looking at Table 3, all the apps share similarities when it comes to specific features, for example: the type of device in which they are used (mobile); all of these need an online account to be used; these also contemplate gamification elements and introduce the user to concepts regarding financial literacy; apart from that, these are all meant to be used in everyday life situations.

Most of the apps were designed having as a first level target, the parents, who control some aspects of the child’s experience on the app. Bankaroo and this project also consider the parents but focus first on the child, giving the parents only a few items that can be controlled. This also translates in the segment of “Autonomy and self-taught strategy” where most of the apps resort to a system where parents customize all the app and the features their children will see, which means that the child will receive the app already modified by their parents, having no control. Bankaroo and this project also give the parents some control, but only to revise expenses and money matters that are really important that their kids do not have full control.

Most of the apps have monthly subscriptions, usually associated with their pre-paid cards. Bankaroo and this project are, once again, fully free, except for Bankaroo PLUS that has a cost associated.

When it comes to the interfaces, their attractiveness and the use of illustrations, some apps have complex interfaces with lots of information in each screen and do not respect the guidelines presented in 3.1.3.1. The information is very dense visually, in GoHenry and Osper, where there is no use of illustrations and the numbers and expenses are shown with very little white space between them, hindering its readability. Bankaroo's interface is a little dated and the graphics are a bit childish. Pockee and Rooster Money, in other hand, have fun interfaces, with bright colors, and the information is distributed between screens avoiding large amounts of text. The illustrations also provide a personality to the system that differentiates them from the others.

For the present project, the interface cannot yet be compared with the rest of the other apps, although the features evaluated will be taken into consideration when designing the interface.

Chapter 4

4. *Discover*: getting to know the users

This chapter is focused on the users, their characteristics, goals and concerns. As explored in section 3.1, this specific group of young people holds certain habits that distinguish them from other age-groups. They usually do not like to spend too much time on something very monotonous, that is why the interviews allowed them to elaborate their answers and talk more freely about their opinions.

First, the structure implemented in the interviews are presented, then a complete analysis of the answers gathered and finally a discussion of the results. This chapter finishes with the initial ideas for the app, based on the interviews previously made.

4.1. User interviews

Based on Piaget's work (McLeod, 2018), the initial hypothesis for the age range of the target audience for this app was 10 to 17 years old, which is the phase where children/teenagers become able to develop complex reasoning, recognizing what is real and defining their own ideas about the world. Therefore, six Portuguese candidates were selected, aged between 10-17 years old. First, their parents were approached and confirmed that their children could participate anonymously in the study by filling a consent form. The interviews were conducted through phone or face-to-face (depending on the interviewee's availability).

Apart from understanding their financial habits, it was also important to assure they owned a smartphone and had Internet access. The interview also addressed subjects related to economy and money, and their thoughts on how society deals with these fields. The questions undertaken allowed the interviewees to expose some ideas and features the application could include.

This method allowed the interviewees to have space to elaborate their answers and give other meaningful insights that would not be gathered using a quantitative research method.

4.1.1. Structure of the interview

The structure of the interview comprised 4 phases. The first was the interview's legitimization, where parents and children were informed about the purpose of the interview, reinforcing the confidentiality and anonymity of the declarations. In this phase, the importance of the interviewee's contribution to the research was highlighted and the parents were asked to give permission to record (audio) their children's interview (through a consent form).

The second phase of the interview involved the definition of the personal profile of the participants, identifying the participant's attending school year, hobbies and interests, internet access availability and mobile phone usage. In this phase, the following questions were asked:

- (1) Which school are you attending and which grade?
- (2) What are your favorite subjects at school? And why?
- (3) Do you have a smartphone with Internet access?
- (4) What do you use your smartphone for? What kind of apps do you have installed?

The third phase of the interview aimed at identifying the knowledge participants have about money and its usage. During this phase, the following questions were asked:

- (1) What is money, in your opinion? And economy? Have you addressed this theme in school?
In what circumstances?
- (2) Do you have a monthly or weekly allowance? Who gives you that allowance? How do you organize the money you are given?
- (3) In what kind of products do you spend more money?
- (4) Do you ask your parents' permission to buy something or you decide for yourself?
- (5) Do you carry around coins in your wallet or do you have a card where you keep that money?
- (6) Do you usually go shopping with your parents? Do you know how to stipulate a budget for recurring monthly shopping?
- (7) When you buy a product, do you analyze the need of that purchase and how happy it will make you in the future? What is the value of a product in your opinion? Is it the price number marked on the tag or the value depends on the utility it will have in the future? For example, spending 1€ in candies is the same as spending 1€ in a sandwich? Isn't the sandwich a healthier choice for example?

(8) Do you have a piggy bank where you save some money? How do you manage that money? When do you spend the money you saved?

(9) Do you think it is important to save money? Why?

The last phase of the interview involved the presentation of the project's idea, including a briefly description of the first thoughts about how the app would work. In this phase, it was collected the interviewee's concerns and understanding of how relevant a mobile application about financial management would be. After presenting the project's idea, the following questions were asked:

(1) Do you think financial education is an important topic for people with your age? Why?

(2) Regarding financial management and saving money, what are your biggest insecurities?

(3) If there was an app that could help and teach you more about economy and consumerism, what do you think that app should have?

(4) Would you be more interested if the app had gamification elements?

4.2. Results: analysis and discussion

Considering that the results of interviews are mostly qualitative data, an analytical strategy to analyze the data according to the material's nature is important. According to Christiane Schmidt (Flick, Kardoff, & Steinke, 2004) "the guiding principle in this analytical strategy is the interchange between material and theoretical prior knowledge". In other words, while analyzing the data collected from the qualitative research, it is important to constantly connect the answers retrieved with the theoretical material previously researched. In our case, the work of Piaget (McLeod, 2018), the education system in Portugal and other existing mobile applications are relevant to discuss and analyze the results.

In the first stage of the analysis, the interviews were recorded and transcribed, in Portuguese (Appendix 2), and then analyzed. During the analysis, each interview was treated individually, however, similarities and/or differences between them were highlighted. In addition, quotes from their answers were freely translated from Portuguese to English in order to be included in the analysis presented here.

The individual analysis of each interview is described in Section 4.2.1. and a discussion about the results is presented in Section 4.2.2.

4.2.1. Results analysis

(1) First interview

The first interviewee is a 10 years old boy that attends the 5th grade in a public school in Lisbon district. He has a smartphone with internet access and uses it mostly to play games and watch Youtube videos. He showed enthusiasm to participate in the study, however, the main purpose of the interview was not entirely understood at first.

When questioned about money and economy, the interviewee revealed a few difficulties explaining what these subjects mean:

“How do I explain this... Money, for me, is like an object that has a value. For example, a five euros’ bill is something that has a value, with which we can buy other objects.” [Answer to the question “What is money, in your opinion?”]

In his understanding, money is something that can only be palpable, and its value is directly related to the number marked on coins or bills. When explaining what economy means, the struggles continued, therefore, it was important to assure the interviewee that there were no right or wrong answers. However, he was not able to explain what economy is in his own words.

When it comes to his allowance, he gets a monthly allowance from his mother, but he does not spend it unless he asks for his parent’s permission. For being only 10 years old and by his parent’s choice, he does not carry any money in his wallet because he does not have the need to eat at the school’s canteen. He usually buys stuff that he needs with help of his parents.

The interviewee finds important to choose the cheapest thing in the supermarket when buying food or groceries, but also to pick what is on a special sale.

“Imagining that my mother is buying, for example, a piece of bread, and that bread is listed at half the price, I think that is the best bread to buy. But if she is going to buy another bread that is more expensive, I will tell her to buy the one at half the price.” [Answer to the question “Do you usually go shopping with your parents?”]

When it comes to the value of money, he finds that its value depends on the utility of the object he is buying (if it will make him happier in the future). When asked if he preferred to spend 1 euro on

candies or 1 euro on a sandwich, he instantly chose the sandwich because it was a healthier choice. Therefore, in his understanding, the value of money does not reside in the price listed on the tag, but on the utility that the product will provide him in the future.

He believes that saving money is important, so that later he can buy things he likes. He keeps a piggy-bank where he saves money that he gets from his family.

The interviewee believes that his generation should learn more about economy and financial education. He feels more difficulties in saving money and how to do it correctly and responsibly. When presenting the idea of our project, he suggested that the application should teach how to manage money and how to spend it consciously. However, he showed some concerns regarding the fact that the application would not give anything in return. One would insert the purchases made and would not get the money back.

(2) Second Interview

The second interviewee is a 11 years old girl and attends the 5th grade in a public school, in Lisbon. She has a smartphone with internet access. The applications she uses the most are Whatsapp, Youtube, Spotify, Tik Tok, and Instagram.

Although she answered and understood the questions about money and economy, she struggled to formulate a cohesive opinion:

“Money is something we use to buy things we need. Economy is a group of factors that help in the daily life, helps the money circulation and shows how the money is spent worldwide.” [Answer to the question “What is money, in your opinion? And economy?”]

Money is always perceived as “something”, an object that exists and allows people to buy other objects and things. The perception that money can exist in a virtual way, and that is not just a printed object, is not yet understood at this age.

She has no assigned monthly or weekly allowance. She chooses to ask her parents when she needs money. The money she carries is usually to be used in the school canteen or to buy school materials. Therefore, the money is always used to charge her school card and not to be used outside of school. This card is provided by the school and only allows purchases inside the school’s canteen, bar and

stationery shop. Children take the physical money and charge their card with the help of a school employee assigned to that task.

When it comes to deciding what to buy, the interviewee chooses by herself without asking her parent's permission, especially if it is related with materials that she needs for school.

In her understanding, the value of money resides on the utility the product will have and not on the price tag.

“If a product is more expensive, I buy it because I know it will have more utility in the future and will have a better quality.” [Answer to the question “What is the value of a product in your opinion? Is it the price number marked on the tag or the value depends on the utility it will have in the future?”]

She understands that a value of a product is not only on its utility and practicality in the future, but also in the quality-price relation.

In her opinion, saving up money is important so that it is possible to buy things we need or want. She uses two piggy-banks, where she keeps money she receives in her birthday or during Christmas, and the other to keep the money to charge her school card.

Teaching young people about economy and financial education is one of her concerns. She believes that knowing how to spend money responsibly is important because it is not infinite. When it comes to economy, she would like to know more about how the money reaches each country, where it goes when we pay something and how does it circulate again.

She presented some ideas for the mobile application, including the possibility of having questions that the user could answer to learn more about money and economy. She also mentioned the inclusion of mini-games inside of the application. These mini-games would be unlocked as soon as the user won a certain number of points. She pointed out a few games that she liked and could be used:

“There could be mini-games between the pages. You could adapt already existing games like Crossy Road, where the goal could be to reach the bank; or Subway Surfers, where the characters

would gather coins and money.” [Answer to the question “If there was an app that could help and teach you more about economy and consumerism, what do you think that app should have?”]

(3) Third Interview

The third interviewee is a boy that attends the 9th grade in a public school in the Lisbon district. He is 14 years old, owns a smartphone with internet access and uses it mostly to play games, to watch videos and follow his favorite athletes and youtubers. He showed instant availability and interest in participating in the study as well as his parents.

In his opinion, money is basically a payment method that should be handled carefully, and not spent irresponsibly. When it comes to economy, he stated that:

“Economy studies everything related to money and its management. We learnt a little about it in school, in the subjects of Citizenship Education and Geography, where we compared the economic situation in different countries in the world.” [Answer to the question “What is money, in your opinion? And economy? Have you addressed this theme in school?”]

In the 9th grade, the subject of Geography begins to introduce economy as a field of study. The students learn about how various countries in the world have different levels of incomes related with social, economic and industrial activities.

He does not have a monthly or weekly allowance. He usually receives money from his mother or grandmother and saves up for when he needs it. The money is spent at school, in food or other materials, therefore, the school card is where he keeps the money.

When buying groceries or other products, he knows that choosing the best quality-price relation is an important choice to save money:

“The price is not the only thing that makes a product more valuable. In my opinion, the sandwich is more useful than candies, because it is healthier. I also like to eat candies, but I do not do it very often.” [Answer to the question “What is the value of a product in your opinion? Is it the price number marked on the tag or the value depends on the utility it will have in the future?”]

When managing his savings, he keeps a piggy-bank where he has the money to use in school materials or meals:

“Usually, I take a bill from my piggy-bank to charge my school card and keep the coins in my wallet to buy stuff that is not available inside the school, like candies or to have lunch with my friends.” [Answer to the question “Do you have a piggy bank where you keep some money? How do you manage it?”]

He believes that saving money is important so that, later, we can have spare in case of an urgency or if we want to buy something more expensive.

When addressed with the question *“Regarding financial management and saving money, what are your biggest insecurities?”*, the interviewee referred that knowing how to save money and managing it responsibly are his main concerns. He also would like to know more about how taxes work.

In his opinion, our mobile application should teach about the definition of economy. He also suggested to have a little game where there was a person in a supermarket and the user had to choose which are the best products to buy.

The interviewee also thinks that the gamification elements would be a good asset to the application, because it would give a sense of growth and a positive learning curve.

(4) Fourth Interview

The interviewee is 15 years old boy and attends the 9th grade in a public school in Lisbon, Portugal. He owns a smartphone with internet access and is always attentive to his social media. Instagram, Whatsapp and Youtube are his favorite applications.

According to the interviewee’s opinion, money is mostly used to buy “stuff”:

“It is what makes the world develop, move and is essential to live well. Economy studies about saving and managing money and how the world is dependent on money.” [Answer to the question “What is money, in your opinion? And economy?”]

He does not have an allowance from his family and spends most of his money on food and stationery, at school. When he wants to buy something specific or more expensive, he asks for his parent's permission.

He usually carries coins and bills in his wallet and always tries to buy products that are on sale or cheaper.

"I only buy something if I really need it. I always think if it will make me happier and if it will be useful in the future." [Answer to the question "When you buy a product, do you analyze the need of that purchase and how happy it will make in the future?"]

When it comes to the value of a product, he believes that a sandwich is much more important than candies.

"A sandwich and candies have different values, even if they cost the same. Candies do not give you vitamins, while a sandwich is a much more rich snack." [Answer to the question "What is the value of a product in your opinion? Is it the price number marked on the tag or the value depends on the utility it will have in the future?"]

Saving money is important to him because it is an assurance if, for some reason, he needs it in the future.

"It is important to save money because if anything goes wrong, or if something unexpected happens, we have spare money to spend." [Answer to the question "Do you think it is important to save money?"]

"My generation should know more about economy and financial education so that in the future we are more aware of the dangers of not knowing how to save and manage our money and expenses." [Answer to the question "Do you think financial education is an important topic for people with your age? Why?"]

In his experience, saving money is where he feels most difficulties and wants to learn new ways to do it. If there was a mobile application that would help him understand these topics, he would like it to have a more serious feel, and not to be just a game. Medals, awards and points would be a good way to motivate him to use it.

(5) Fifth Interview

The interviewee is a 15 year old boy that attends the 9th grade in a public school in Lisbon, Portugal. He owns a smartphone with internet access for playing games and watching videos on Youtube.

In his understanding, when it comes to money and its definition, he said:

“Money is what makes us live, it rules everything. Economy consists of ways to manage money and it is used. This is a subject not so talked about in school.” [Answer to the question “What is money, in your opinion? And economy? Have you addressed this theme in school?”]

He does not have an allowance and spends most of his money at school, buying food or supplies. He always asks for his parents’ permission to buy something and usually carries money in his wallet but also owns a credit card. He keeps a piggy bank where he stores spare money he gets. When that piggy bank is full, the money is deposited in his bank account.

“Yes, because saving money is important so we can think about the future and to not spend everything at once.” [Answer to the question “Do you think financial education is an important topic for people with your age? Why?”]

When it comes to financial education, he would like to learn more about new ways to save money and to spend it responsibly. While, regarding the app proposed he would like it to be a serious app to learn other ways to manage our money. He would like to see gamification elements implemented in this app too.

(6) Sixth Interview

The interviewee is a 17 years old girl. She just finished the 11th grade in a public school in Lisbon, and is starting to attend the 12th grade next year. She owns a smartphone with internet access and uses it to consult social media. Twitter and Instagram are her favorite applications to use.

In her opinion, without money we cannot live. It is what rules our society and our choices:

“Money controls our choices and without it, we do not have a good quality of life. Economy is everything related to money and how it surrounds us. We talk about economy at school, but it is

not very explored.” [Answer to the question “What is money, in your opinion? And economy? Have you addressed this theme in school?”]

She does not have an allowance from her parents and spends the money she is given in food and sometimes clothes. When she wants to buy something, she asks for her parent’s permission and is always concern with buying products that are on sale or are cheaper. She only buys something more expensive if she wants it to last longer or if its quality matters. She also usually carries coins and bills in her wallet.

When it comes to the value of a product, regarding its utility versus price, she believes that candies are not something really useful or helpful for our health, while a sandwich is healthier.

When managing her piggy bank, she follows this method:

“When someone gives me extra money, I save it in my piggy bank, but I do not put money there very often. I only spend the money I saved when I need something specific, and if it is too expensive, I divide the payment with my parents.” [Answer to the question “Do you have a piggy bank where you save some money? How do you manage that money? When do you spend the money you saved?”]

In her opinion, many people with her age do not believe in the importance of money nowadays, and it needs to be clarified for them:

“We all have a common knowledge regarding finances and economy, but many of my friends do not understand how important it is to manage our money carefully. It is something we usually leave for the adults to care.” [Answer to the question “Regarding financial management and saving money, what are your biggest insecurities?”]

When it comes to the mobile application, she would like it to be a serious application that would teach more about these topics. However, she would prefer if it to be fun to use and not difficult and boring. She also thinks that medals, awards and other gamification elements would make it more fun and challenging.

4.2.2. Discussion

The interviews were very useful to better understand the point of view of young people regarding financial education and consumerism.

When it comes to having smartphones and Internet access, all of them own and have these devices or services. They usually use them to play games and various social media platforms, like Youtube, Instagram or Whatsapp. Educational applications are not explored when they use their smartphones.

Regarding money and economy as concepts, they struggled when having to explain them. Money is always referred to as an “object with value”. It is always related to something physical used to pay for products or services. Therefore, it is not perceived as a “medium of exchange, a measure of value or a means of payment” (Merriam-Webster, n.d.-c).

Economy is also a difficult concept for them to explain. “Economy”, as stated by the Merriam-Webster Dictionary (Merriam-Webster, n.d.-b) is the “structure or conditions of economic life in a country, area, or period”. While “Economic” is described as everything related with “production, distribution, and consumption of goods and services” (Merriam-Webster, n.d.-a). Kids with 10 and 11 years old were not able to explain “economy” with a definition close to this one. Only at 14 years old, when they talk about it at Geography classes, it becomes easier to explain.

Most of them do not negotiate an allowance with their parents. Until 15 years old, their parents manage their finances and only give them money when they need it for school materials or canteen meals, which is where most of their expenses are made. When reaching 15 years old, other expenses begin to appear.

One thing that is transverse to all of them is the mindset to the importance of buying products on sale or reflecting on their buying choices in order to save money. They believe that saving money is important for when they later need or want to buy something special for themselves. Therefore, they want to know more about saving money and strategies to have spare money.

4.3. Initial idea – Requirements and Constraints

The initial idea regarding this app was centered around its main features. In order to educate and stimulate young people’s minds regarding economy and consumerism, it was considered the main feature of the application to be an option to “insert purchases”, in which users can insert their purchases in order to keep track of their expenses. Their expenses would be translated into “points”, based on the principle of utility (exposed in section 3.3).

Considering the app proposed to develop in this project, the elements that will be featured are: points, levels, leaderboard, and badges. To form the foundation of the experience to be created, the type of point system to be implemented is based on “experience points”.

This idea was presented to users (see chapter 4) and, based on their opinions, it was concluded that it can be improved. For example, one of their biggest concerns regarding financial management was how to save money responsibly. Therefore, apart from inserting purchases, the application can also promote responsibility and reflection regarding the money spent by questioning the user on how the product/service acquired will benefit their life in the future. The beneficial aspect of the product can be automatically defined by the application, which can use a “basket of goods”³ that contemplates all the products most teenagers spend money on, establishing how often each product should be bought and how helpful or useful it can be in the future. This feature follows the answers that were given to the questions: *“When you buy a product, do you analyze the need of that purchase and how happy it will make you in the future? What is the value of a product in your opinion? Is it the price number marked on the tag or the value depends on the utility it will have in the future? For example, spending 1€ in candies is the same as spending 1€ in a sandwich? Isn’t the sandwich a healthier choice for example?”*. All of the interviewees addressed with these questions found the “sandwich” to be a more useful and healthier choice, but also emphasized the value of a product to be on its utility and social impact on the world, and not on its price.

One of the main features in this app are the gamification elements to be implemented. From points, to badges and a leaderboard, the users will see their learning process evolving as they use the app.

³ A fixed set of consumer products and services, which are adjusted periodically to account for changes in consumer habits.

One of the biggest initial constraints was related to the target audience and their possible lack of interest and availability to cooperate in the studies to be developed. However, the first series of six interviews turned out to be quite instructive. The interviewees, aged between 10 and 17 years old, showed a keen interest and assertive and informed opinions, which will greatly help in the development of this application.

The usability tests to be implemented are the next step. Some obstacles are revealed again, namely, regarding to the availability of users with the stipulated age group. One of the objectives would be to make a presentation at a school, where the main characteristics of this application would be presented, in order to gather insights. It would be suggested that students use the application for a stipulated period of time and then answer some questions related to the application experience. However, a presentation at a school can be difficult to schedule due to tight schedules and low availability in these institutions.

Some of the constraints already felt are related to the complexity of the areas of knowledge that intersect in this project. To define the application rules, it will be necessary to call specialists within each product or service category. Time limitation is the main constraint felt. This type of studies and contacts are the most challenging to solve. The application will have several product categories (those that young people consume the most), one of which is Food. To better define the application rules, one of the next steps will be to talk to a nutritionist who can provide some support and scientific bases that support the formulation of these rules.

Another constraint that arises from the time factor, is the intention to develop all the graphic elements of the application. Icons, badges and other illustrations that define its identity, are elements that will be created from scratch in order to make the application even more unique.

The evaluation of the effectiveness of this tool will be yet another challenge. This project is aimed at young people, not so much at their parents as most apps of this kind are (see more at section 3.6.). The goal here is to promote an autonomous learning process, taking the parents out of the equation. This is a complicated premise to resolve, because parents are usually the main resource of information young people resort to (as shown in Figure 5). Schools also call upon a method that does not give space to critical thinking, having a system based on tests and assessments that consist of knowing facts and memorizing subjects (this is slowly changing as shown in section 3.1.2.2.).

As ambitious as it can be, this app aims to use a learning process based on gamification and rewards, developing a sense of critical conscience, by promoting the user's autonomous work.

David Ausubel called this “Meaningful learning”. Ausubel was an American psychologist who first introduced this theory of learning. Meaningful learning is often contrasted with rote learning. Instead of internalizing content to later be available for reproduction, just using memorization (called “rote learning”), meaningful learning manifests when a learner has “a disposition to relate the new learning task nonarbitrarily and substantively to what he already knows, and that the learning task is potentially meaningful to him, namely, relatable to his structure of knowledge on a nonarbitrary and nonverbatim basis.” (Ausubel, 1977). This is the learning method, that the app proposed by this project, aims to promote.

The app aims to instill in teenagers a method of responsible and conscious consumerism. With this in mind, by introducing the item they want to purchase on the app and check how much utility it would give them, they will know if what they wish to purchase really is valuable for them. Using points, this notion of utility is quantified and more objective to understand.

Chapter 5

5. *Explore & Test*: designing the experience and interface of the app and testing with users

This is the chapter where the creative, structural and interactive dimensions of the app are exposed. Here, it is possible to have a complete overview on the whole process taken to create this app.

First, the *personas* are built and the task flow of the app is designed. These will determine the experience of the final product. Then, the gamification elements that will be featured are described and all the details regarding the points' system, the badges, and challenges are traced.

Finally, the three types of prototypes, from the low fidelity, to medium and high fidelity are explained, alongside with the two usability tests performed (using the SUS scale) and the improvements made and retrieved from the users' feedback.

5.1. Personas

The field of user experience centers on the idea that we must design products around people, rather than teaching people how to use products: user-centered design (UCD), not technology-centered design. In order to do so, we must understand people—their behaviors, attitudes, needs, and goals. (Harley , 2015)

When designing software applications, mobile apps or websites, it is important to take into consideration that these tools will be used by a user that holds certain needs and has expectations that wants to achieve.

Personas work because designers and developers have the same tendency as all other people to be captivated more by concrete instances than by abstractions and generalizations. (Harley, 2015)

This method allows the developers and designers to have a sense of empathy when creating digital tools. By only considering statistical terms and broad profiles, a gap begins to open between the development team and the user itself. Therefore, a persona is basically a way of reducing a broad target audience into two or three actual people, that work as an archetype of the audience.

In order to be accurate and representative, the information must be based on user research, with real potential users, such as interviews, field studies or surveys. With this data range, it is possible to create a set of typical users that will resume all the information gathered, into just the most

significant details and features of the group. Even if they are imaginary people, their characteristics must be grounded on real people's information.

By providing insights into “real” behaviors of “real” users, personas can help resolve conflicts that arise when making design and development decisions (...) (Unger & Chandler, 2012, p. 130)

Unger and Chandler (2012) suggest that the minimum number of personas to be created is three and the maximum is seven, more than this is very uncommon. Besides that, to pick the number of personas, it should be considered the number of target segments that the product will be addressing and what are the key differences between them.

By crossing the content requirements suggested by Unger and Chandler (2012), and by Harley (2015), the key pieces of information that must be included to the designing of the app proposed by this project are:

- Photo
- Name
- Age
- Gender
- Location
- Occupation
- Education Level
- Biography
- Online activities
- Offline activities
- Goals and concerns
- Experience level in the area of product or service (in this case a mobile app)
- Social comfort level

The photo, name, age, gender, location, occupation, and education level will help to profile and humanize a model of the app's typical user. While the “Biography”, should be as authentic as it can be, in a way to bring the persona to life. In order to gather all this information, the surveys and interviews performed previously, are the most valuable resource. This research data will appear in the form of a biography so that it will not be just quoted analytical information, in order to become a more humanized way to show the persona's life story (Unger & Chandler, 2012).

“Online and Offline Activities” consist of all the activities performed using digital systems or concerning hobbies and occupations. The “Online activities” are based on how people spend their time online, which include paying bills, watching movies or series or engaging in social network activities. The “Offline activities” are related to hobbies or free-time occupations, basically is what the users do when they are not online (Unger & Chandler, 2012).

Regarding the app this project aims to develop, it is important to know: when using the app what are the users looking for? What are their main goals and concerns? These can be related to the speed, accuracy or content of the app, that is why they are mostly concerned with the positive and negative expectations of the user, what they are looking for within the system, and what may affect its usage (Harley, 2015). The experience level of the user, regarding digital interfaces or other types of virtual systems, is really important when designing an app because this will determine how difficult the level of usage and understanding of the rules and tasks are (Harley, 2015). At last, the “social comfort level” regards the users’ knowledge of social networks’ systems and how actively they use these tools, in order to access how the users engage in this particular environments (Unger & Chandler, 2012).

5.1.1. Persona building

For this project, building personas constituted a very important step that made possible to envision what kind of features the users of this app will have. The three personas created hold common features with the participants that were interviewed in chapter 4.

The features chosen and previously listed are the most significant ones, because they show the main interests of the target audience. Three personas were created, which represent three imaginary teenagers.

Their interests and characteristics were based on the information presented in chapter 4. These characteristics were randomized and distributed between the three personas in order to have the most complete archetypes of the target audience. Figures 12, 13 and 14 show the personas created for this project.



Figure 12. Persona 1 / Photography (Wall, n.d.)



Figure 13. Persona 2 / Photography (Kresna, n.d.)



Figure 14. Persona 3 / Photography (Michaelsen, n.d.)

5.2. Site map and task flow

Site maps help to identify the structure of websites and applications. They can show hierarchies and connections that allow your audience to gain an understanding of where users may locate content. Task flows take site maps a step further by identifying the various courses of action that a user may traverse within a section of the site. Task flows also draw the connections to error states, content, or page views based on decision points throughout the process. When used together, site maps and task flows can provide your audience with a clear picture of content structures and how users may navigate through them. (Unger & Chandler, 2012, p. 219)

In order to organize the different pages of an app or a website, the “site map” is a visual way to display all the pages embedded in the system and how they are connected. A “task flow” shows, through the same diagram style, the various paths and choices the user has to take to accomplish a task or achieve a certain goal. (Unger & Chandler, 2012)

While the site map only shows the content’s organization of the digital application, the task flow provides an overview on the processes that the user will have to take as they progress through the different steps, being it decision points or constraints found along the process.

Garrett (2002) defines a standard set of basic shapes and elements to ensure that the task flow will be easily interpreted by the audience. The first basic shape is a plain rectangle (Figure 15), that represents a single page. According to Garrett, a page is “the basic unit of user experience on the Web” and is just a unit of presentation and not implementation, because each one of these rectangles may correspond to multiple files of code.

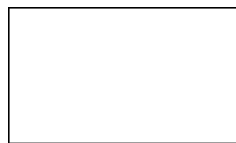


Figure 15. *Page element* (Garrett, 2002)

A pagestack (Figure 16) represents a set of identical pages whose “navigational properties are immaterial to the macrostructure of the site” (Garrett, 2002). It represents multiple pages that have similar content (e.g. basic blog page). These pages are designed using a template, which means they are very similar. The design template never changes but the user can go through different pages that show different content.

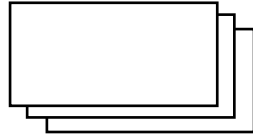


Figure 16. *Pagestack element* (Garrett, 2002)

Connectors and arrows (Figure 17) are represented as simple lines, with or without arrows at the end of them. These lines depict the relationships and connections between pages, and basically, the overall navigation system of the app or website.

Garrett (2002) suggests that when developing the information architecture, the hierarchical organization is usually represented as a tree shape. This means that each set of pages is aligned according to its organizational structure, defining which appears first or last.

The connectors also show the directionality by introducing arrows at the end of each string. The arrows will indicate the downstream or upstream flow as the users reach a certain page. However, these arrows only indicate the next possible direction the user is more likely to take, there is no prohibition in moving into another direction.

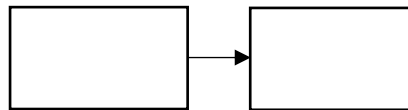


Figure 17. *Arrow indicates downstream movement toward task completion* (Garrett, 2002)

In some cases, the designer or developer may want to block a certain direction path. In this case, it should be added a short crossbar (Figure 18) to indicate that there is no way back as soon as the user moves to the next page.

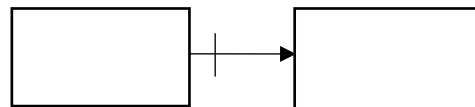


Figure 18. *Crossbar indicates upstream movement is not allowed* (Garrett, 2002)

A decision point is represented by a diamond shape (Figure 19), and it is used “to show the path that a user can take depending on the answer to a question” (Unger & Chandler, 2012). The answer to that question determines which page will be displayed next.

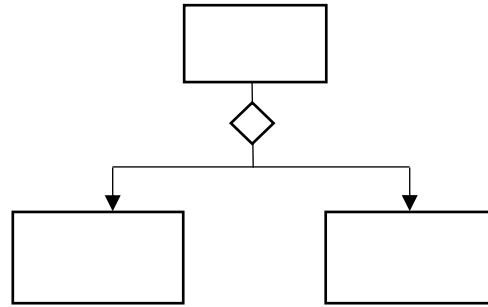


Figure 19. *Decision point element* (Garrett, 2002)

Conditions are represented as dashed lines (Figure 20). These lines are used as connectors or surrounding a page box and indicate that the path represented is conditional based on other action or interaction.

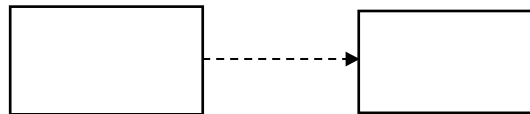


Figure 20. *Condition element* (Garrett, 2002)

For the specific app that is being created, the task flow (Figure 21) is the most proficient representation to better understand how the app will be organized in terms of number of pages, how they are interconnected and which decisions the user has to take. The text that appears in blue corresponds to the actions required to make in order to pass to the next screen, while the information in red corresponds to decision making points. All of the remaining shapes used are the ones described earlier, based on Garrett’s Visual Vocabulary.

The Task Flow (Figure 19) shows the different paths that are possible to take within the app. The main navigation is made through a menu that appears in all of the screens in the same place, which makes it possible for the user to travel to a specific page without having to make a longer path.

In the “Add purchase” screen, the user can cancel the purchase any time along the way, even if there are steps already completed, like “select category” for example. The rest of the navigation is based on changing one screen to another, using the “main menu”. This menu is the only way to navigate along the app, and the “add purchase” screen is the only one where the menu does not appear, that is why when the user cancels the purchase, they return to the “home – dashboard”.

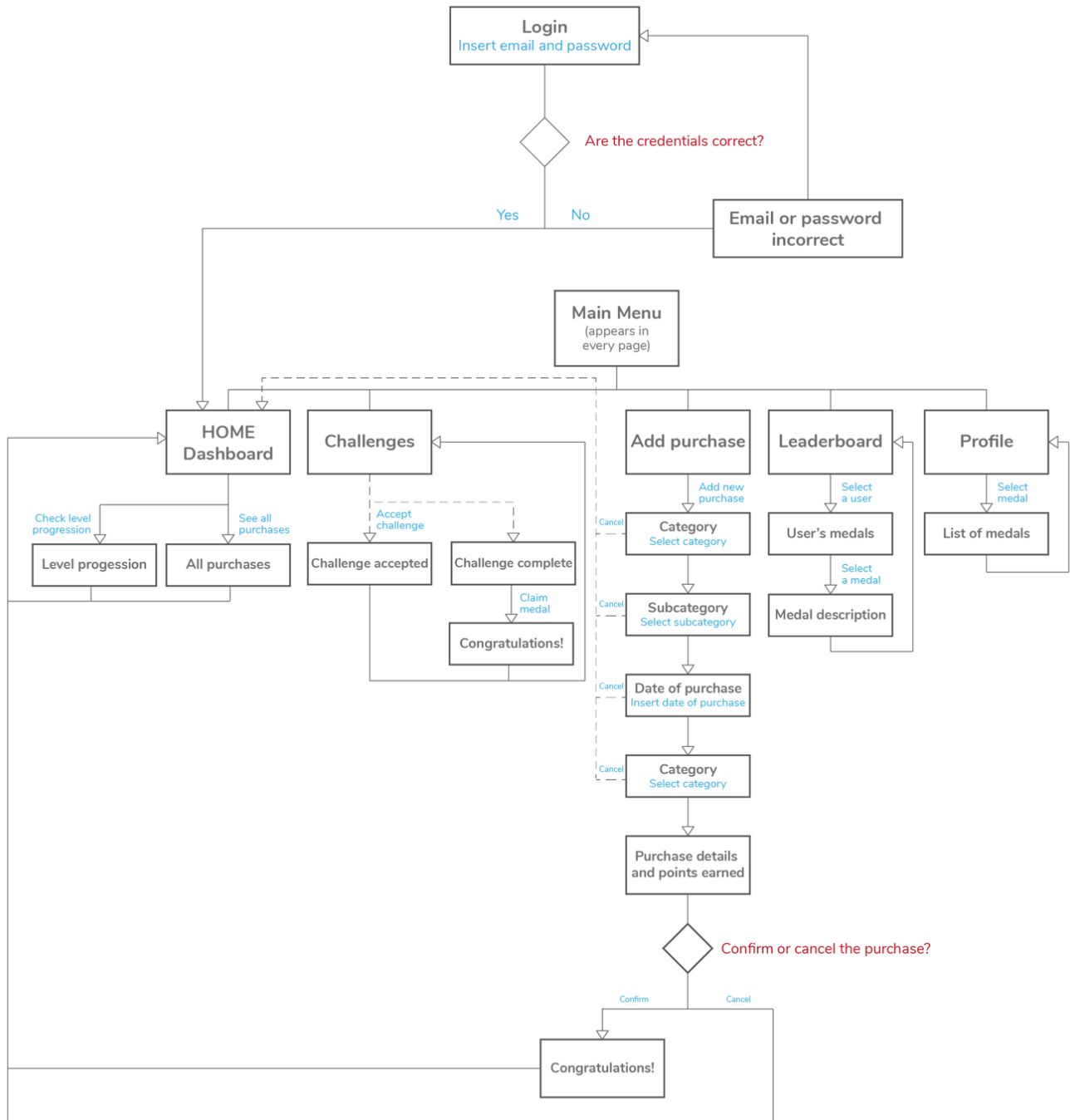


Figure 21. Task flow designed for the app.

5.3. Gamification Elements

In the case of this application, a points’ system is the main gamification element to be implemented, because it will be crucial to evaluate and reward the users’ evolution on their best utility practices. When it comes to the interactive and cooperative elements, leaderboards are also important to the users’ evolution. Apart from that, it can increase the competition between peers, which stimulates the learning process. Badges and challenges are also implemented.

5.3.1. The Points’ System

When it comes to the mechanics of the points’ system, the calculation of the points will be based on the “marginal utility” concept, applied to economics, as explored in chapter 3.3. The goal is to assign a number of points to the utility value of a certain product. Here, an abstract concept, like “utility” is translated to a quantified value. Therefore, the points will work as “experience points” (3.2.2.) but are named “utility points”.

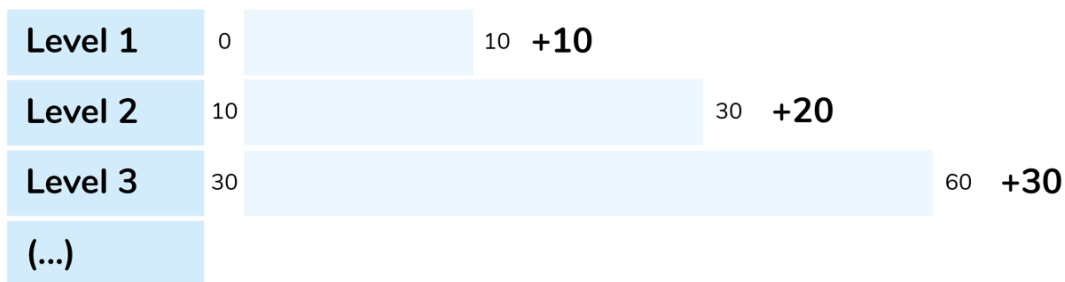


Figure 22. Level progression

By gaining points, the user can level up, after reaching a certain number of points. The number of points will increase by ten, in each level. As illustrated in Figure 22.

The distribution of the points will be divided in four main categories, based on the interviewees’ needs (Chapter 4), when asked in which products or services they usually spend more money at. In order to simplify the process of calculating and assigning a value of points to a purchase made, these categories will be divided in subcategories. That being said, the app will never know the specific product that will be bought, but will calculate its “utility value” according to the category and subcategory it belongs to. Thus, avoiding the need for an extensive “basket of goods”, which can always run the risk of not contemplating all the products or services available in the real world.

The four main categories and the correspondent subcategories are illustrated in Table 4.

Table 4. “Basket of Goods”, based on four categories and the correspondent subcategories.

Categories	FOOD	SCHOOL	LEISURE	BEAUTY
Subcategories	Fruits, Vegetables and Legumes	Book	Book	Clothes
	Meat, Fish and Eggs	Supplies	Sports equipment	Cosmetic product
	Soups		Painting Supplies	
	Dairy Products		Videogames	
	Cereals, Derivatives and Tubers			
	Sweets, Cakes and Cookies			
	Snacks, Savory and Pizzas			
	Water			
	Soft Drinks and Nectars			

When it comes to the Food category, in order to contemplate all types of food, the subcategories were based on the “National Food and Physical Activity Survey: Results Report” (2017) (free translation from “Inquérito Alimentar Nacional e de Atividade Física: Relatório de Resultados”):

- *Fruits, Vegetables and Legumes*
- *Meat, Fish and Eggs*
- *Soups**
- *Dairy Products*
- *Cereals, Derivatives and Tubers*
- *Sweets, Cakes and Cookies**
- *Snacks, Savory and Pizzas**
- *Water*
- *Soft Drinks and Nectars*

**include recipes, in addition to isolated food items*
(Lopes et al., 2017, p. 31-41)

When it comes to quantities, each time the user inserts a purchase, it always counts as one item. It will not be displayed a field to insert the quantity of items bought, in order to avoid consumerism habits. Each time an item is inserted, it counts as one. Apart from that, the user can select more than one subcategory of “Food” if he/she will consume a complete meal. For example, one can select the “Fruits, Vegetables and Legumes”, “Meat, Fish and Eggs” and “Soups” at the same time.

According to the World Health Organization (2014), children’s nutrition should take into consideration these factors:

- increase the consumption of fruit and vegetables, as well as legumes, whole grains and nuts;
- limit the energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats;
- limit the intake of sugars.

Therefore, the “Sweets, Cakes and Cookies” and the “Snacks, Savory and Pizzas” categories will be at the bottom of the table, when it comes to the points earned.

Taking into consideration the Principle of Utility explained in chapter 3.3, this system of points will be based on the Law of Diminishing Marginal Utility, but not entirely. In the sense that, if the number of points diminishes in subcategories like “Fruits, Vegetables and Legumes”, the users would not feel motivated to consume these products that are good for their health. So, in subcategories that correspond to the recommendations of the World Health Organization or to School supplies that are really needed to study or even Beauty products that are required to have, the points attributed will not decrease. In other hand, in categories of products that are not so healthy, the points will decrease or stagnate.

These points correspond to the consumption of these products in a time range of five days. The app registers the day the product was bought; therefore, it also registers how many times the user has bought that specific product in the last five days.

Tables 5 to 8 show the distribution of points along all the categories and subcategories. The points are arbitrary in the sense of their quantities because, as explained in chapter 3.3.1, there is not a restricted way to calculate utility since it is a subjective concept. The maximum of points a user can earn with a purchase is five and the lowest is three, depending on the type of product. When purchasing unnecessary or unhealthy products, the user can lose up to three points.

Table 5. Distribution of points in the Food category

FOOD	points earned	First purchase in 5 days	Second purchase in 5 days	Third purchase (and more) in 5 days	Points increased or decreased for each purchase
Fruits, Vegetables and Legumes		10	15	20	+5
Meat, Fish and Eggs		10	15	20	+5
Soups		10	15	20	+5
Dairy Products		10	15	20	+5
Cereals, Derivatives and Tubers		10	15	20	+5
Sweets, Cakes and Cookies		5	2	-1	-3
Snacks, Savory and Pizzas		5	2	-1	-3
Water		10	15	20	+5
Soft Drinks and Nectars		5	2	-1	-3

Table 6. Distribution of points in the School category

SCHOOL	points earned	First purchase in 5 days	Second purchase in 5 days	Third purchase (and more) in 5 days	Points increased or decreased for each purchase
Books		10	13	16	+3
Supplies		10	13	16	+3

Table 7. Distribution of points in the Beauty category

BEAUTY	points earned	First purchase in 5 days	Second purchase in 5 days	Third purchase (and more) in 5 days	Points increased or decreased for each purchase
Clothes		8	11 / 5*	14 / 2*	+3 / -3
Cosmetic products		8	11 / 5*	14 / 2*	+3 / -3

* In the case of Beauty products, on the second purchase in 5 days, the app shows a pop-up where the user selects whether he/she really needs this product: "Are you buying this because you really need it or just because you like the product but do not really need it?". If the user chooses the first option the points increase, if they choose the second option the points decrease.

Table 8. Distribution of points in the Leisure category

LEISURE	points earned	First purchase in 5 days	Second purchase in 5 days	Third purchase (and more) in 5 days	Points increased or decreased for each purchase
Books		8	11 / 5*	14 / 2*	+3 / -3
Sports Equipment		8	11 / 5*	14 / 2*	+3 / -3
Painting supplies		8	11 / 5*	14 / 2*	+3 / -3
Videogames		8	11 / 5*	14 / 2*	+3 / -3

* In the case of Leisure products, on the second purchase in 5 days, the app shows a pop-up where the user selects whether he/she really needs this product: "Are you buying this because you really need it or just because you like the product but do not really need it?". If the user chooses the first option the points increase, if they choose the second option the points decrease.

5.3.2. Challenges, Badges and Leaderboard

Apart from a points' system, other gamification elements are included: challenges, badges and a leaderboard. All these elements contribute to improve engagement and to generate a more appealing experience.

In this app, there is a special section destined to showcase a series of challenges. Thus, the user has a set of guidelines and goals to accomplish, so they do not feel disoriented when using the app. This choice to include a challenges' section comes from what is described in chapter 3.1.3, where teenagers are described as goal-oriented users.

This gamification element allows the users to have a direction for what to do within a digital system, it focuses their attention on important tasks to accomplish. Some users have no idea of the goals that are supposed to be completed. "So, even if a challenge isn't at the front and center of the experience, using challenges as an option somewhere in the body of the system can add depth and meaning (...)" (Zichermann & Cunningham, 2011, p. 64).

In this specific app, by completing the proposed challenges the user gains badges. Each challenge offers one badge, and the badges do not give any points (Table 9). The badges give a sense of recognition and accomplishment to the user, recognizing that they were able to complete a certain task successfully. These badges are then displayed in one's profile, so that other friends can see their progress.

Badges are prerequisites for a foundation to a collection-based ecosystem. Apart from the collectable aspect, being recognized is a desire reflected in every human being, and badges are the most versatile and flexible elements that can be fine-tuned in limitless ways (Zichermann & Cunningham, 2011).

This desire for recognition is also reflected on the leaderboard. Users can add friends by inserting their email and username, then they appear ranked. In this way, a healthy competition is fostered between peers and the user will want to improve even more in order to pass ahead their friends and show off his/her progress.

This leaderboard is tailored for each user, which means that each one has a personal leaderboard that only shows the friends they add manually. This prevents users from having to share personal information, like the email or username with other users they do not know.

Table 9. Challenges and respective badges

Challenges	Badges
Complete the tutorial	Completed tutorial
Make your first purchase	First purchase
Purchase your first Food item	First Food item purchased
Purchase your first School item	First School item purchased
Purchase your first Leisure item	First Leisure item purchased
Purchase your first Beauty item	First Beauty item purchased
Add 1 friend	First friend added
Win five upsies in one purchase	Five upsies in one purchase

Note: These are the first challenges that appear on the app, alongside the correspondent badges that one gets after completing a challenge. The challenges are infinite and change according to the user's performance and evolution.

5.3. Low Fidelity Prototype

Starting with the brainstorming process, a few sketches were made with initial ideas for the screens of the app (Figure 23). These sketches were mainly inspired by the apps' interfaces displayed in 3.6, where their dashboards' display were used as the main reference.

In order to simplify the analysis of these rough sketches, the best solutions were selected and then designed into cleaner wireframes on Adobe Illustrator. Figure 24 illustrates the improved main dashboard⁴, where users can consult their latest purchases, classified by category and subcategory. This dashboard is also the first screen the user sees when entering the app.

In the dashboard screen, there is also a profile icon and a section that shows the amount of points owned by the user. In the bottom section, the menu allows users to navigate through all the different pages (leaderboard, profile, etc.).

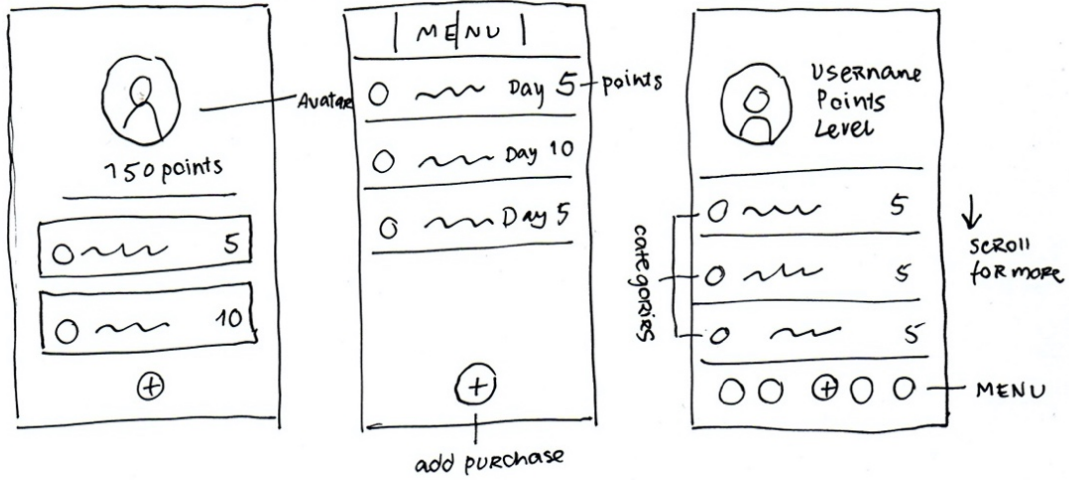
Figure 25 shows the wireframe designed for the "add purchase" screen, where the user can insert the items that he/she is going to buy and check if its utility/value makes him/her earn points. In this case, the option to "add purchase" is compressed into one single screen. First the user selects the product category, then the subcategory, and at last the date of purchase.

Figure 26 shows the wireframe for the leaderboard, which comprises a list of ranked friends, their respective points and the user's own points and place in the ranking.

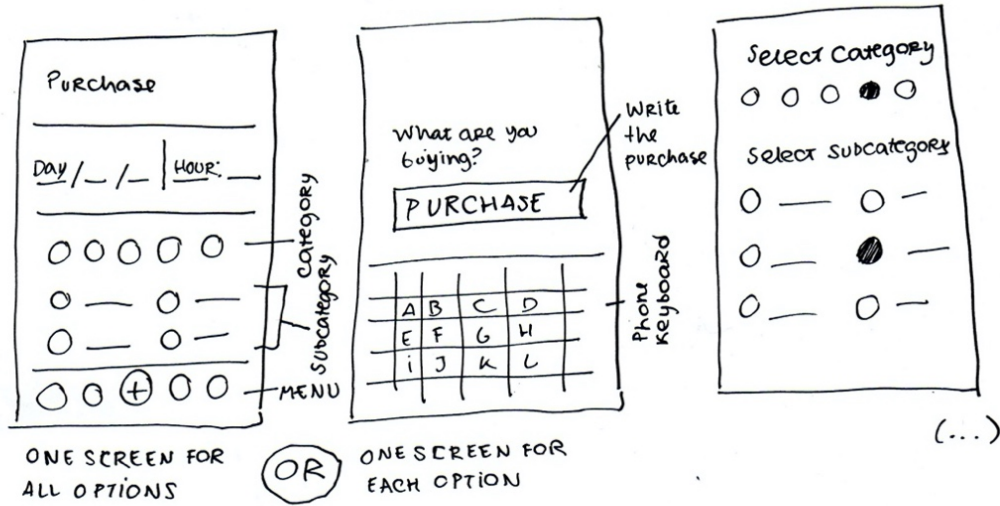
Finally, Figure 27 shows the user's profile and respective badges earned. The layout is similar to the one with the dashboard (Figure 23). The dark circles represent the owned badges and the light circles are badges yet to achieve.

⁴ "Dashboards are collections of data visualizations, presented in a single-page view that imparts at-a-glance information on which users can act quickly." (Laubheimer, 2017)

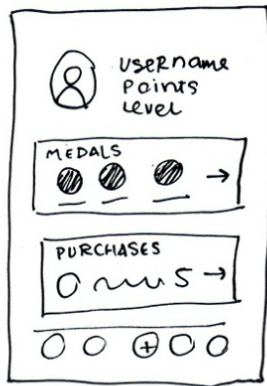
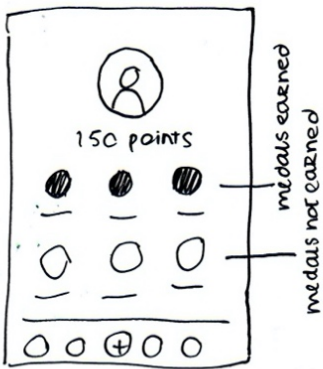
ADD/PURCHASE DASHBOARD OPTIONS



ADD PURCHASE



PROFILE



LEADERBOARD

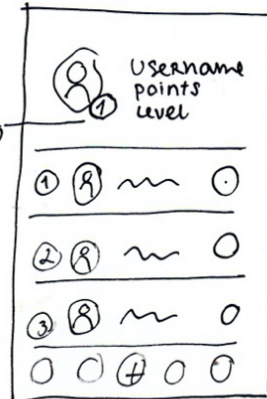


Figure 23. Low fidelity prototype – paper sketches

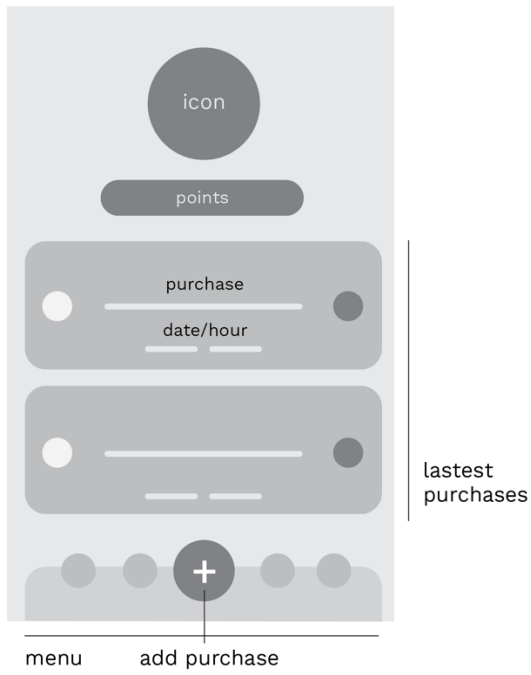


Figure 24. Dashboard: list of latest purchases and menu

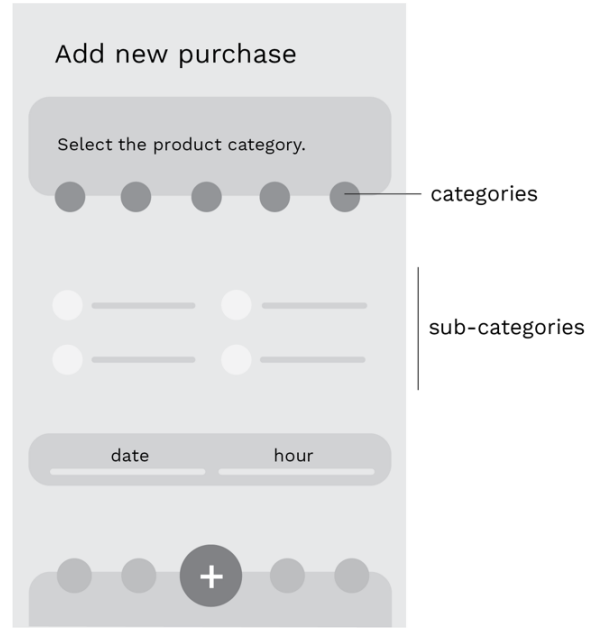


Figure 25. "Add purchase" screen

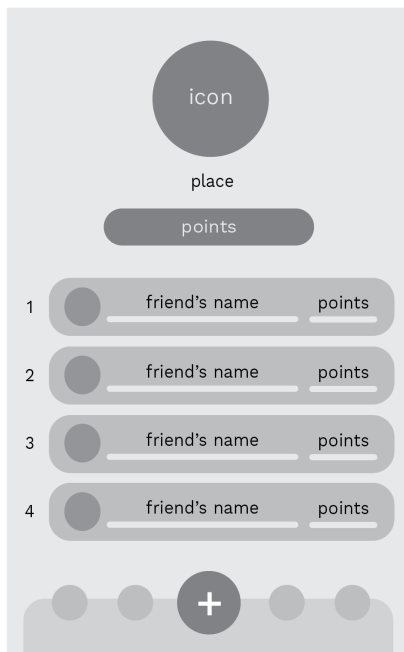


Figure 26. Leaderboard

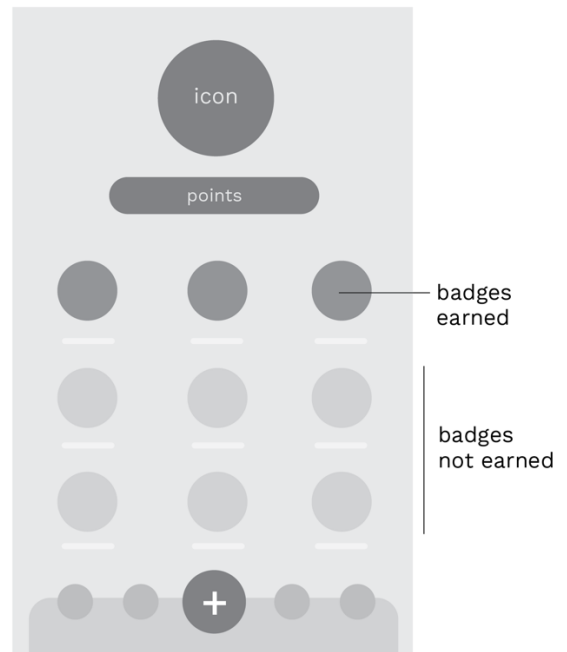


Figure 27. User's Profile showcasing the badges

5.4. Medium Fidelity Prototype

From the wireframes previously shown, the first interactive prototype was created⁵. The text components in the prototype are in Portuguese, to facilitate the users' comprehension. However, to insert the screens here, the texts were translated to English.

Figure 28 shows the main dashboard, where the information is more organized than in the low fidelity prototype (Figure 24). The profile icon is surrounded by a chart that is divided according to the quantity of points earned in each category. There is also a "See all" option, so that the user can check all the purchases made before the ones shown in the "Latest purchases" section. This option leads to screen illustrated in Figure 29.

Figures 30 and 31 show the Challenges page. This page is based on a grid of four cards, where the user has an overview of the challenges available, setting goals to achieve. In order to better understand what it takes to complete the challenge, by pressing one card, a pop-up shows up with a more extensive description (Figure 31).

Figures 32 to 35 show the "Add purchase" option divided by four screens, while in the low fidelity prototype it was all compressed into one (Figure 25). This separation of content was made in order to create simpler and quicker tasks, making it easier for the user to make a decision and not be bombarded with lots of information in one single screen. Each screen has an "X" to cancel the purchase, and an arrow pointing right to continue the purchase. These screens are based on a clean layout, where the main focus is on the selections and decisions to make. First the user selects the product category (Figure 32), then the subcategory (Figure 33), and finally the purchase date (Figure 34). The final screen of the "Add purchase" section shows all the options selected before, as well as the points the user will make with that purchase (Figure 35).

The personal profile screen (Figure 36) is similar to the initial dashboard, with the profile icon and a chart. However, in this case the chart corresponds to the level progression. It also showcases the latest badges earned and it is possible to return to the list of all purchases made (Figure 29).

Finally, the leaderboard (Figure 38) shows a ranked list of friends, their levels and points. By clicking on a friend, the user can see their latest badges earned (Figure 39).

⁵ The prototype is available at <https://xd.adobe.com/view/abe66fd4-a117-4bfa-8b03-936722e9ca7d-feb5/>

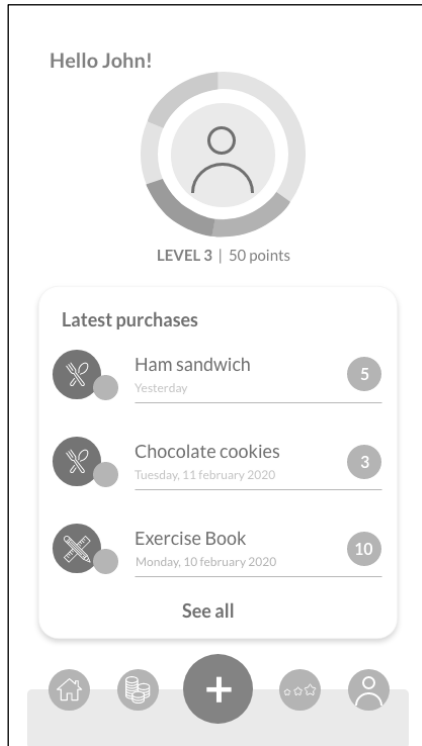


Figure 28. Main dashboard: list of latest purchases and menu.

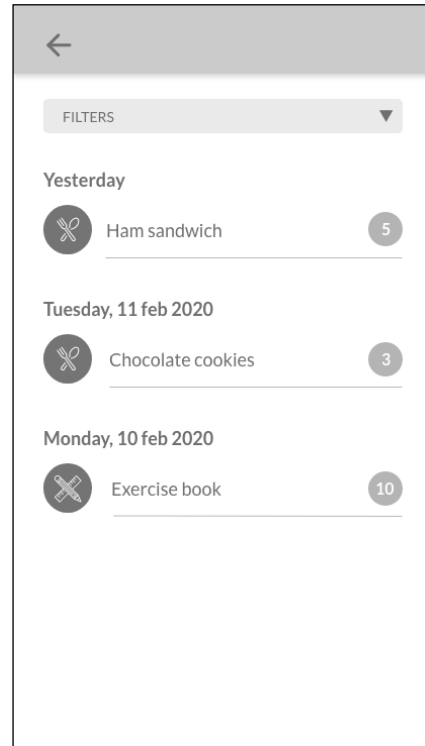


Figure 29. List of all purchases.

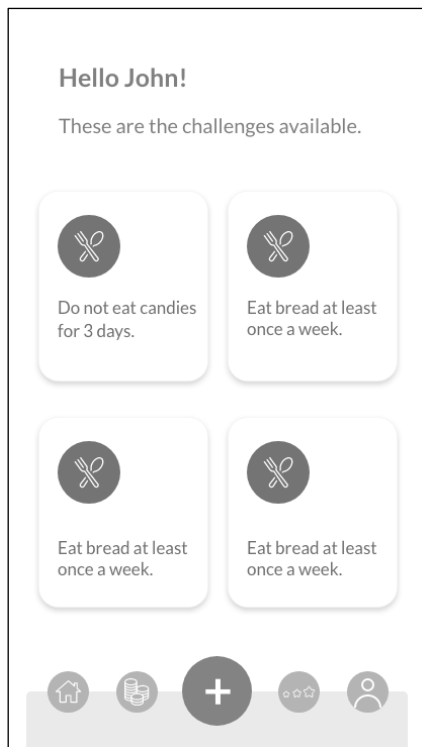


Figure 30. Challenges.

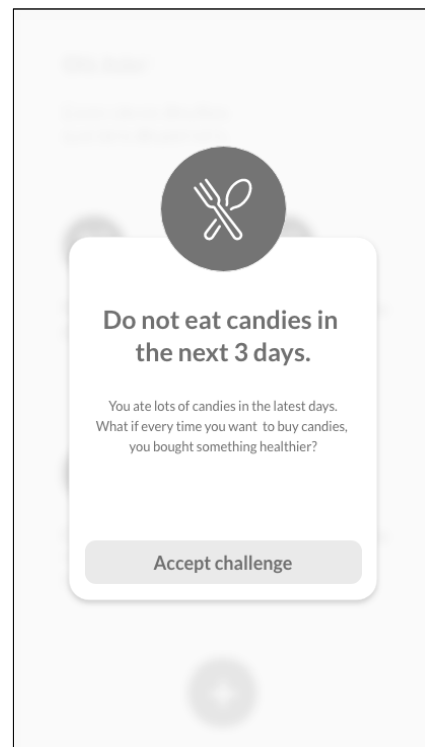


Figure 31. When clicking over a challenge, it appears more information about that challenge.

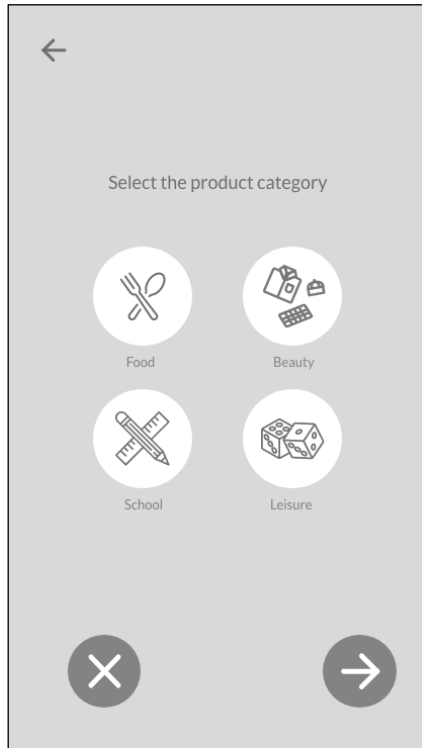


Figure 32. "Add purchase": "select the product category"

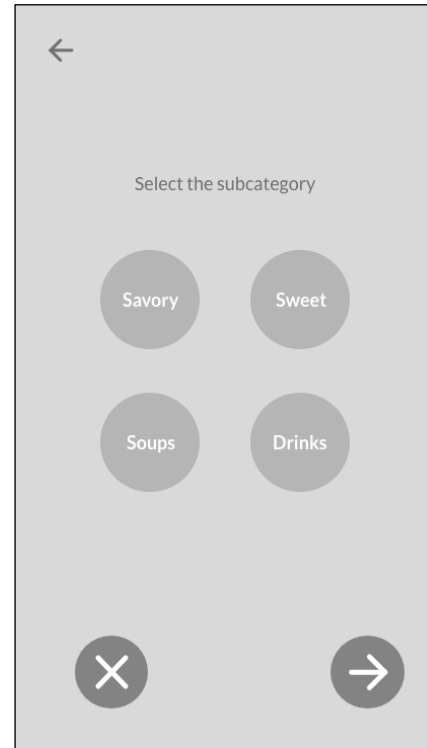


Figure 33. "Select the subcategory" screen.

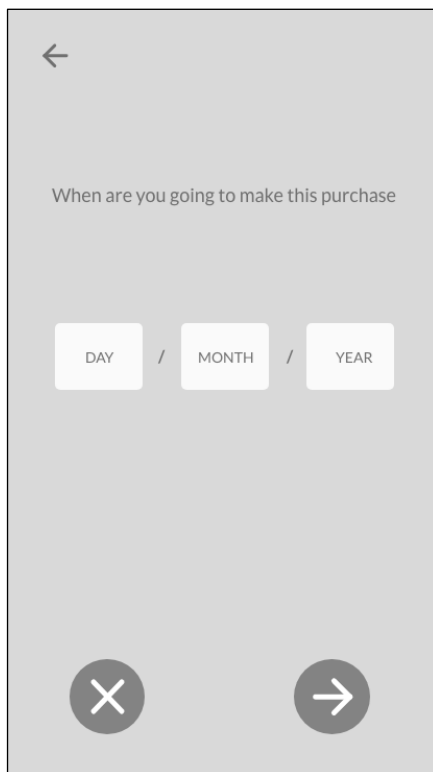


Figure 34. Insert the date of purchase.

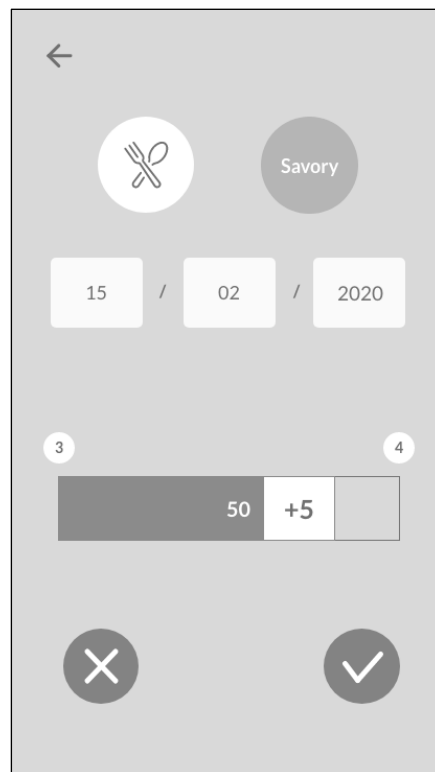


Figure 35. Final screen: shows the points to earn with that purchase

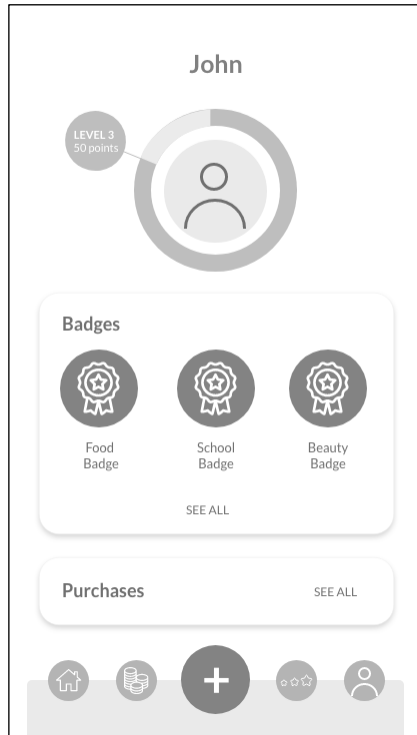


Figure 36. Personal profile: showcasing the badges earned and an option to see all the purchases, that goes to screen on Figure 27

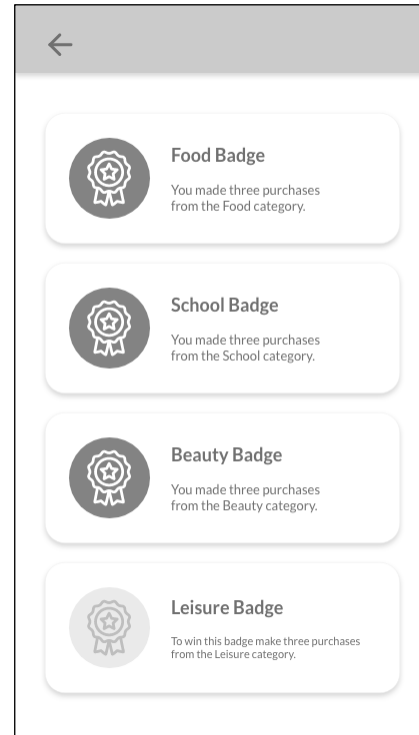


Figure 37. List of Badges: The darker ones were already collected

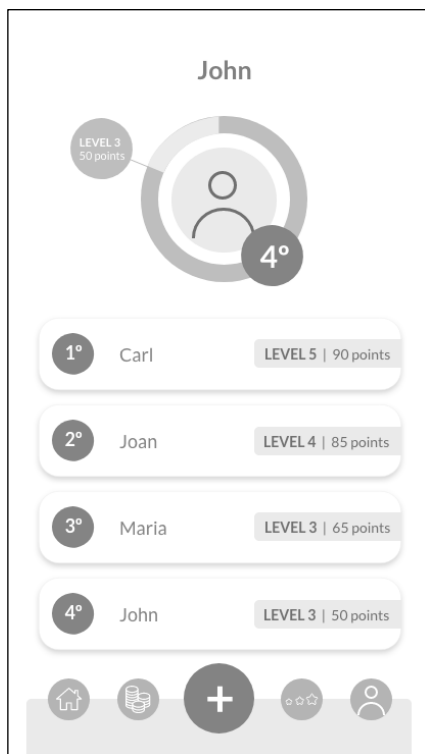


Figure 38. Leaderboard

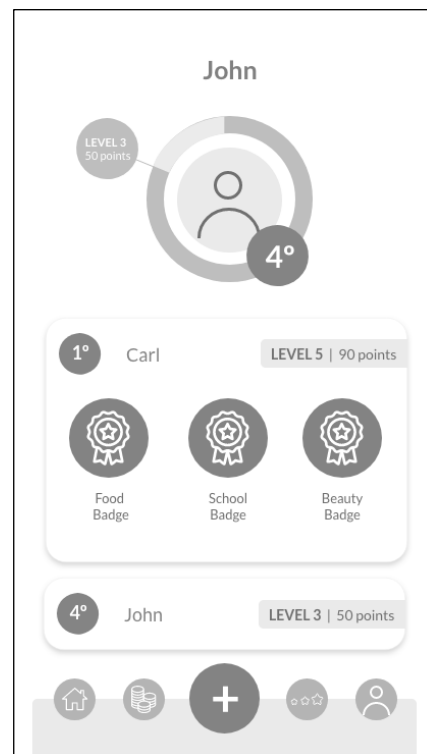


Figure 39. By clicking on another user, one can see their badges.

5.4.1. First usability test – Results and Discussion

By using the System Usability Scale (SUS), one can study the user's motivation and evaluate the experience of the system being analyzed. It consists of a 10-item questionnaire, where each question is followed by a 5-point Likert scale ranging, from Strongly Agree to Strongly Disagree.

When implementing this type of study, it is important to define who will be the users of the system, the tasks they will perform within the app and the social and environmental context in which they will use it. In the case of the mobile app being created, there is already an age range defined for the target audience and the first prototype is ready to be tested.

Brooke (1996) in "SUS – A quick and dirty usability scale", suggests that measures of usability should cover:

- effectiveness (the ability of users to complete tasks using the system, and the quality of the output of those tasks)
- efficiency (the level of resource consumed in performing tasks)
- satisfaction (users' subjective reactions to using the system)

The System Usability Scale is based on the Likert scale, and offers a global view on assessing the usability of a system, being it hardware, software or another type. The SUS covers a wide variety of aspects related to system usability, from the interface to the complexity of the experience itself.

In order to apply this scale into the app that is being tested, it was created a Google Form (Appendix 3) to gather all the answers. Although, apart from the questions initially stipulated in the scale, optional fields for long answers were added in order to register a more detailed opinion of what the users would think that was missing in the application. These questions were "Which colors would you like to see in the app?", "Which are the positive aspects of the app?" and "Which are the negative aspects of the app?".

Four users tested the app. These four users belonged to the first group of interviewees that were approached in section 4.1. The test was carried out individually with each user. They were asked to perform five simple tasks; their performance was observed and the struggles they felt were registered (the recorded screens are available in Appendix 4). They were assured that there were no right or wrong answers and that the goal was to evaluate the overall experience of the app, ignoring its visual aspect. The tasks are based on the task flow, in section 5.2, which are:

- 1) Open the app and create an account.
- 2) You are at the school cafeteria and you want to buy a sandwich. Please, add a new purchase and simulate how many “utility” points the purchase would give you.
- 3) Go to the Leaderboard. Check in which position you are in relation to your friends’ rank.
- 4) Visit your profile. Please, check the medals you earned.
- 5) Go to the Challenges and check the challenges available.

After performing these tasks, they were asked to fill a SUS questionnaire. The scores’ average assigned by each user, after performing the tasks, are illustrated at Figure 40. Looking at these averages, all of them sit in a positive place on the spectrum. The users’ concerns fall mostly on “I think that I would need the support of a technical person to be able to use this system”. This premise was noticed during the tests, where users kept asking questions in how to travel between pages and what they could do in each one of them. This is a problem that must be resolved with an inclusion of a tutorial right at the beginning of the app. Apart from that, one can also highlight the “I needed to learn a lot of things before I could get going with this system” that shows an average answer score higher than should be expected. This score may be related with the one regarding the “support of a technical support”, because the users felt they needed more information to start using the app.

To better understand their concerns and the difficulties registered during the test, they were asked to indicate the positive and negative aspects they found on the system, and those could be improved.

When questioned about what could be improved in the app, the first user suggested that there should be a “category and subcategory color distinction”. He found interesting “the fact that it reflects real life purchases and/or choices into points”. On the other hand, he suggested a “different menu disposal on the screen”. He felt the need of a “tutorial” when beginning to use the app and also recommended to use a “slide gesture” to change screens.

The second user wanted to see “happy colors” in the app. One of the best aspects of the app is that it is “simple and easy to use”. However, this user found it was difficult to understand the “Challenges” section. It was also pointed out that the pages were “visually similar, which made them difficult to distinguish”.

The third user suggested to “associate a color to each category and subcategory”. It was also referred that the most positive aspect of the app was the fact that “it helped in real-life situations”. No negative aspects were pointed out.

The fourth user would like to see “shades of blue” in the app. The favorite section was the “Add Purchase” option. When it comes to improvements that could be made, it was suggested to add a “tutorial in the beginning, explaining how to use the app” and “to include a username, profile picture and a biography to the “Profile page””.

When calculating the score results of the SUS scale, Brooke (1996) states:

To calculate the SUS score, first sum the score contributions from each item. Each item's score contribution will range from 0 to 4. For items 1,3,5,7 and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SU.

This system was implemented in the present app and the results are shown in Table 10, where the SUS scores for each item is already calculated using the rules explained above. Using these scores and in order to assess whether the app’s usability is coherent, Jeff Sauro developed a system to interpret the SUS (Sauro, 2018). In this case, it will be used the Percentile approach.

Percentiles are the same approach pediatricians use to tell whether an infant is over or underweight. We took the large dataset of SUS scores and “normalized” them to allow for percentile ranks. Percentile ranks tell you how well your raw score compares to others in the database. (Sauro, 2018)

According to the percentile rank, the average score is 68 (50th percentile). This means that scores below 68 are considered as not having the best experience to other scores in the database.

Looking at the final SUS Scores obtained from the questionnaires (Figure 41) only one score was registered below the average. The app has still space to improve but it is well positioned in the rank. The users presented some ideas for improvements that could be added and felt overall confident using the app, as Figure 39 shows. However, in some cases, it was hard for them to ignore the fact that the app was all in shades of grey while trying to focus only on its experience. They were interested in using the final version of the app and wanted to know how it would look like as a final product.

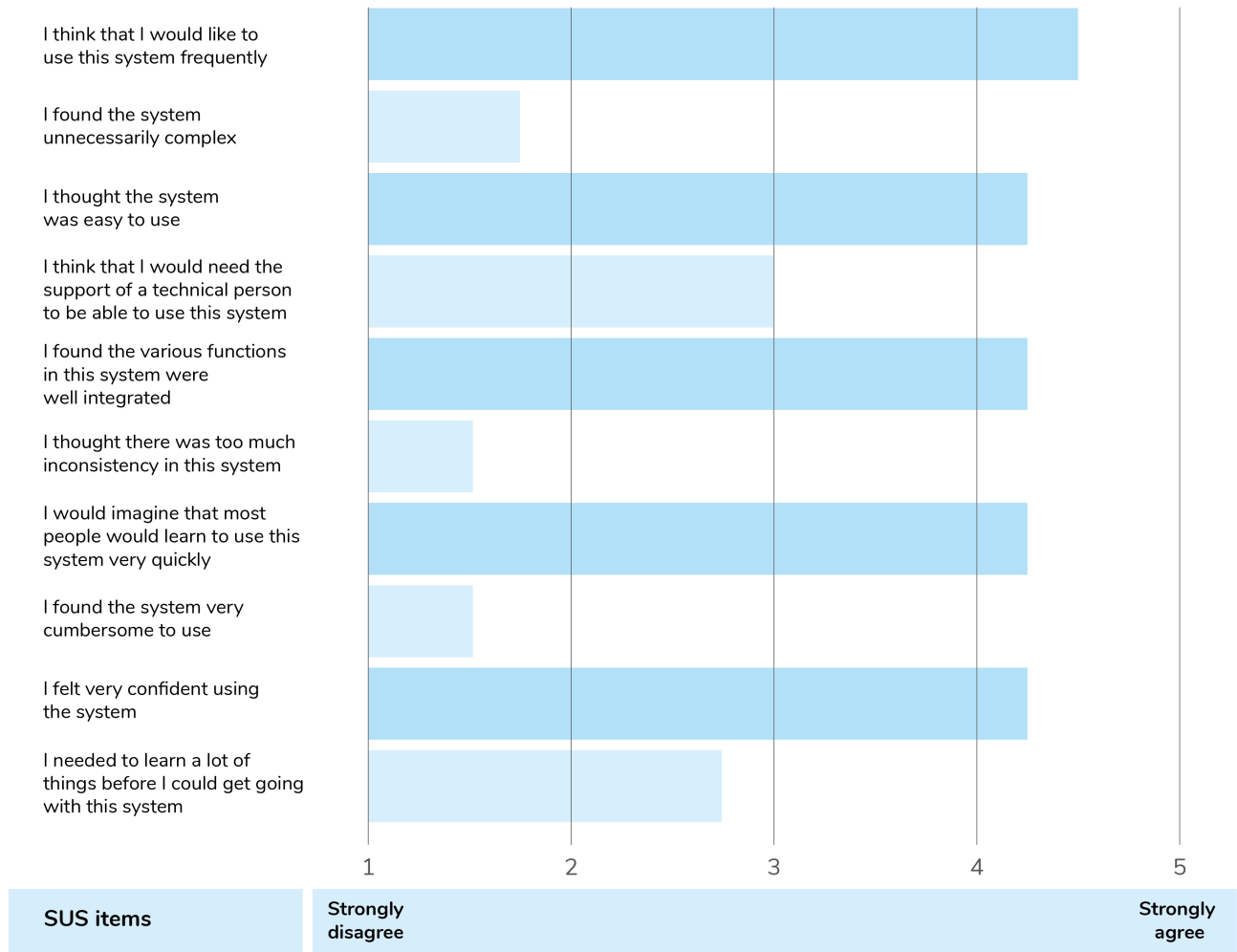


Figure 40. Average scores attributed by each user, from 1 to 5, registered in the first usability test

Table 10. SUS scores per user, in the first usability test

SUS items	First user 15 years old	Second user 15 years old	Third user 11 years old	Fourth user 11 years old
I think that I would like to use this system frequently	4	3	3	4
I found the system unnecessarily complex	2	4	3	4
I thought the system was easy to use	2	4	3	4
I think that I would need the support of a technical person to be able to use this system	0	3	2	3
I found the various functions in this system were well integrated	4	2	3	4
I thought there was too much inconsistency in this system	3	4	3	4
I would imagine that most people would learn to use this system very quickly	2	4	3	3
I found the system very cumbersome to use	2	4	3	4
I felt very confident using the system	3	3	3	4
I needed to learn a lot of things before I could get going with this system	1	3	2	3
TOTAL SCORE	23	34	28	37
SUS SCORE	57,5	85	70	92,5

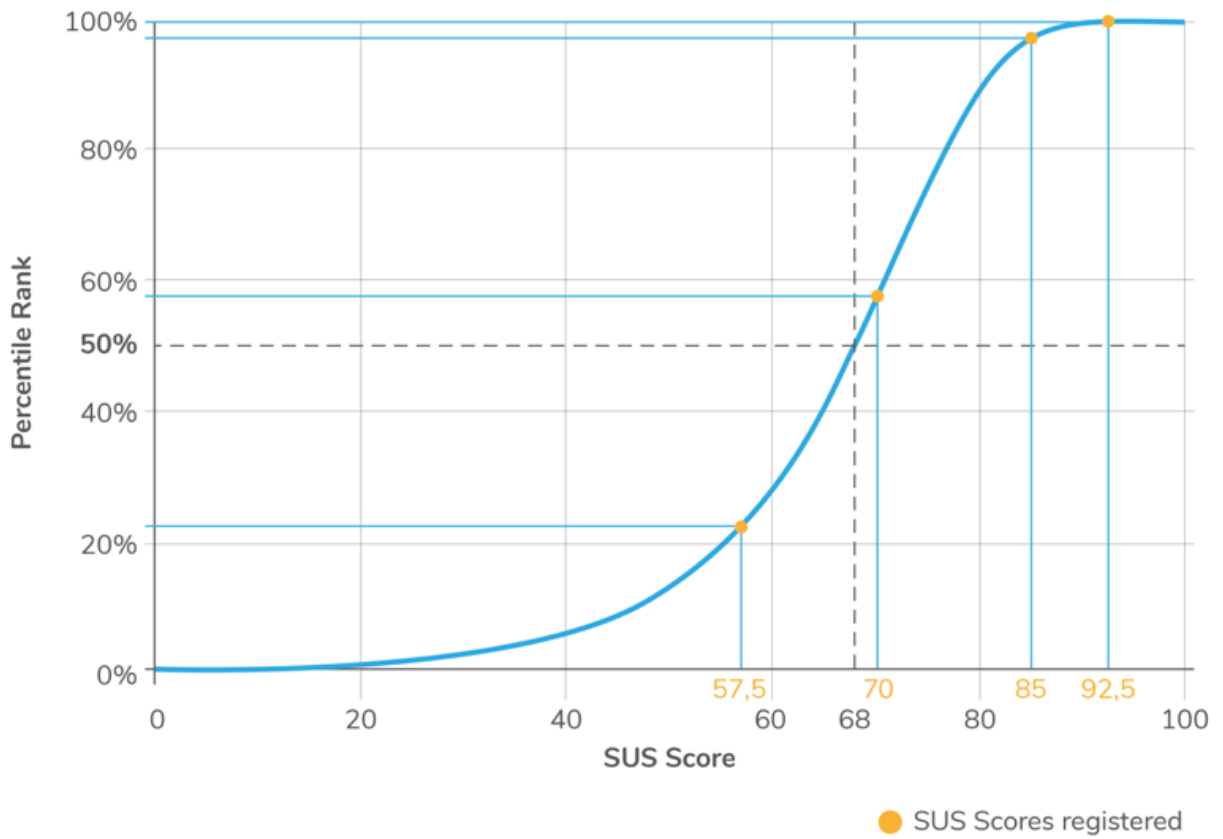


Figure 41. First usability test SUS scores positioned in the Percentile rank

5.6. Naming and Interface Visuals

Any digital product must have a distinctive visual identity, that distinguishes it from other products available. This chapter is destined to define the graphic and visual elements that will grant this app, a special personality. All of the elements chosen here were based on the recommendations of users, which are reported in section 5.4.1.

5.6.1. Color palette

Choosing a color palette is always an important step when designing any product, being it digital or printed. The colors will determine the personality and identity of the product.

For this project the color palette selected is inspired by the users' suggestions when they tested the first prototype of the interface (section 5.4.2).

According to the Color Theory developed by Sir Isaac Newton in 1666, three groups of colors were defined: Primary, Secondary and Tertiary. (IDF, n.d.) In this case the "Primary colors" served as the basis of the color palette for the app: Red, Blue and Yellow. Primary colors change according to how they are synthesized.

The Primary Colors of Additive Color Synthesis match to the RGB color model: Red, Green and Yellow. For this app, the Primary Colors chosen belong to the Subtractive Color Synthesis, which correspond to the CMYK color model (used for print): Cyan, Magenta, Yellow and Key (Black).

Computer monitors display information using the RGB (Red-Green-Blue) color model. An RGB monitor synthesizes colors additively by selectively illuminating each of its pixel's red, green, and blue phosphor dots at varying levels of intensity. (...) In additive color synthesis, all hues of the visible spectrum of light are mixtures of various proportions of one, two, or three of the primary colors of light. (Gabriel-Petit, 2006)

The Primary Colors of Subtractive Color Synthesis were chosen because they are well-known colors and also have enough contrast between each other to make them pleasing to the eye. This contrast allows the interface to have sections distinguished by color (Figure 42).

Green is the fourth main color selected. Green does not belong to the group of Primary Colors, although it was chosen because it refers to a very important concept addressed by this app: sustainability and ecologic. Apart from also being usually associated with money. Four colors were

chosen to match the number of categories' products (four), which are the most important feature of the app.

All these colors were selected in a way to not evoke any gender, but just to convey a sense of happiness, cheerfulness, and pedagogy. As it will be seen in the rest of the graphic elements of the interface, all the visuals are genderless. The app is supposed to draw the attention of younger generations without distinguishing gender, social status, or wealth.

Within this color palette, there are two warm colors (red and yellow) and two cool colors (green and blue) creating a temperature balance. However, the colors have a slightly increased brightness, to draw more attention. This brightness is allowed because the colors values are set in RGB.

RGB values indicate the intensity of each of the primary colors of light—ranging from 0%, the darkest value, which indicates the absence of a color, to 100%, the lightest value, which indicates that a color is at its full intensity. (Gabriel-Petit, 2006)

Apart from these, there are also three neutral colors: white, a shade of grey and black. These colors create a balance between the main colors and the secondary colors that will appear in the app. Thus, the main colors have the primordial position in the app's interface, highlighting the main features of the app. While the secondary colors occupy sections that are less important to the user.

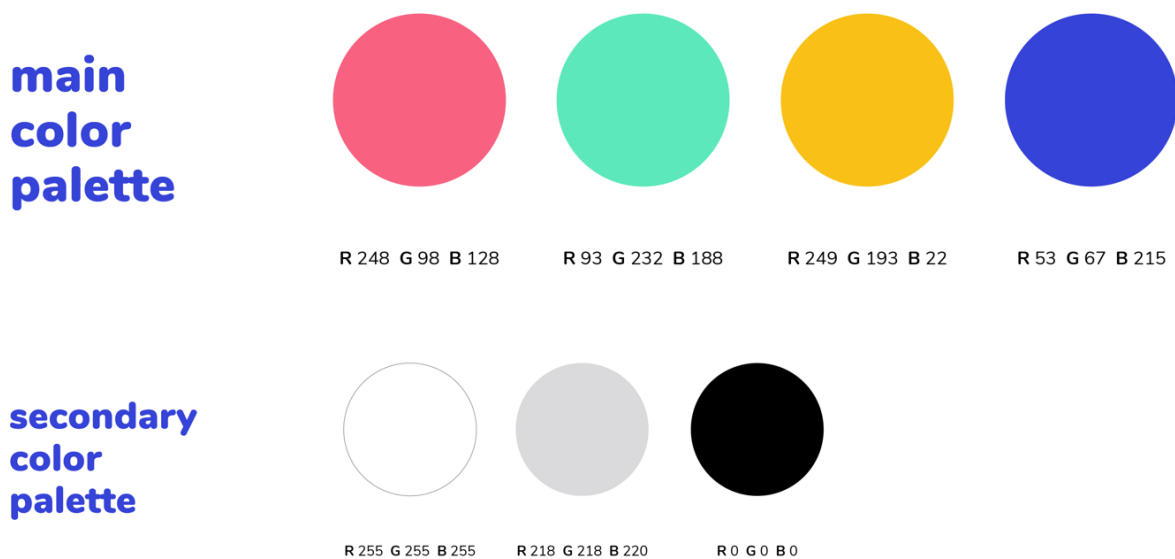


Figure 42. Main and Secondary Color Palette

5.6.2. *Typography*

As important as the color palette, choosing a font also sets the tone and personality of a product.

Google provides an open source collection of fonts to be used, primarily, on web and digital products. Google Fonts is a catalogue from 2010 that presents a wide variety of fonts, which can be used freely with a commercial or non-commercial purpose. In order to safely use a font with no licensing or hosting issues involved, this catalog is the starting point for selecting the type family to be used in this project.

Before consulting Google Fonts, there are a few features previously defined to begin the search. It should be a sans-serif font, with a wide range of weights (an extensive type family) and good readability.

“Nunito” fulfills the requirements mentioned above (Figure 43). It is a sans-serif typeface with distinctive round terminals, characterized for having round shapes as the basis of its construction. Apart from having a wide range of weights, all the way from Extra Light to Black, it also conveys a sense of youth and fun, because of its roundness. It is a well-balanced typeface created by type designer Vernon Adams and recently provided by Google at Google Fonts.

Nunito Extralight
Nunito Extralight Italic
 Nunito Light
Nunito Light Italic
 Nunito Regular
Nunito Italic
 Nunito Semibold
Nunito Semibold Italic
 Nunito Bold
Nunito Bold Italic
 Nunito Extrabold
Nunito Extrabold Italic
Nunito Black
Nunito Black Italic

Figure 43. Nunito Type Family

5.6.3. Naming

After having a tone set for the product, it is important to define the name of the app. Following the fun and youth sense that the typography and color palette already convey, the naming should follow these exact premises.

The initial idea is to find a short and fun name that would also be used as the points name. This contributes to a cohesive identity for the product. Apart from that, it should be easy to pronounce and it must have a playful and distinctive sound.

Another important aspect of the app’s name is that it must have some kind of reference to the primary feature that differentiates this app from others in the market: the utility points’ system.

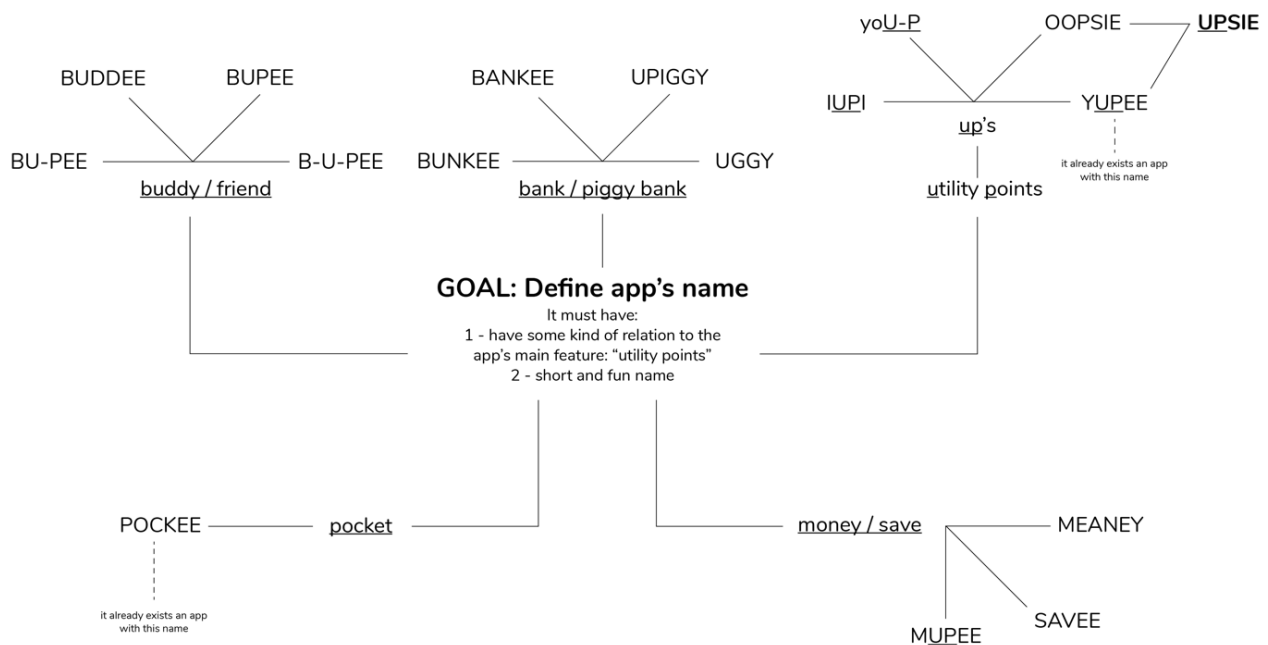


Figure 44. Mind map of the brainstorming process to create the app’s name

The strategy to come up with a name began with selecting a few words that have some relation to the product: “buddy/friend”, “bank/piggy bank”, “utility points”, “pocket” and “money/save” (Figure 44). With these words in mind, the goal was to make them have a different pronunciation, sounding almost like an onomatopoeia.

Being the main feature of the app the “utility points”, a few naming options arrived from this expression. Taking the initials of the words, “u” and “p”, plus the “s” in “points” and connecting their sounds, emerges the sound “ups” or “oops”. Then, the last “i” and “e” transforms it into a new word: “Upsie”.

“Upsie” also works as the name of the points: “How many upsies do you have? I have 120 upsies.” It is a fun and short name that also holds an easter egg within: a reference to the “utility points”.

5.6.4. Logo, Icon and Illustrations

The proposed app holds a lot of different concepts and the information can be a bit too dense sometimes. For this reason, all the visual elements should be simple and have an unambiguous interpretation.

Four sets of illustration were created: menu icons, categories icons, buttons and profile icons. Each set also has four different icons. In order to establish a standard construction, all the shapes, buttons and icons are built using simple geometric shapes. These shapes are circles and rectangles, resembling coins and bills respectively. All the shapes, icons and buttons have the four main colors of the color palette. Figures 47 to 54 illustrate these shapes and their construction.

When it comes to the logo of the app, which will also work as the app icon, it must make a reference to the app’s name (“Upsie”) and have a clean and recognizable shape. Making an app icon is creating the first impression a new user will have, because it is the app’s identity compressed into a small shape.

Product icons are the visual expression of a brand and product, including their services and tools. Icons communicate the core idea and intent of a product in a simple, bold, and friendly way. While each icon is visually distinct, all product icons for a brand should be unified through concept and execution. (“Product icons,” n.d.)

The initial idea for the app icon was to make it look like a coin. It should have a round shape and a clear symbol in the middle. With this in mind, the symbol has two overlapping “u”, the initial letter of “upsie”. While the app icon does not have a reference to the app’s name (because every mobile operative system already shows the name of the app automatically), only the complete logo has the app’s name underneath (Figure 45). The logo lives inside a circle and has a straight-forward construction. The “p” descender sets the margins’ size, represented in Figure 46, as an “x”.

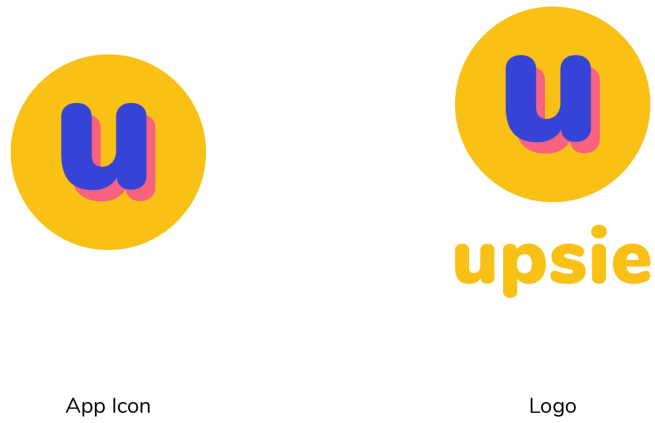


Figure 45. App Icon and Logo

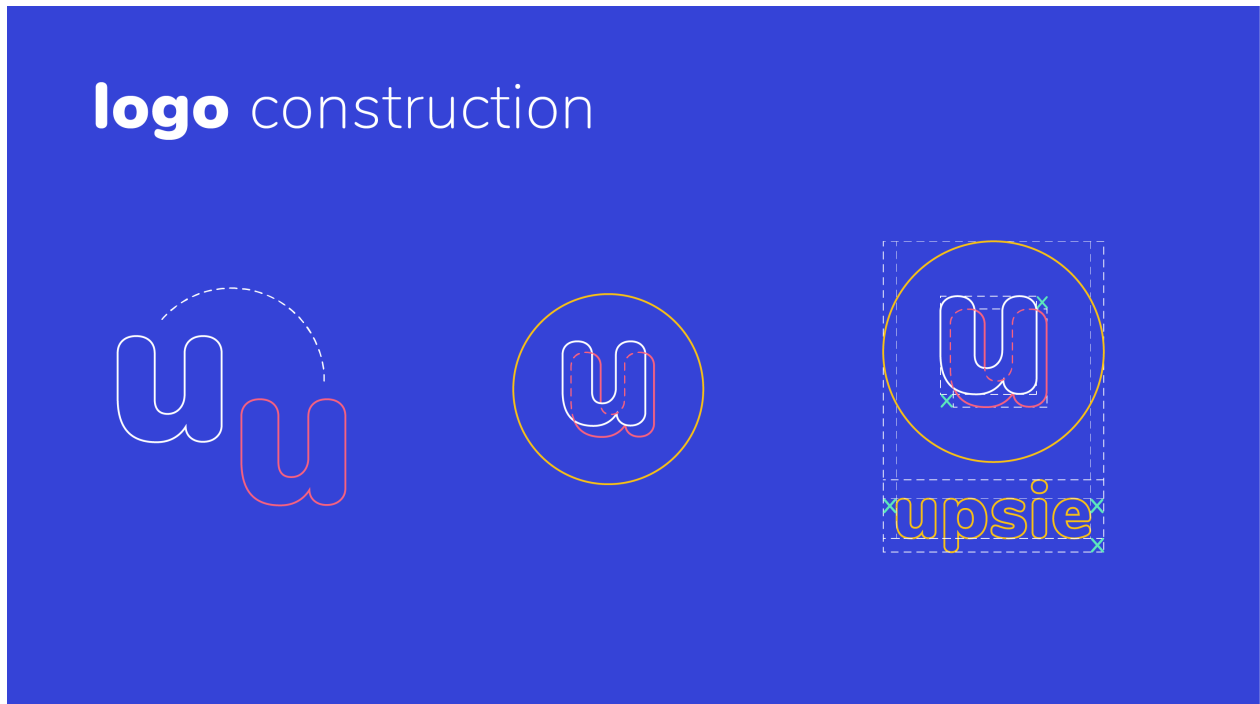


Figure 46. App Icon and Logo construction

buttons and shapes

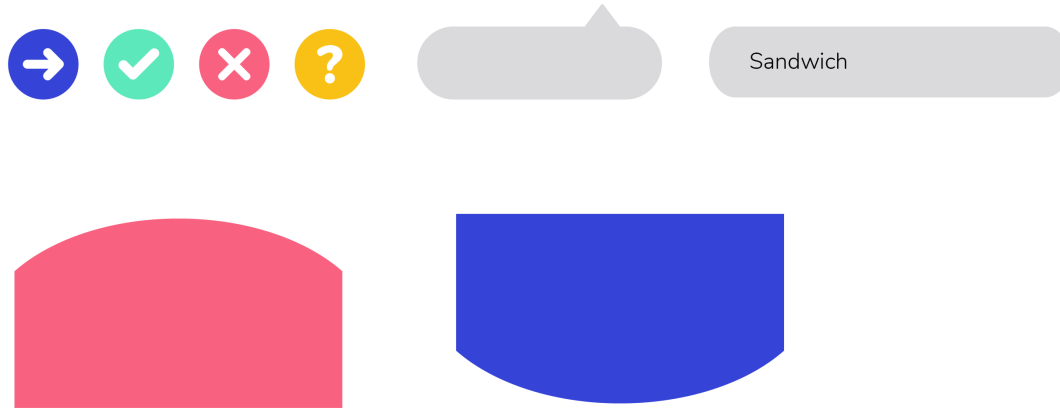


Figure 47. The main buttons and shapes that define the app's visual identity

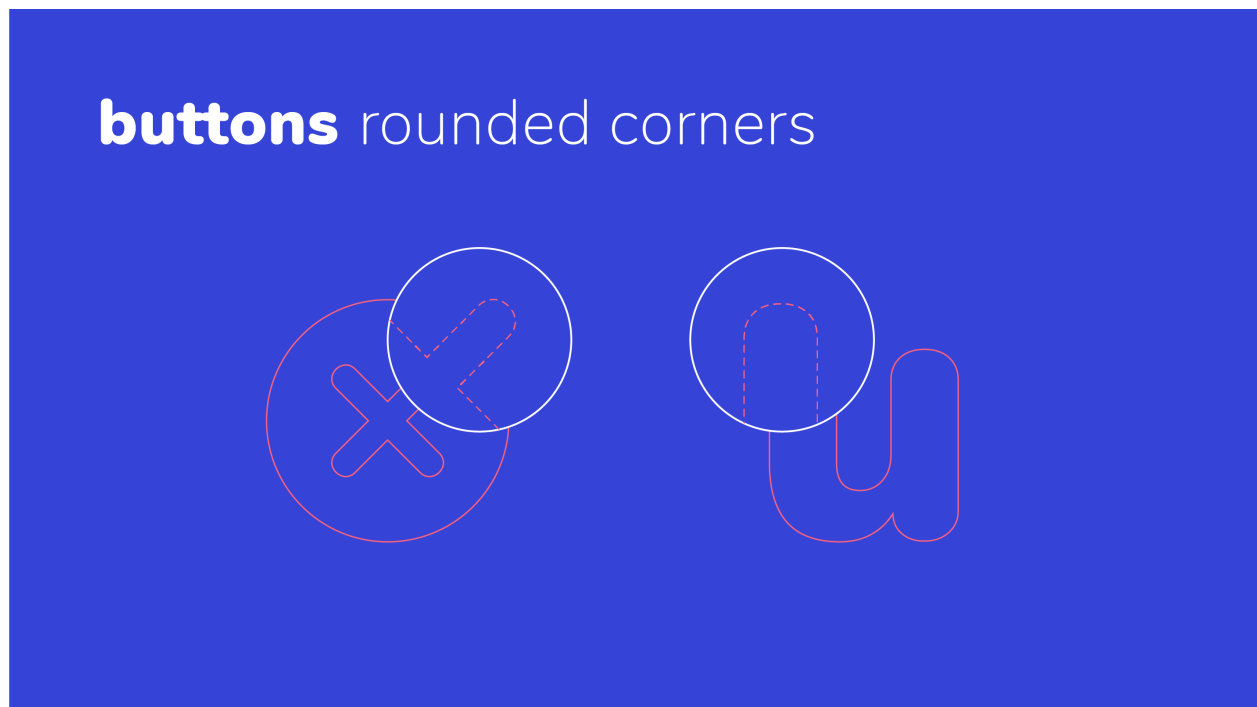


Figure 48. The buttons have round corners that resemble the round terminals of the typeface chosen: Nunito (Figure 41)

categories icons

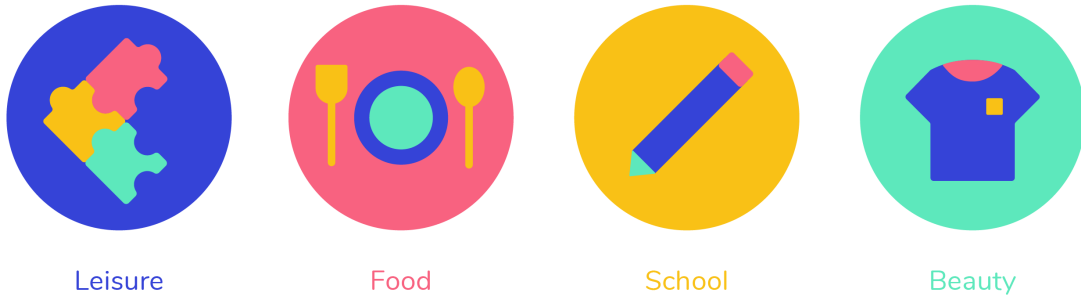


Figure 49. Categories' Icons

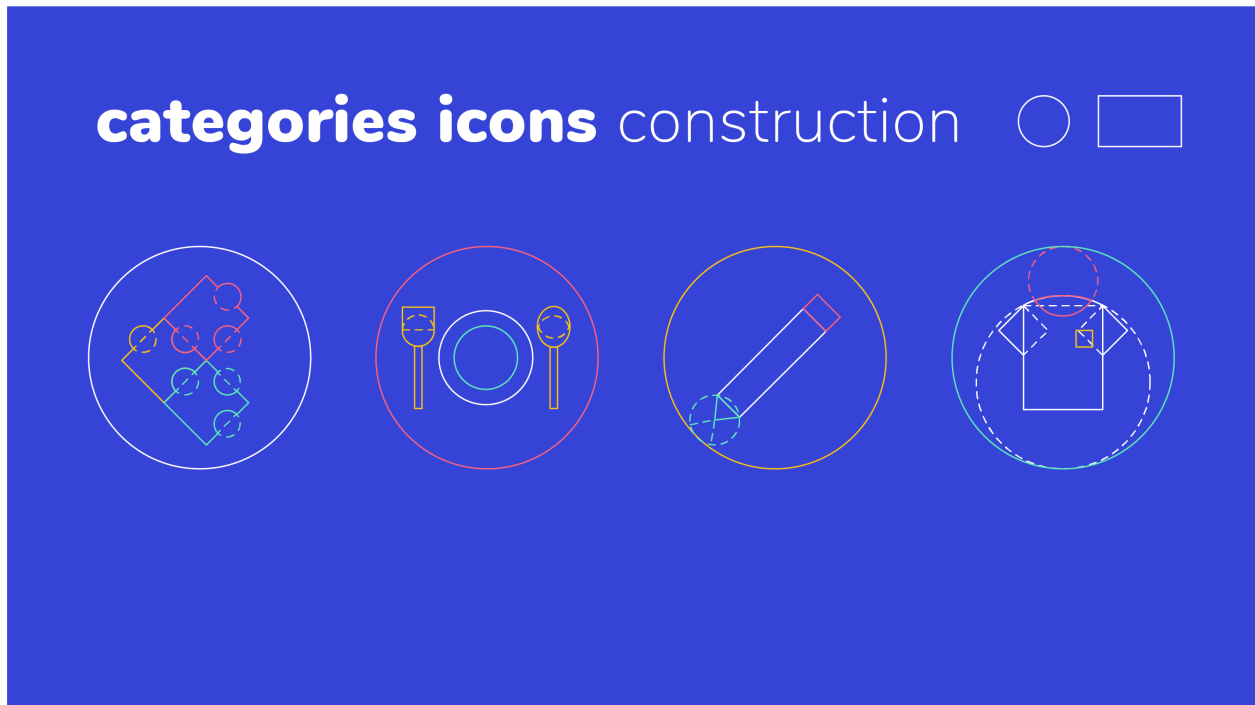


Figure 50. The Categories' icons were built using circles and rectangles as the basis of its structure.

menu icons



Figure 51. The Menu Icons use symbols that refer to the content of each screen.

Note: "Dashboard" – home; "Challenges" – flag in a mountain; "Upsie Simulator" – plus sign; "Leaderboard" – podium

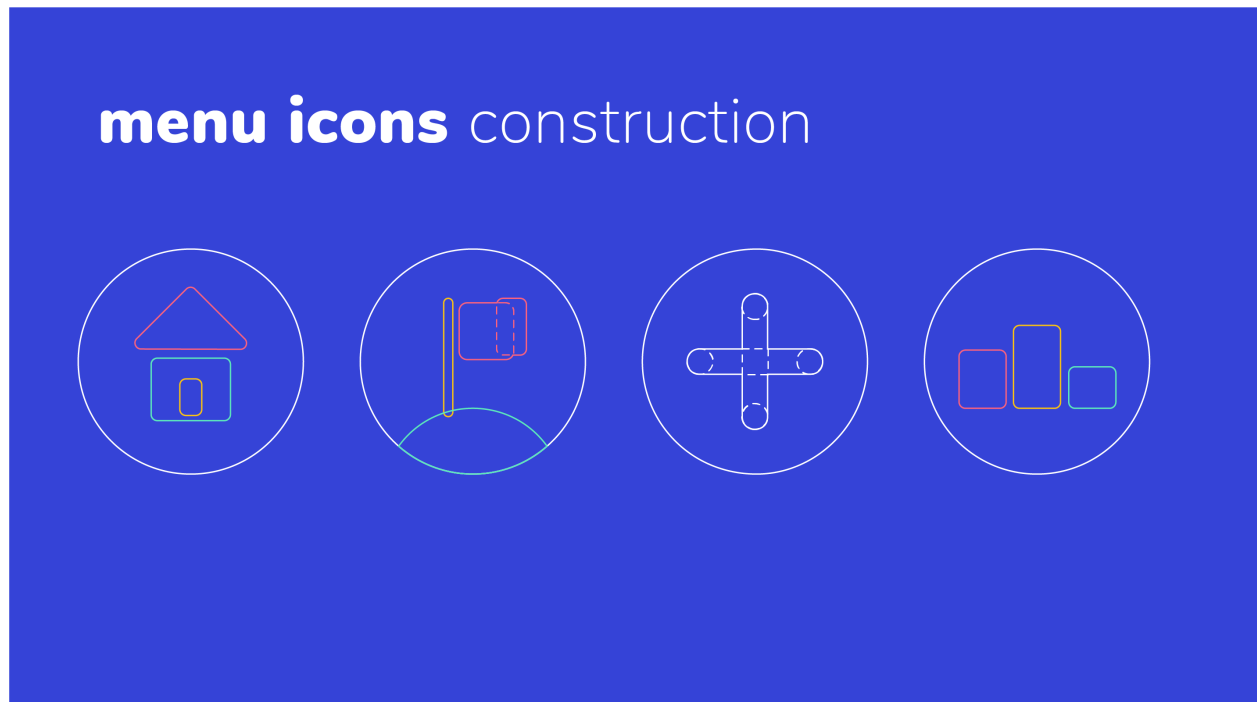


Figure 52. Menu icons construction

profile icons



Figure 53. Genderless profile icons

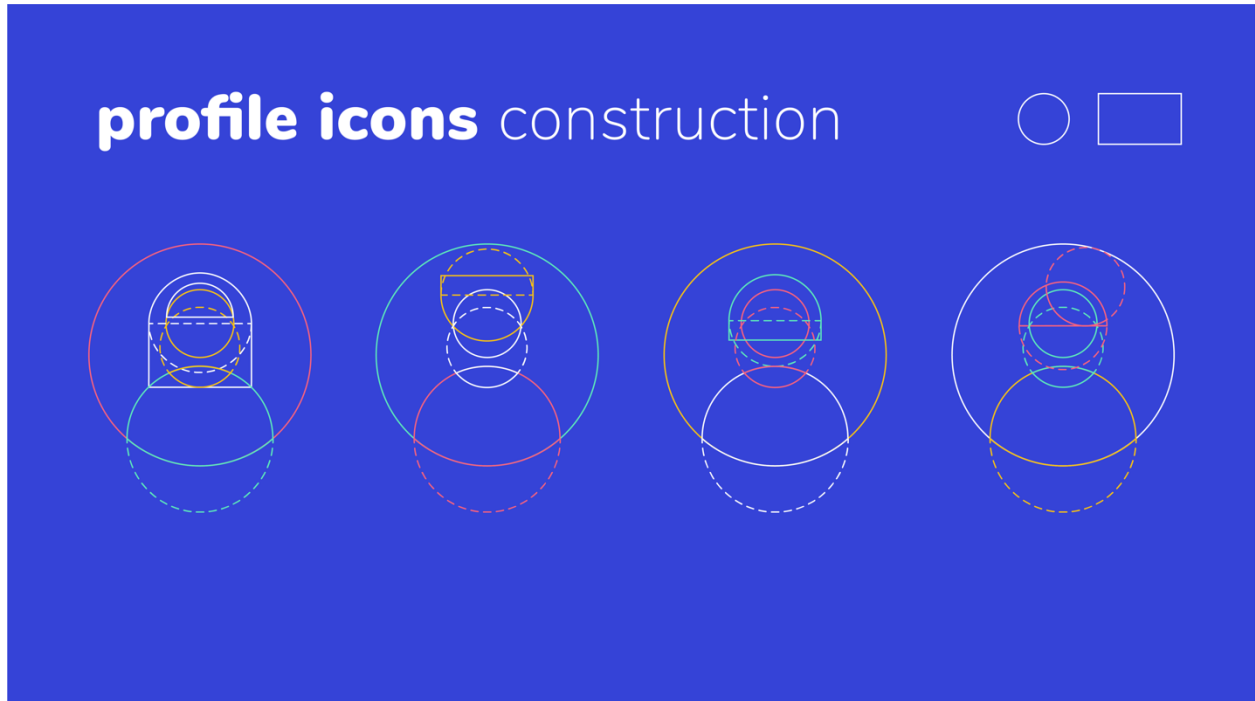


Figure 54. Icons' construction using circles and rectangles.

5.7. High Fidelity Prototype

After the low fidelity prototype and the medium fidelity prototype, the high-fidelity prototype⁶ contemplates all the visuals and graphics shown in section 5.6, placed in their proper places.

The prototype was developed in Adobe XD, which allowed to create the interactions between screens and buttons, simulating the normal operation of the app. When designing for this platform it is important to set a fixed screen resolution. The smartphone used as a support and testing tool for this project was a Huawei P Smart (2018), which has a screen resolution of 2160px by 1080px. The following mockups of this prototype are embedded in the phone they were tested in, so that it is possible to observe how the app would work on a real phone.

Nevertheless, during the implementation process, with programming languages, other screen resolutions and operative systems would be taken into consideration, making a responsive design⁷.

In the digital world, the grid system acts similarly to the print layout in organizing the elements on the page. Additionally, it provides a guide for designers to create multiple layouts that support responsive themes for different screen sizes. (Soegaard, 2019b)

Grids are an ancient structure used throughout the greatest pieces of art as well as the most beautiful printed books. The digital world got inspiration from these traditional techniques. The layout is divided by margins and columns, to help designers organize content and also create a responsive design. In upsie's case, the content is organized in an eight-column grid, while the margins are marked with an "x", as shown in Figure 55. There is also a smaller grid of 4 pixels squares, used to align the content more precisely.

On the next pages are some of the screens that show the overall experience of upsie. The complete collection of screens created for this app are in Appendix 6. The interface is fun and dynamic, where colors and shapes have the protagonist spot. The prototype is the most similar to the final result of the app, where is possible to see how the colors will behave and how the shapes will occupy the screen.

⁶ The interactive prototype is available at <https://xd.adobe.com/view/b283ab2b-bf8b-4308-b169-5043821687a1-e7d0/screen/3895d668-7dae-4585-90b8-09d2e7362fe1>

⁷ "Responsive designs respond to changes in browser width by adjusting the placement of design elements to fit in the available space" (Soegaard, 2019a)

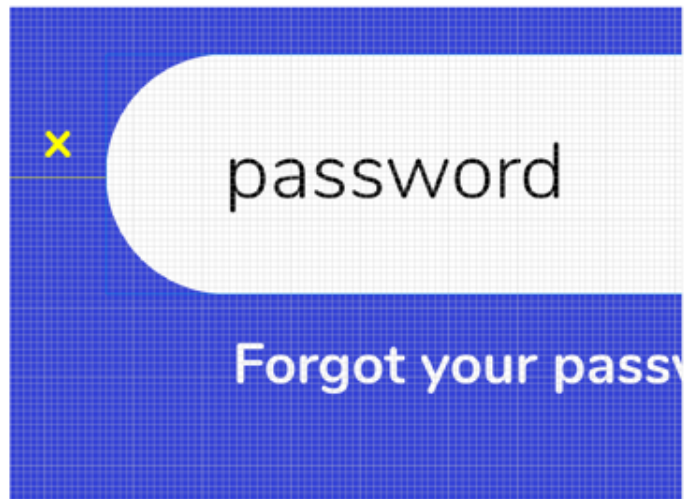


Figure 55. On the left: the column grid, with 8 columns / On the right: a squared grid of 4px squares

As soon as the user installs the app and opens it for the first time, it is required to login with their credentials: username and password (Figure 56). If the user does not have an account, it is required to sign up, creating a username and password and inserting an email. When creating an account, the user can also choose a profile icon. After creating an account, the user can go through the tutorial where they will learn the most important features displayed on the screen (Figure 58). These are new screens that were not foreseen in the low or medium fidelity prototype, but are also very important to the overall experience, because they are the app's first impression.

Figure 57 shows the main dashboard, with even more improvements than the one in the medium fidelity prototype. Here one can see the graphic elements from Figures 47 to 54, implemented in the high-fidelity prototype. The round corners and bright colors help to organize the information of this dashboard. First, the user can see their own profile icon, surrounded by a chart (organized by categories), as in the medium fidelity prototype. However, the greeting "Hello John!" disappears to make room for the upsie icon. In this way, the user never forgets in which app he/she is and starts to get familiar with the icon. On the top right there is a "?" that leads to a screen where the user can have more information about the app's usage and even repeat the tutorial. The greeting "Hello dafm8!" goes below the profile icon, and there is also a saying "You have 5 upsies" so the user knows how many upsies they have. Right below that, there is a progression bar where one can see how far he/she is from leveling up. Then, the last three purchases the user made are shown in three boxes, alongside the category icon it belongs to, the subcategory, date and upsies earned (on the right end). There is a button that says "See all" where the user can check all the purchases, not just the last three. This screen is finished with a bottom horizontal menu, that displays different icons (Figure 51), starting from left to right, with the Home button, the Challenges button, Add purchase button, the Leaderboard and the Personal profile.

Moving on to the "Challenges" screen (Figure 59), the cards display layout is still used, as how it was used in the medium fidelity prototype. There is also a progression bar for each challenge, so that the user knows how far he/she is from completing the challenge. The user can also delete challenges on the top right "x", and new challenges will appear.



Figure 56. First screen: Login

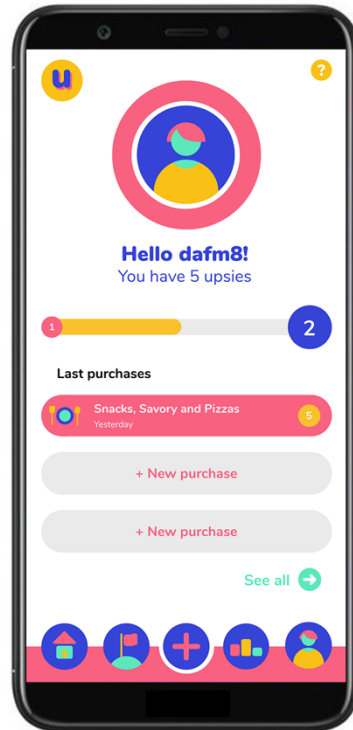


Figure 57. Main dashboard

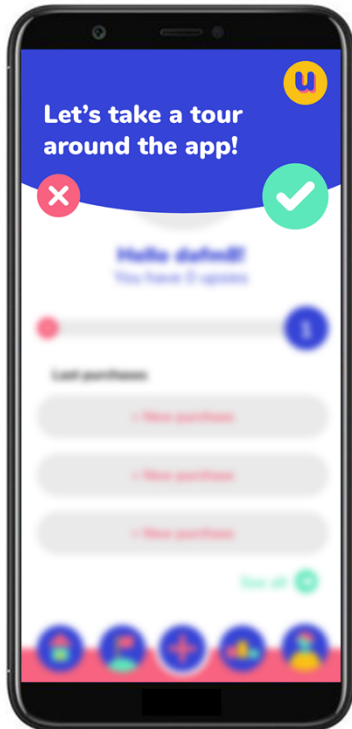


Figure 58. First screen: tutorial

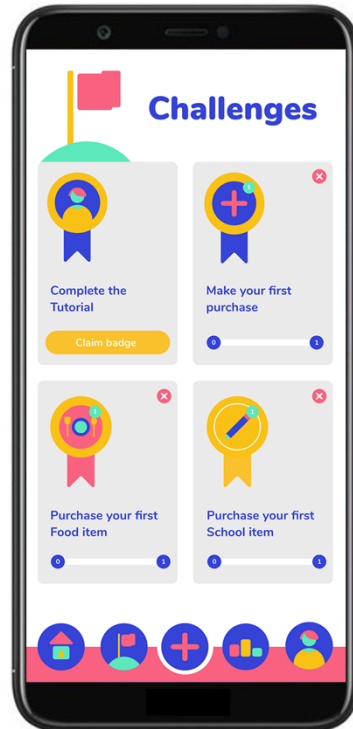


Figure 59. Challenges screen

The “Add purchase” option changed its name to “Upsie Simulator”. This is a distinctive name that corresponds more faithfully to what this section brings to the user. This allows the user to simulate the purchases he/she intends to make and observe how many points they will receive from it.

The screens from this section are organized in the same way they were in the medium fidelity prototype. There is the “select category” screen (Figure 60), the “select subcategory” (Figure 61), the screen to insert a date (Figure 62) and finally, a redesigned screen that shows all the previous selections and the upsies that will be earned (Figure 63). The upsies are shown in a progress bar, so that the user immediately knows how far they are from levelling up.

Each of these screens has the same “?” that was on the main dashboard (Figure 57), it is a place where the user can clarify any doubt about the app. There is also an “X” on the bottom left, that allows the user to cancel the simulation at any time, there is an arrow pointing left to return to the previous screen and an arrow pointing right to go to the next screen (this arrow only appears after selecting one possible option) (Figure 62).

The Leaderboard screen (Figure 64) is very different from the medium fidelity prototype. For this final prototype, the Leaderboard shows the user ranked position right on top, then there are two buttons to “add friend” and “requests”. On the first one, the user can send requests to their friends by inserting their username and email, and then wait for them to approve it. The second one shows the requests received from other users (Figure 65). The Leaderboard itself is organized by rounded corner boxes, that show other users’ profile icon, their ranking position, username, level and upsies obtained. By clicking on other users’ username, it is possible to see their latest earned badges.

Finally, the personal profile page (Figure 66) is very similar to the main dashboard, but the “Last purchases” section is closed on the bottom of the screen, giving space to show the last three badges the user earned. On the “See all” button in the badges section, one can see their complete badges’ collection (Figure 67).

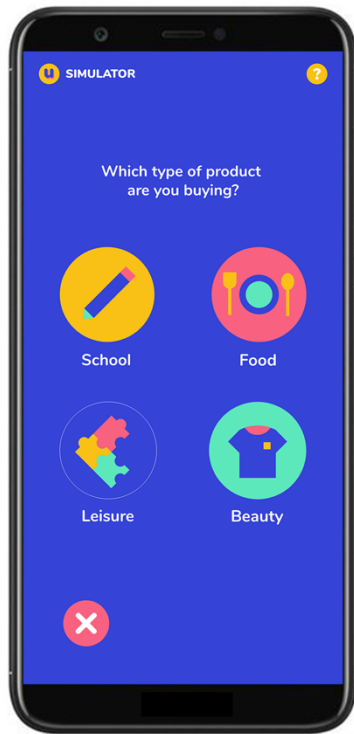


Figure 60. "Select the category"

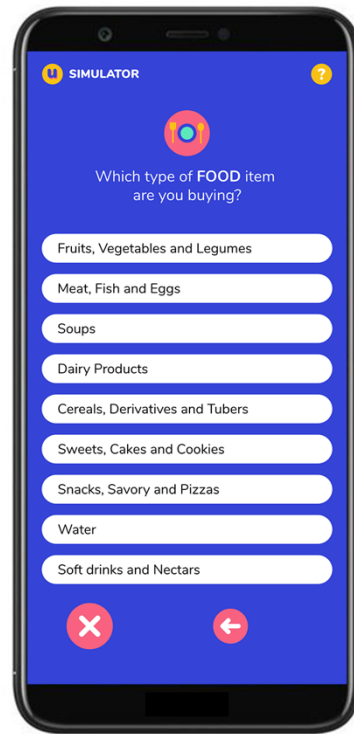


Figure 61. "Select the subcategory"



Figure 62. "Insert the date"

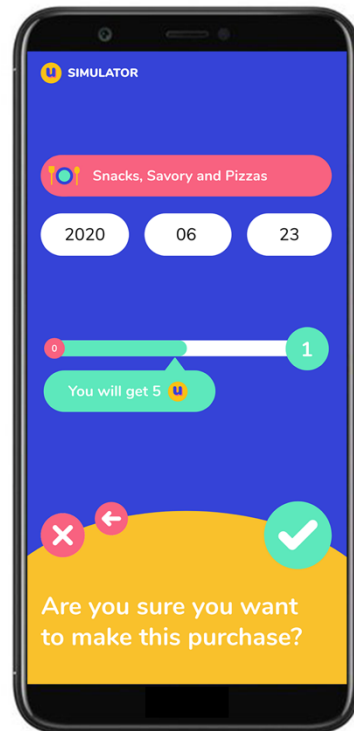


Figure 63. Final screen: shows the points earned

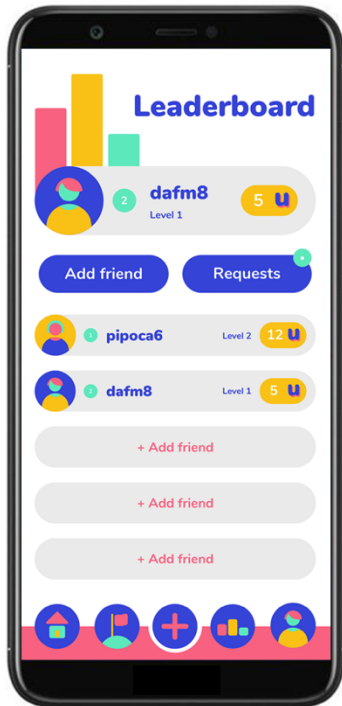


Figure 64. Leaderboard

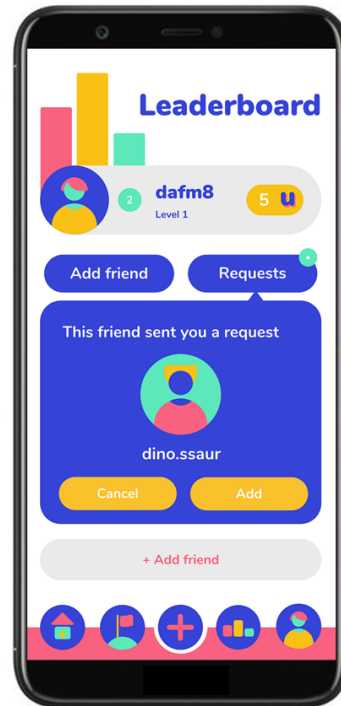


Figure 65. Received friend request

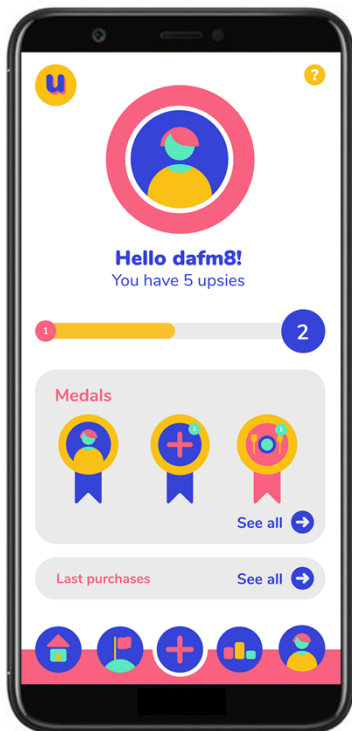


Figure 66. Personal profile: badges earned and with an option to see all the purchases

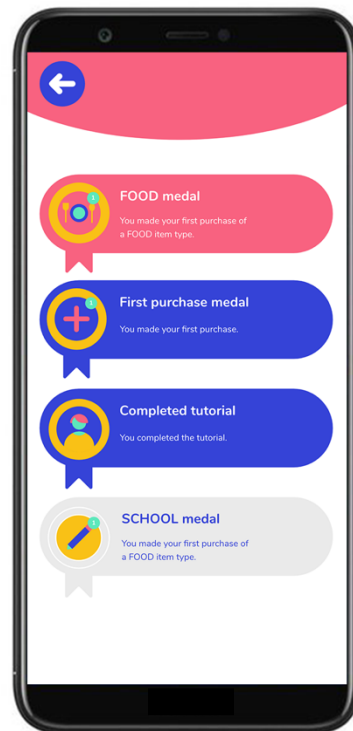


Figure 67. Badges collection: The ones in color were already collected, the grey ones are yet to achieve.

5.7.1. *Second usability test*

For this second usability test, the SUS form implemented in the first usability test and described in section 5.4.1, was used again. The tests were also performed side by side with the users, and they were given ten tasks to perform:

- 1) Create a new account;
- 2) Complete the tutorial;
- 3) Claim the “Complete the tutorial” badge on the “Challenges” page;
- 4) Imagine you want to buy a snack and you want to see how many *upsies* that purchase would give you. Please insert a new purchase from the “Food” category and “Snacks, Savory and Pizzas” subcategory;
- 5) Return to the “Challenges” page and claim two badges;
- 6) Return to the “Home” page and check all the purchases you have made;
- 7) On the “Leaderboard” page, add a new friend by sending a friend request;
- 8) Still on the “Leaderboard” page, accept a friend request;
- 9) Still on the “Leaderboard” page, check pipoca6’s badges;
- 10) Go to your “Profile” page and check all the badges you won.

After performing the tasks and answering the SUS questionnaire, the users could point out the negative and positive aspects they consider important. When it comes to the positive aspects, three out of the five users highlighted the choice of colors as an important element that draws their attention. Four out of five users pointed that the structure and experience of the app was “well-organized”, “easy to use” and “good for your everyday life, especially for young people that do not know how to spend money on necessary things”. Other user referred the existence of a tutorial in the beginning to be “useful” and also liked the interaction with friends the app allows. Another user highlighted the “upsie simulator” as an important feature of the app.

Overall, the users enjoyed the experience of the app and its visual aspect. When it comes to the negative aspects, two out of the five users pointed that there were no negative aspects, justifying that the app is “useful and easy to use on a daily basis and it shows how money can be well spent”. One of the other three users said that it could exist more options of profile icons to choose from. Another said that the app could also be in Portuguese, not just in English. The final user said “when one completes a challenge and has to claim a badge, it could appear a notification on top of the

challenges' icon on the menu". The user also pointed out that, when using the app for the first time and during a certain period of time, the name of each page could appear below the icons on the menu, because the user sometimes forgot what each page had in them.

The obstacle regarding identifying the content of each page was noticed in the beginning of the test where the most significant problem registered was with the first impact after completing the tutorial, where the users forgot what each button on the bottom menu represented.

Their performance was also recorded (Appendix 5) and they felt more confident using the app, than what was registered in the previous usability test. "I felt very confident using the app" reached the top score of 5 ("Strongly agree") in all users, while the rest of the items scored very positively. The items "I found the system unnecessarily complex", "I think I would need the support of a technical person to be able to use this system", "I thought there was too much inconsistency in this system", "I found the system very cumbersome to use" and "I needed to learn a lot of things before I could get going with this system" registered low scores, very close to 1 ("Strongly disagree") which means the users felt the app had a quick and easy usage method, while all the features were well integrated. The remaining items scored an average of more than 4 ("Strongly agree") which corresponds to a favorable result, as Figure 68 shows.

Having colors and an interface with a closer look to a final product helped during the test. They felt it was easier to move through the app and the overall scores for the SUS questionnaire improved, comparing to the previous test, as Figure 69 shows.

Table 11 shows the SUS scores attributed by each user, where two of the users evaluated the app's experience with the highest score (100). The lowest score reached 75, while two other users reached 92,5. Figure 70 shows where the scores fall on the percentile rank, where all the five users' evaluation is placed above the average score (68).

Performing usability tests alongside the users, optimized the results of these tests. Being a very specific population, some of the users were distracted during the test, and it was important to repeat the tasks they had to make. After reassuring what had to be done, the task was completed in a few seconds. This is an important characteristic noticed in the performed usability tests. When asked if they found anything difficult to accomplish, they all said they found no obstacles.

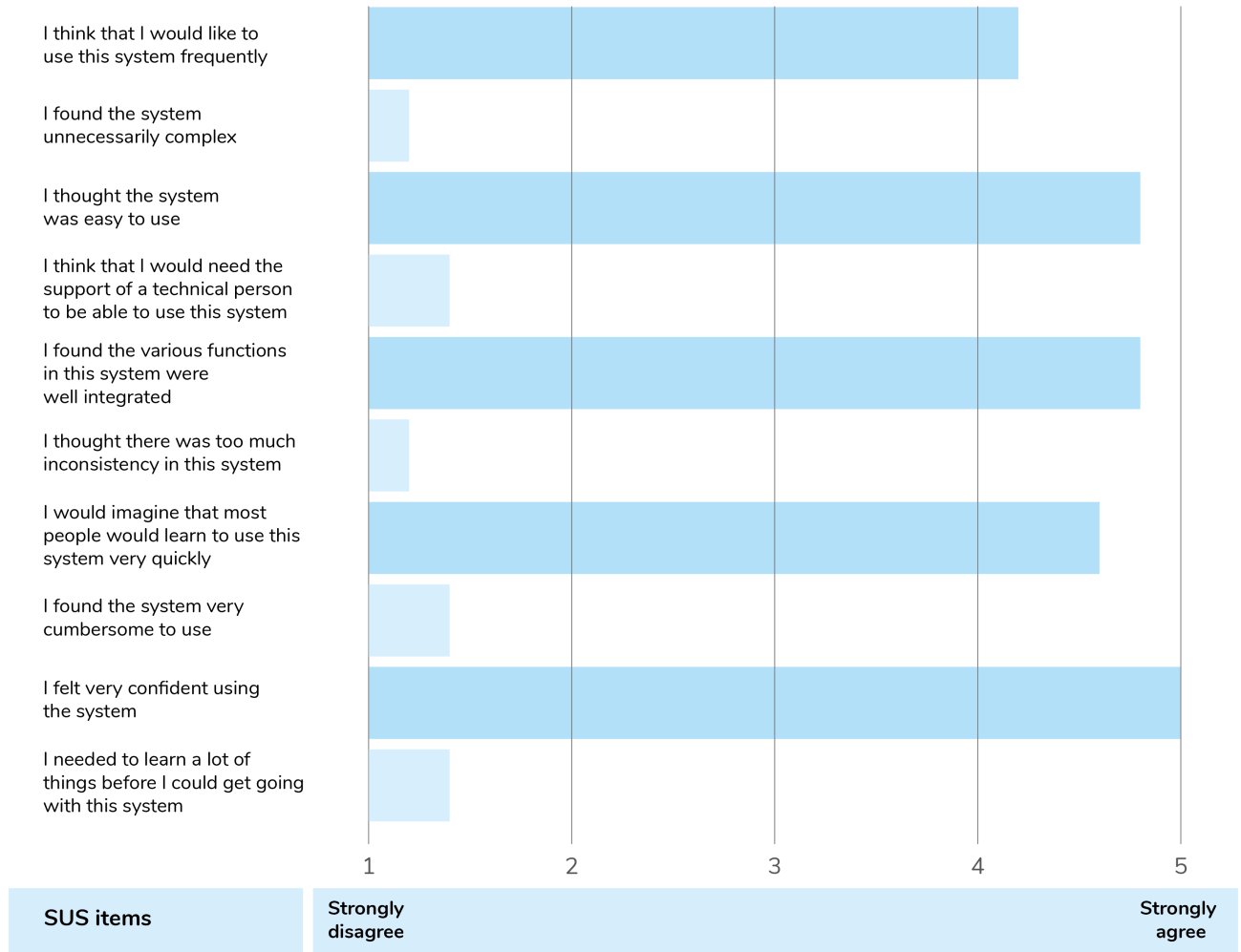


Figure 68. Average scores attributed by each user, from 1 to 5, registered in the second usability test

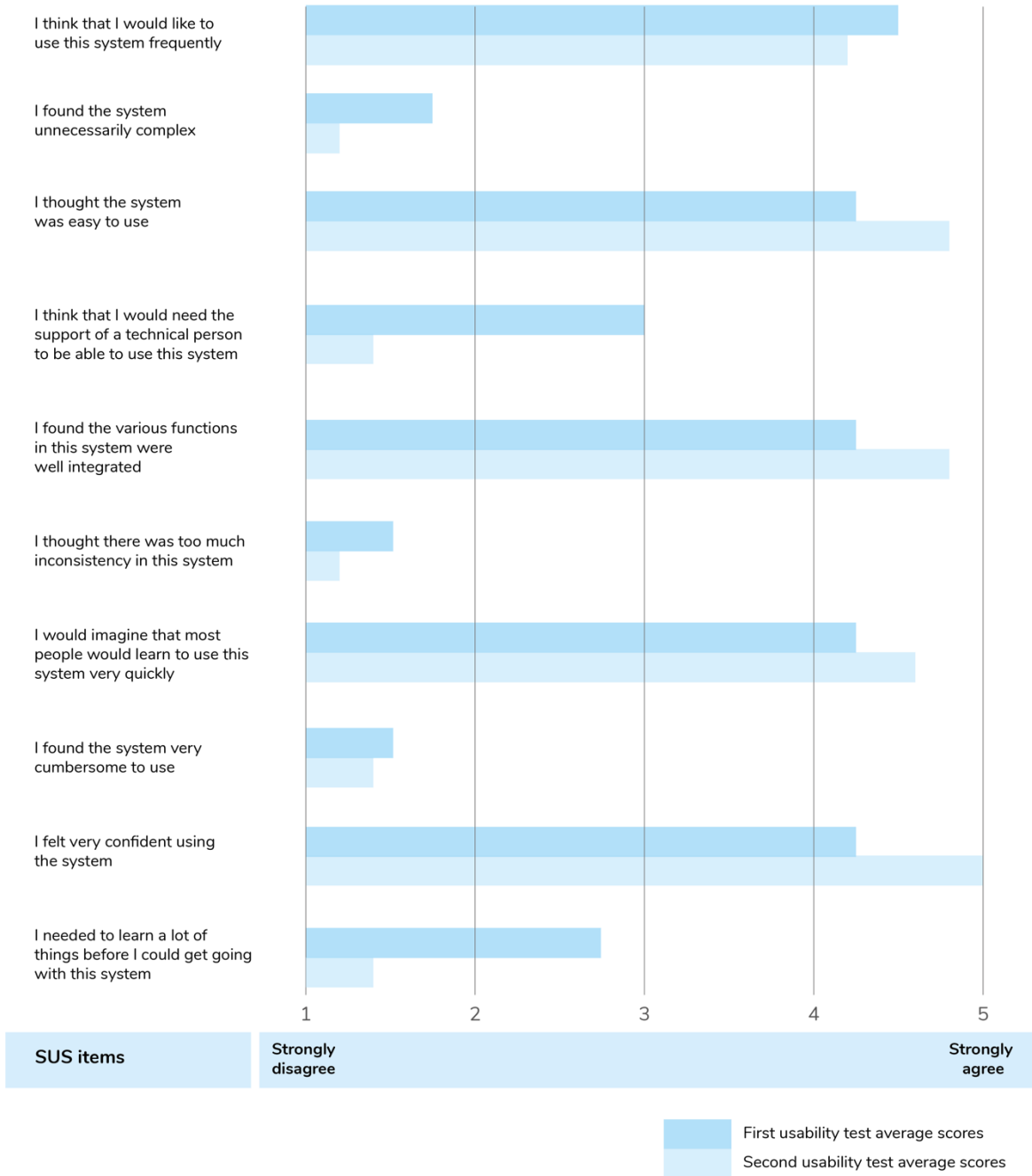


Figure 69. Comparing the average scores from the two usability tests

Table 11. SUS scores registered in the second usability test

SUS items	First user 12 years old	Second user 15 years old	Third user 12 years old	Fourth user 16 years old	Fifth user 16 years old
I think that I would like to use this system frequently	4	3	3	4	2
I found the system unnecessarily complex	4	4	3	4	4
I thought the system was easy to use	4	4	3	4	4
I think that I would need the support of a technical person to be able to use this system	4	4	2	4	4
I found the various functions in this system were well integrated	4	4	4	4	3
I thought there was too much inconsistency in this system	4	4	3	4	4
I would imagine that most people would learn to use this system very quickly	4	3	3	4	4
I found the system very cumbersome to use	4	3	3	4	4
I felt very confident using the system	4	4	4	4	4
I needed to learn a lot of things before I could get going with this system	4	4	2	4	4
TOTAL SCORE	40	37	30	40	37
SUS SCORE	100	92,5	75	100	92,5

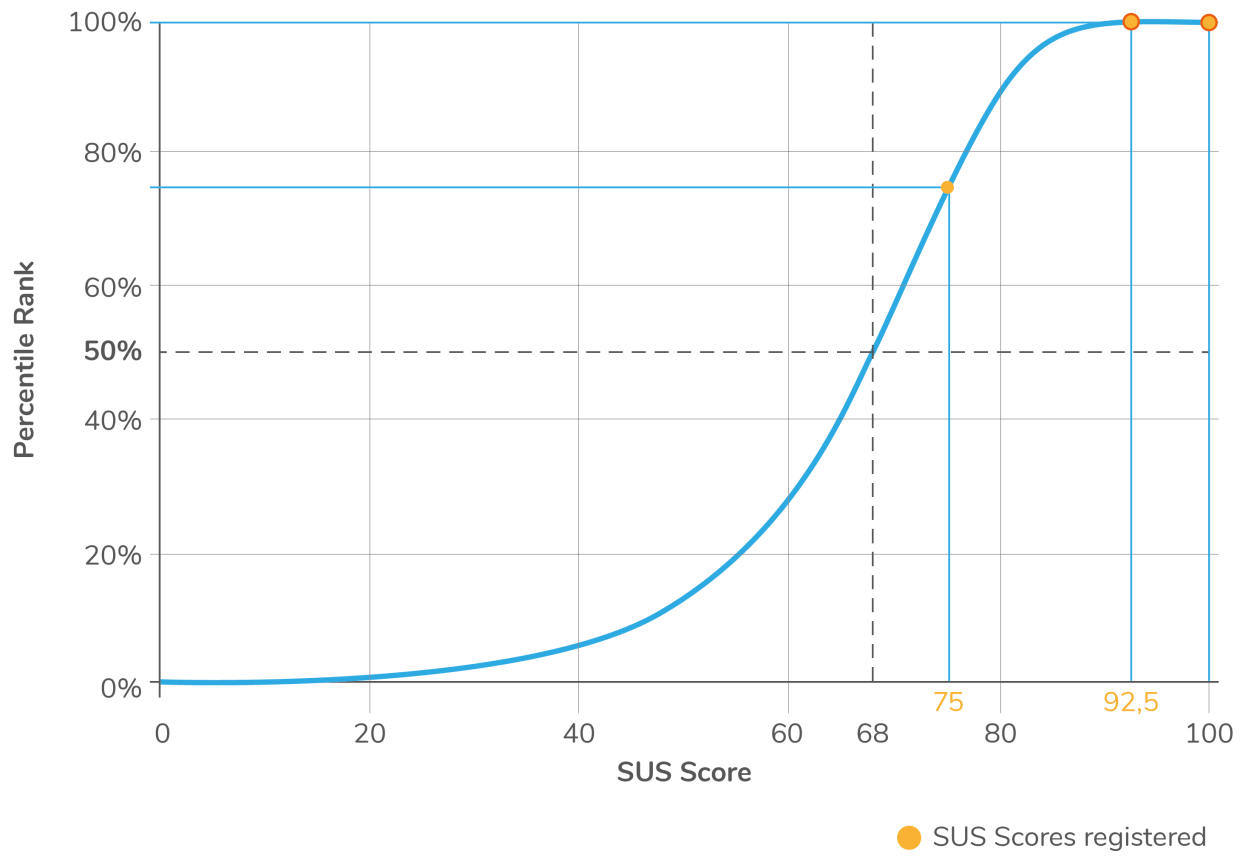


Figure 70. Second usability test SUS scores positioned in the Percentile rank

5.8. Improved Interface

After collecting feedback from the users in the second usability test, a few changes were made to the interface. Overall, the users felt confident using the app and felt that there were few things to improve.

As described in section 5.7.1., most of their insights were related to features that could only be implemented in a more advanced stage of the app's implementation. Like introducing other idioms, such as Portuguese, or creating more options for profile icons. Apart from those, one user pointed out that, when using the app for the first time and during a certain period of time, the name of each page could appear below the icons on the menu, because the user sometimes forgot what each page had in them. Another aspect pointed was the possibility of having notifications inside the app, namely on the menu icons. Figures 71 and 72 show these improvements.

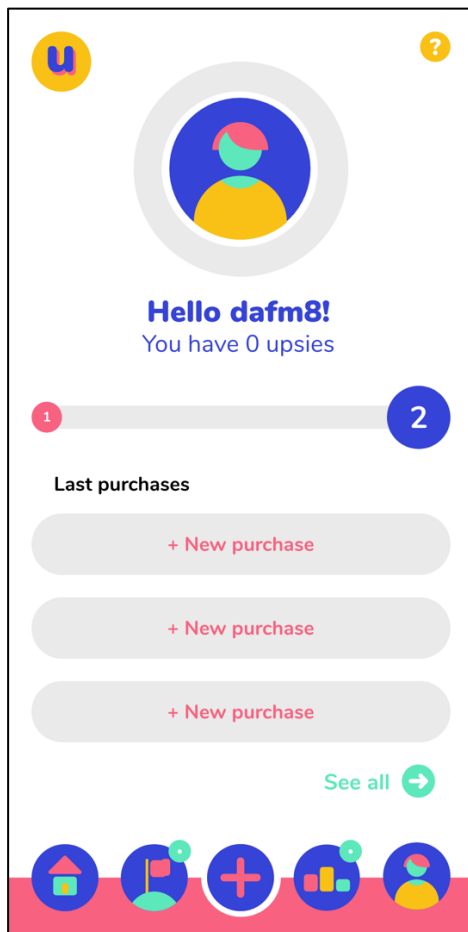


Figure 71. Notifications on the menu icons

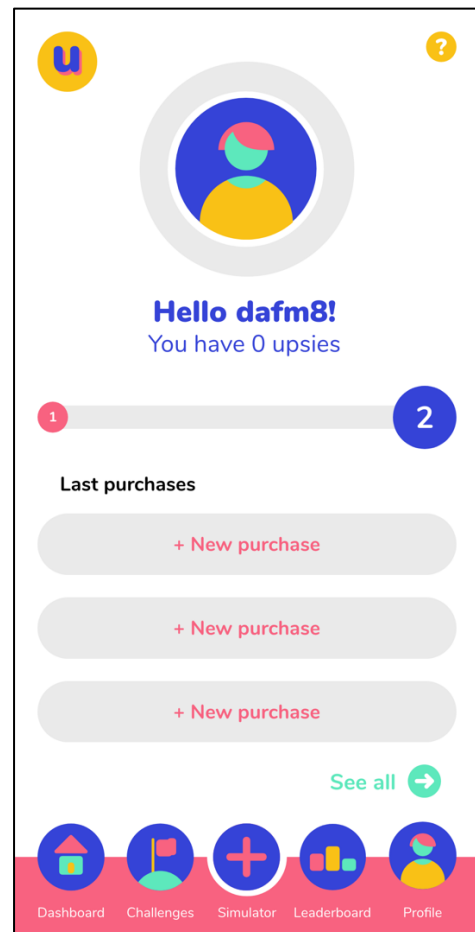


Figure 72. Page description on the menu

Chapter 6

6. Conclusion

Nowadays, smartphones are the main devices used by young people. Not only this study, but also many other investigations about generations and their differences, assure that the smartphone changed the way people socialize and interact. The interviews carried out in the course of this work helped to understand how most recent generations deal with this device. Social media and games are the entertainment features that make these phones so desirable and hard to put down and disconnect from them.

In this study, it was important to understand why children use these devices because the main goal is to create an educational mobile application to teach and raise awareness for the importance of saving money. Warning younger generations about the importance of money and how it is a finite resource that must be handled carefully, is very necessary in the current society. Reverse the cycle of consumerism, optimize and manage financial resources are the main problems addressed by the tool presented. Although, these changes are not easy for adults (the result of decades-old unbridled consuming policies), children as the future citizens of the world, should be the ones to educate, so that other economic policies can emerge, and crises can be handled more responsibly in the future.

The first hypothesis for the age range of the target audience for the app was set to 10 to 16 years old, because this is when young people begin to reach adolescence. They are able to develop complex reasoning, disregarding what is real, and defining their own ideas about the world. Teenagers begin to think and formulate arguments before reaching any conclusion, which is an important aspect when it comes to starting to have an economic awareness as a consumer, and to be able to evaluate the utility of their purchases.

The teenagers interviewed showed interest in the concept of the project and said they would install the app. This is mostly due to the fact that gamification elements were suggested to be added in the experience. The interviewees preferred it to be a “serious” tool, but with gamification elements to improve their engagement. That is why the inclusion of badges, points and challenges was a good solution to transform the app into an educational and fun platform to use.

During the usability tests, it was very gratifying to see the interest of the users participating in the development of this project. Exposing vital insights and pertinent arguments to how the app should or could work. By learning how a mobile app is idealized and constructed, they understood how the apps they use on their daily life are built, and what it takes to create such an important tool that people cannot live without nowadays.

Performing usability tests alongside the users, optimized the results of these tests. Being a very specific population, some of the users were distracted during the test, and it was important to repeat the tasks they had to make. After reassuring what had to be done, the task was completed in a few seconds. Teenagers are, as previously said, in constant contact with the online world and being permanently bombarded with new information, which means their attention span is affected by this exposure to new data.

Even so, the users felt confident using upsie, and two out of the five users that performed the last usability test did not point out any negative aspects on the experience. Two out of the five users also registered the highest score (100) on the System Usability Scale. The users also enjoyed the visual aspect and all the graphic elements created especially for the app. Menu icons, profile icons and a logo were the main elements designed. With a short and fun name that implies a reference to “utility points”, upsie is ready to be implemented and used in teenagers’ everyday life.

Society faces new and more challenging problems every day. Not a day goes by without new developments on science, social, economic or culture matters. That is why, young generations need to be prepared to face an ever-changing world. Critical conscience and the ability to create links between concepts and subjects are important competences that young people increasingly need to have.

During the course of this project, the world was struck by a global pandemic. Paradigms changed, the digital became the protagonist, and various parts of what builds our lives were turned upside down. The education models were reinvented, and a full digital system was implemented. Concepts, like gamification, will begin to emerge, as teachers and students find new ways to be encouraged into learning using new platforms. These platforms also enhance the need for a more independent and autonomous learning method, where students learn from their own experiences, establishing meaningful connections, instead of just memorizing facts and terms.

6.1. Limitations

The usability tests performed reached positive results and the users enjoyed the overall experience of the app proposed. However, there are a few limitations that must be pointed out.

First, the interviews and tests developed for this project were applied to a restrict number of users, with a certain economic and social background. It would be interesting to widen these tests to more population inside the teenager's age range, for example, contacting with people from other cities in Portugal, from different school systems and even other familiar and economic backgrounds.

Due to force majeure reasons, a more extended and in-depth test was not possible to be performed. The world stopped, schools closed, and it was not possible to implement a long-term test that would evaluate the app's credibility and usability value in everyday life of users, which is an important study to be conducted in the future.

6.2. Future work

After this research, other studies could be made regarding the themes addressed, such as:

- 1) Performing an in-depth research on teenagers and their relation with design:

There are still few studies that focus on the specific audience targeted by this project, especially in Portugal. It would be an interesting experience to develop an in-depth research on teenagers. Being it focus on financial matters, but also on their relation with digital products, smartphones and mobile apps. This is a special age-group that is not yet an adult but does not like to be called a child, so it needs to have a different approach. Involving more teenagers in usability tests is a good opportunity for them to understand how the apps they use on their devices are created, generated and implemented. It would be interesting to work with a class or a school, to work as a pilot test to understand the value of the app proposed by this project.

- 2) Present the project at schools:

By presenting this project to schools, teachers and students, could evaluate and suggest new ways to improve the system in order to learn with more ease. Perform a long-term test with users, where they can use the app for a long period of time to assess its credibility and practical usage, is also an important test to evaluate the app's viability.

3) Implement new features and improve the existing ones:

In future work, new features could be implemented in the application in order to create a more fulfilling experience. For example, deepen the points' system, create more categories, subcategories, and a more complex way for awarding points taking into consideration various real-life situations. But also, expand the options to connect with friends, in the Leaderboard, and generate a healthy competition between peers.

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Appendixes

Appendix 1

Consent Form Model [in Portuguese]



Termo de Consentimento Livre e Informado

Eu, _____, encarregado/a de educação de _____, autorizo a participação do/a meu/minha educando/a no projeto de investigação “A MOBILE APP ON FINANCIAL MANAGEMENT FOR TEENAGERS BASED ON GAMIFICATION ELEMENTS” [título provisório], no âmbito do Mestrado em Design e Cultura Visual, desenvolvido no IADE – Universidade Europeia, pela Licenciada Catarina Alexandra Félix Monteiro, sob a orientação do Professor Doutor Edirlei Soares Lima e coorientação do Professor Doutor João Rodrigues dos Santos.

A participação neste estudo consistirá em **3 sessões de entrevistas e testes presenciais**. A participação é **voluntária** e, por essa razão, o/a participante pode decidir abandonar as sessões a qualquer momento, sem qualquer penalização.

Declaro que dou o meu consentimento, de forma livre e informada, para a participação do/a meu/minha educando/a nesta investigação, tendo em conta que:

- serão feitas entrevistas apenas com voz gravada;
- testes de usabilidade com gravação de ecrã do telemóvel;
- será mantido o anonimato do/a participante, sendo que os únicos dados divulgados serão: a idade do/a participante, o género e a cidade onde estuda.

Caso aceite que o/a seu/sua educando/a faça parte deste estudo, deverá **assinar as duas vias deste documento** sendo que, uma delas, ficará na sua posse e a outra com a investigadora responsável.

Ao assinar este documento está a declarar que nada tem a opor e que autoriza a participação do/a seu/sua educando/a neste estudo.

Nome do/a Educando/a: _____

Assinatura do/a Encarregado/a de Educação: _____

Data: _____

Appendix 2

User research interviews – transcribed [in Portuguese]

(1) First interview

1. *Que escola frequentas e em que ano estás?*

Estou na Escola (-) e estou no 5º ano.

2. *Quais são as tuas disciplinas favoritas na escola? E porquê?*

Português, porque gosto de aprender mais sobre palavras novas. E Educação Tecnológica porque fala sobre novas técnicas de aprendizagem e de trabalhos manuais.

3. *Tens telemóvel com acesso à Internet?*

Sim.

4. *Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?*

Numera algumas das aplicações que mais usas.

Uso mais para jogar OSm que é um jogo de futebol, também o Youtube para ver vídeos, a PlayStore para instalar jogos e o Instagram mas uso menos porque não tenho conta.

5. *O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?*

O dinheiro para mim é como se fosse um objeto que vale, e que dá para comprar outros objetos.

Sobre economia nunca falei muito na escola e não sei explicar o que é.

6. *Tens mesada ou semanada?*

Eu recebo dinheiro por mês. A minha mãe é que me dá.

7. *Em que tipo de produtos gastas mais dinheiro?*

Não costumo gastar em nada.

8. *Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?*

Sim, peço autorização aos meus pais.

9. *Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?*

Não, nunca ando com dinheiro na carteira, nem tenho nenhum cartão.

10. *Costumas ir às compras com os teus pais?*

Sim, e tento sempre ajudá-los a encontrar as coisas mais baratas e que estão em promoção.

11. *Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gatares 1€ em gomas é diferente de gatares 1€ numa sandes, para ti?*

Não costumo comprar brinquedos para mim, é mais para os meus amigos quando há alguma festa de anos.

De resto, acho que a sandes é melhor porque é mais saudável e é melhor para emagrecer.

12. Tens algum mealheiro onde guardes algum dinheiro? Como é que geres esse mealheiro? Colocas alguma quantia certa de x em x tempo ou só quando recebes algum dinheiro extra? Quando é que gastas o dinheiro desse mealheiro e quais são as razões para o fazeres?

Sim. Só quando recebo algum dinheiro extra é que coloco no mealheiro.

13. Consideras importante poupar dinheiro? Porquê?

Sim é importante, para mais tarde poder comprar coisas que goste.

14. Consideras importante a economia e a educação financeira? Porquê?

Sim. Principalmente para pessoas da minha idade, para saberem como poupar e não gastarem logo o dinheiro em porcarias.

15. Quanto à educação financeira, em que é que sentes mais dificuldades?

Gostava de saber mais sobre como se poupar mais dinheiro.

16. Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?

Gostava de poder aprender a gerir melhor o meu dinheiro.

17. Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?

Eu acho que sim. Mas não devia ser simplesmente inserir as compras na aplicação, porque assim a pessoa estava a inserir compras na app e não recebia nada em troca, só gastava o dinheiro.

(2) Second Interview

1. Que escola frequentas e em que ano estás?

Ando na Escola (-) e estou no 5º ano.

2. Quais são as tuas disciplinas favoritas na escola? E porquê?

Gosto mais de Português e Inglês porque gosto de aprender línguas do mundo. São mais interessantes que as outras matérias. E sabermos falar inglês é importante porque é uma língua universal

3. Tens telemóvel com acesso à Internet?

Sim.

4. Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?

Numera algumas das aplicações que mais usas.

Uso mais o Whatsapp, para falar com amigas, ou falar sobre a escola. Uso também o Youtube, Spotify, Tik Tok e Instagram, para ver vídeos, ouvir musica, e fazer vídeos de música.

5. O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?

O dinheiro é algo que podemos utilizar para comprar coisas que são precisas mas sempre com moderação. A economia é um conjunto de fatores que ajudam no dia-a-dia, ajuda o dinheiro a circular e a ver as percentagens de mais gastos no ranking mundial.

Este ano, vamos falar sobre economia na disciplina de cidadania, mas ainda só falámos por alto.

6. Tens mesada ou semanada?

Não tenho mesada. Mas tenho um cartão na escola, que eu carrego para as refeições. Depois vou pedindo dinheiro, consoante preciso aos meus pais.

7. Em que tipo de produtos gastas mais dinheiro?

Gasto mais na escola, para senhas do almoço, pão para o lanche, ou materiais que preciso para algumas disciplinas.

8. Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?

Às vezes peço, depende. Se são materiais que realmente preciso, compro eu sozinha.

9. Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?

Costumo usar o cartão da escola, e tenho algum dinheiro na carteira.

10. Costumas ir às compras com os teus pais?

Sim.

11. Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gastares 1€ em gomas é diferente de gastares 1€ numa sandes, para ti?

Às vezes. É diferente. Depende da utilidade do que quiser comprar. Se for um produto mais caro, compro porque sei que me vai dar mais utilidade, produtos mais baratos às vezes não são tão bons. Mas a sandes é mais saudável do que as gomas e por isso mais útil.

12. Tens algum mealheiro onde guardes algum dinheiro? Como é que geres esse mealheiro? Colocas alguma quantia certa de x em x tempo ou só quando recibes algum dinheiro extra? Quando é que gastas o dinheiro desse mealheiro e quais são as razões para o fazeres?

Sim tenho um mealheiro. Um mealheiro para as minhas coisas e outro para a escola para carregar o cartão. Para as minhas coisas uso o primeiro mealheiro e para carregar o cartão o segundo.

13. Consideras importante poupar dinheiro? Porquê?

Sim. Porque se gastarmos o dinheiro sem valer a pena, e estamos a gastar dinheiro sem ser preciso depois não temos mais dinheiro para gastar em coisas necessárias, como por exemplo na alimentação.

14. Consideras importante a economia e a educação financeira? Porquê?

Sim. Porque os mais jovens pensam que podem gastar o dinheiro sem ser preciso, e é preciso alertar para utilizar o dinheiro com moderação.

15. Quanto à educação financeira, em que é que sentes mais dificuldades?

Gostava de saber como é que o dinheiro chega dentro de um país e como é que circula. Para onde vai quando é utilizado e se volta outra vez a circular.

16. Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?

Gostava que na página inicial, tivesse o básico e depois ter mais páginas cada vez mais difíceis e com perguntas, conforme as curiosidades dos mais jovens.

17. Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?

Sim. Podia ter mini jogos, tipo jogos entre as páginas, por exemplo adaptações de jogos já existentes: como sandbox, crossy road (com o objetivo de chegar à casa onde circula o dinheiro, por exemplo) ou o subway surfers (o boneco podia andar a angariar dinheiro para as pessoas). A app podia chamar-se “Economizar em segurança” ou “Economia útil” por exemplo.

(3) Third Interview

1. Que escola frequentas e em que ano estás?

Estou na Escola (-), no 9º ano.

2. Quais são as tuas disciplinas favoritas na escola? E porquê?

Gosto de Matemática e tudo o que esteja relacionado com números, fazer contas e aprender novas maneiras de fazer exercícios. Mas gosto também de Educação Física e de aprender novos desportos.

3. Tens telemóvel com acesso à Internet?

Sim.

4. Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?

Numera algumas das aplicações que mais usas.

Utilizo mais para jogos. Mas também uso o Youtube, para acompanhar as notícias e os youtubers que mais gosto. Também uso o telemóvel para fazer chamadas ou mandar mensagens.

5. O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?

O dinheiro é um meio de pagamento, que se deve tratar com cuidado e gastar com cuidado, não gastando logo todo o dinheiro que se recebe. A economia estuda tudo o que tem a ver com dinheiro e a sua gestão. Falámos sobre economia por alto em cidadania e em geografia, para comparar a economia nos diferentes países do mundo.

6. Tens mesada ou semanada?

Não. Mas de vez em quando a minha mãe ou a minha avó dão-me dinheiro e eu guardo no mealheiro, quando preciso é que vou buscar.

7. Em que tipo de produtos gastas mais dinheiro?

Gasto mais na escola, no bar e em sandes para comer.

8. Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?

Dão-me dinheiro para coisas da escola, e depois eu carrego o cartão da escola e gasto esse dinheiro só na escola e em coisas que realmente preciso.

9. Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?

Há pouco tempo fiz o meu primeiro cartão, mas uso mais os trocos da carteira. Só uso notas quando preciso de carregar o cartão da escola.

10. Costumas ir às compras com os teus pais?

Costumo ir às vezes sim.

11. Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gastares 1€ em gomas é diferente de gastares 1€ numa sandes, para ti?

Sim, faço essa análise e opto pelo menor preço. O preço e não só. A sandes é mais útil que as gomas, mas mesmo assim também gosto de comprar gomas.

12. Tens algum mealheiro onde guardes algum dinheiro? Como é que geres esse mealheiro? Colocas alguma quantia certa de x em x tempo ou só quando recebes algum dinheiro extra? Quando é que gastas o dinheiro desse mealheiro e quais são as razões para o fazeres?

Sim. Só quando recebo é que meto dinheiro nesse mealheiro.

Tiro uma nota, para o cartão da escola, ou tiro umas moedas para ter na carteira.

13. Consideras importante poupar dinheiro? Porquê?

Sim. Para mais tarde quando for necessário, ter sempre algum de reserva. Para tudo o que se vá precisando de comprar é importante ir poupando dinheiro cedo.

14. Consideras importante a economia e a educação financeira? Porquê?

Sim, a partir de uma certa idade é importante. Para mais tarde, se tiver um cartão de crédito saber o que é melhor comprar e onde se deve gastar o dinheiro.

15. Quanto à educação financeira, em que é que sentes mais dificuldades?

Nunca falámos muito na escola, mas gostava de saber o que são os impostos e como é que se gere o dinheiro para ter dinheiro de sobra e suficiente.

16. Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?

Podia-se aprender a definição de economia. Podia ter um tutorial no início. Podia ser tipo um jogo em que está alguém num supermercado e depois tem que escolher a melhor opção para uma compra mais sustentável.

17. Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?

Sim. Porque dá um sentimento de evolução.

(4) Fourth Interview

1. Que escola frequentas e em que ano estás?

Estou na Escola (-) e frequento o 9º ano.

2. Quais são as tuas disciplinas favoritas na escola? E porquê?

Gosto muito de Matemática, porque gosto de fazer contas e de resolver problemas complicados que necessitam de raciocínios elaborados. Também gosto de Educação Física porque gosto de fazer desporto.

3. Tens telemóvel com acesso à Internet?

Sim.

4. Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?

Uso mais para redes sociais, tipo Instagram, Whatsapp, Google ou Youtube.

5. O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?

O dinheiro serve para se comprar coisas, é o que faz o mundo desenvolver-se e ter as suas atividades normais ativas. A Economia serve para poupar e gerir dinheiro, e também move o mundo.

6. Tens mesada ou semanada?

Não.

7. Em que tipo de produtos gastas mais dinheiro?

Gasto mais em alimentação ou material escolar, mas tudo dentro da escola.

8. Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?

Peço autorização aos meus pais.

9. Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?

Ando mais com moedas e notas na carteira.

10. Costumas ir às compras com os teus pais?

Sim, costume ir.

11. *Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gastares 1€ em gomas é diferente de gastares 1€ numa sandes, para ti?*

Se necessito daquilo vai ter diferentes valores e usos, do que algo que eu não vá necessitar. A sandes nesse caso é mais saudável. Os doces não dão vitaminas.

12. *Tens algum mealheiro onde guardes algum dinheiro?*

Sim.

13. *Consideras importante poupar dinheiro? Porquê?*

Sim, porque vou necessitar no futuro e é importante poupar para qualquer eventualidade inesperada.

14. *Consideras importante a economia e a educação financeira? Porquê?*

Sim, para se saber poupar e no futuro se estar mais à parte a par disso e de como funciona o dinheiro.

15. *Quanto à educação financeira, em que é que sentes mais dificuldades?*

Gostava de saber mais sobre poupar mais dinheiro.

16. *Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?*

Preferia que fosse mais séria, mas divertida também.

17. *Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?*

Sim, porque ajuda a ter mais vontade de a usar.

(5) Fifth Interview

1. *Que escola frequentas e em que ano estás?*

Estou na Escola (-) e no 9º ano.

2. *Quais são as tuas disciplinas favoritas na escola? E porquê?*

Geografia é a minha disciplina favorita porque gosto de saber mais sobre o mundo. Também gosto de Educação Física, porque gosto de desporto.

3. *Tens telemóvel com acesso à Internet?*

Sim.

4. *Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?*

Numera algumas das aplicações que mais usas.

Utilizo mais para jogo e para ver vídeos no Youtube.

5. *O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?*

O dinheiro é o que nos faz viver, governa tudo. Já a Economia é a maneira de gerir o dinheiro, mas não é muito falado na escola.

6. Tens mesada ou semanada?

Não.

7. Em que tipo de produtos gastas mais dinheiro?

Gasto mais em comida e em coisas para a escola.

8. Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?

Peço autorização aos meus pais.

9. Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?

Os dois, costumo usar as duas opções.

10. Costumas ir às compras com os teus pais?

Sim.

11. Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gastares 1€ em gomas é diferente de gastares 1€ numa sandes, para ti?

Sim, penso sempre bem antes de comprar algo. Acho que o valor dos produtos depende da utilidade que lhe vamos dar. Neste caso, a sandes é mais saudável e por isso mais útil.

12. Tens algum mealheiro onde guardes algum dinheiro? Como é que geres esse mealheiro? Colocas alguma quantia certa de x em x tempo ou só quando recibes algum dinheiro extra? Quando é que gastas o dinheiro desse mealheiro e quais são as razões para o fazeres?

Guardo no mealheiro e quando começa a ficar muito, deposito no banco.

13. Consideras importante poupar dinheiro? Porquê?

Sim, para termos dinheiro para comprar coisas no futuro.

14. Consideras importante a economia e a educação financeira? Porquê?

Sim, para começarmos a pensar no futuro, e para não gastarmos o dinheiro todo logo, sabermos geri-lo melhor.

15. Quanto à educação financeira, em que é que sentes mais dificuldades?

Gostava de saber diferentes maneiras de poupar dinheiro.

16. Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?

Preferia que fosse uma aplicação mais séria para podermos aprender mais sobre como gerir o nosso dinheiro.

17. Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?

Sim.

(6) Sixth Interview

1. Que escola frequentas e em que ano estás?

Ando na Escola (-) e estou no 11º ano.

2. Quais são as tuas disciplinas favoritas na escola? E porquê?

Gosto de Português, Inglês e tudo o que seja da área das línguas porque é uma área que gosto e quero seguir no futuro.

3. Tens telemóvel com acesso à Internet?

Sim.

4. Para que é que usas o telemóvel? Que tipo de aplicações tens instaladas? Redes sociais, jogos, etc.?

Numera algumas das aplicações que mais usas.

Uso o Twitter e Instagram, no geral uso o telemóvel mais para redes sociais.

5. O que é, para ti, o dinheiro? E economia? Já falaste sobre este tema na escola?

O dinheiro é o que nos gere, sem dinheiro não temos uma vida de qualidade.

Eu acho que tudo o que envolve economia e finanças tem a ver com dinheiro.

Já falei um pouco sobre este tema na escola, mas não muito.

6. Tens mesada ou semanada?

Não.

7. Em que tipo de produtos gastas mais dinheiro?

Costumo gastar mais em comida. Em roupa também, mas menos.

8. Pedes autorização aos teus pais para comprar alguma coisa ou decides tu mesmo o que deves ou não comprar?

Costumo pedir sempre autorização.

9. Costumas andar com moedas e notas na carteira ou tens algum cartão onde guardas esse dinheiro?

Como não tenho nenhum cartão uso mais moedas e notas.

10. Costumas ir às compras com os teus pais?

Sim, e quando vou costumo tomar atenção ao que está em promoção. Tento sempre escolher coisas que estejam com o preço mais baixo, mas que tenham qualidade na mesma.

11. Quando fazes uma compra analisas a necessidade dessa compra e questionas se ela te fará mais feliz

ou será útil no futuro? É o valor que está marcado no preço ou o seu valor depende da utilidade que lhe vais dar? Por exemplo, gastares 1€ em gomas é diferente de gastares 1€ numa sandes, para ti?

Sim, nunca compro nada que não me vá ser útil. Eu acho que depende da sua utilidade porque gomas é guloseima, não é propriamente útil, sandes é comida a sério e alimenta como deve ser.

12. Tens algum mealheiro onde guardes algum dinheiro? Como é que geres esse mealheiro? Colocas alguma quantia certa de x em x tempo ou só quando recebes algum dinheiro extra? Quando é que gastas o dinheiro desse mealheiro e quais são as razões para o fazeres?

Sim e sempre que recebo algum dinheiro extra coloco lá. Só gasto quando há algo que necessito, mas se for algo mais caro divido com os meus pais.

13. Consideras importante poupar dinheiro? Porquê?

Sim, porque é o que nos gere e se não tivermos é difícil vivermos.

14. Consideras importante a economia e a educação financeira? Porquê?

Sim é importante, porque há muita gente que não tem a noção da importância do dinheiro e é preciso ter mais conhecimento sobre isto.

15. Quanto à educação financeira, em que é que sentes mais dificuldades?

Eu acho que todos temos algum conhecimento geral, só que normalmente deixamos estes assuntos para os adultos. As pessoas da minha idade deviam começar a ter mais noção sobre isto.

16. Se existisse uma aplicação para o telemóvel, que te ajudasse e te ensinasse mais sobre economia e educação financeira, o que é que achas que essa aplicação devia ter?

Eu acho que deveria ser uma aplicação mais séria mas não totalmente, também gosto que seja algo divertido e onde possa aprender mais.

17. Ao inserir elementos de jogos, como por exemplo recompensas e medalhas, ficarias mais interessado e motivado para usar essa aplicação?

Sim sim, porque permite tornar a experiência mais divertida.

Appendix 3

Usability test form using SUS [in Portuguese]

Formulário de Usabilidade

Este formulário tem como objetivo recolher o feedback de potenciais utilizadores de uma app de educação financeira para adolescentes.

Vais analisar o protótipo final de uma aplicação de telemóvel e responder às questões que se seguem, assinalando a tua opção numa escala de 1 a 5. A escala tem dois extremos: "Discordo plenamente" e "Concordo plenamente".

Por favor, sê honesto/a nas tuas respostas porque serão bastante úteis para melhorar a experiência desta aplicação. Não há respostas certas ou erradas, há apenas a tua opinião.

Obrigada pela ajuda!

Catarina Monteiro | IADE-MDCV | 2020

Eu gostava de usar esta app no meu dia-a-dia. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

A app é demasiado complexa. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

A app é fácil de utilizar. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Eu preciso da ajuda de alguém para entender como funciona a app. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

As várias funções da app estavam bem integradas. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

A app era muito inconsistente e difícil de utilizar. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Eu acredito que qualquer pessoa aprende facilmente a usar esta app. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Eu acredito que esta app é muito difícil de usar. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Eu senti-me confiante a usar esta app. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Eu preciso de ter muitos conhecimentos para saber utilizar esta app. *

Discordo plenamente 1 2 3 4 5 Concordo plenamente

Na tua opinião, quais são os pontos positivos desta app? *

Na tua opinião, quais são os pontos negativos desta app? *

***Obrigatório**

Appendix 4

First usability test – recorded screen

(1) First user

https://drive.google.com/file/d/1jdHzc2_MORE--fKzCcJrGXX1CIvNByI/view?usp=sharing

(2) Second user

<https://drive.google.com/file/d/1pUmfsdZhQN-NkOogwzxBWPrM3b1Anr9D/view?usp=sharing>

(3) Third user

https://drive.google.com/file/d/1_hFys1BrMZNjvJdrEUKYYTZORLxR_6r1/view?usp=sharing

(4) Fourth user

<https://drive.google.com/file/d/1cNm0A6jJqaKqij2HVd4LpjcfL4qLbQum/view?usp=sharing>

Appendix 5

Second usability test – recorded screen

(1) First user

<https://drive.google.com/file/d/1fhkz-BRCVE-S5g3QqFdCpQSuQt7C2tvU/view?usp=sharing>

(2) Second user

<https://drive.google.com/file/d/1iKQReISHEwmgRiMYIkJ5ws6USJ55J-MQ/view?usp=sharing>

(3) Third user

<https://drive.google.com/file/d/1BXLjV9YvGbpRiXuLphLHRz2bIYTUxwdo/view?usp=sharing>

(4) Forth user

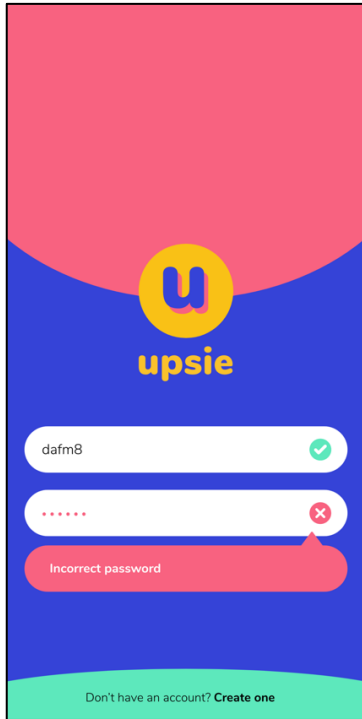
<https://drive.google.com/file/d/1WddE8s247flPCWpCszMndstPFnKARPX8/view?usp=sharing>

(5) Fifth user

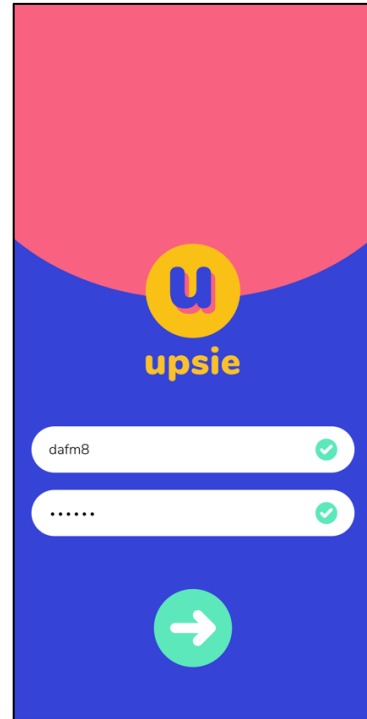
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Appendix 6

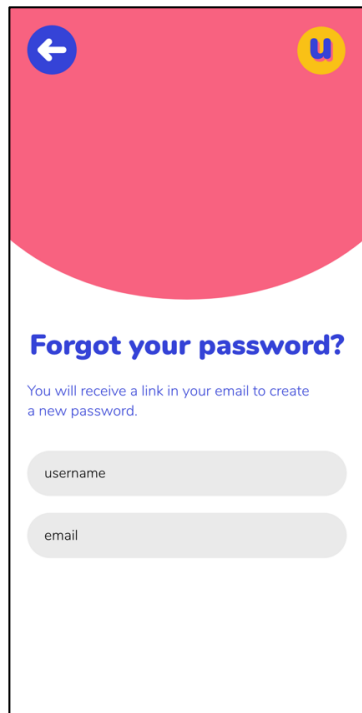
Upsie's final screens



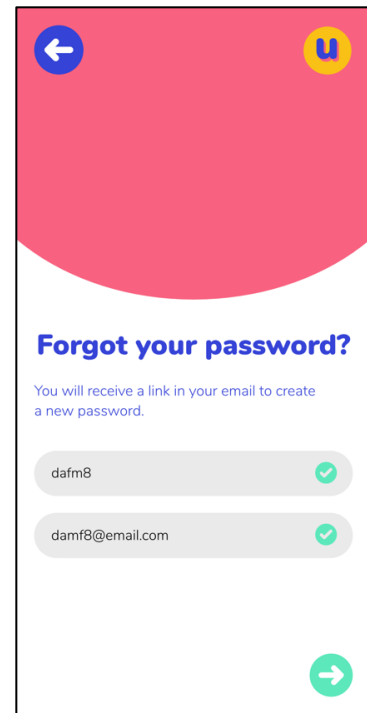
Login: password error



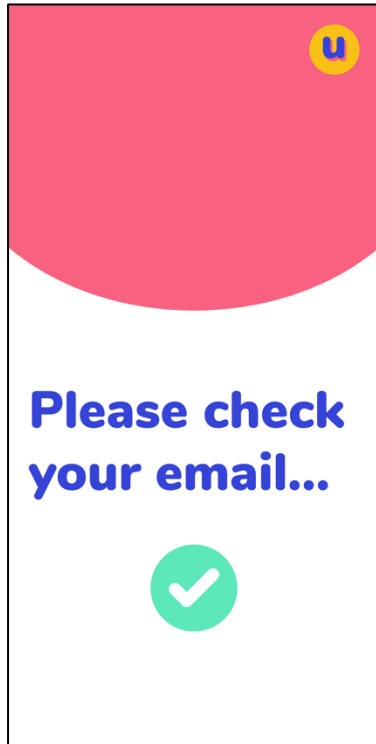
Login: username and password correct



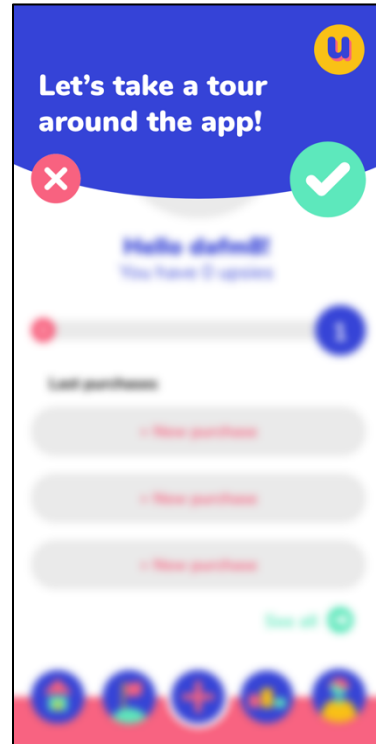
Forgot your password



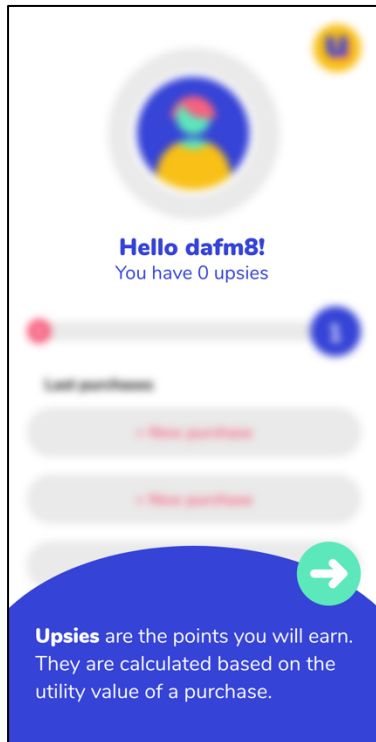
Forgot your password: username and email correct



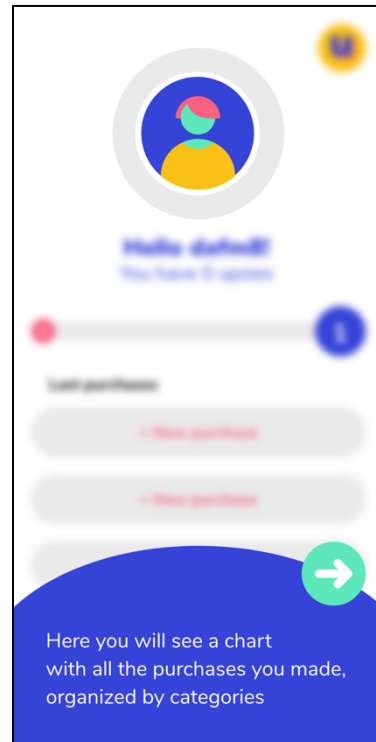
Forgot your password: email confirmation



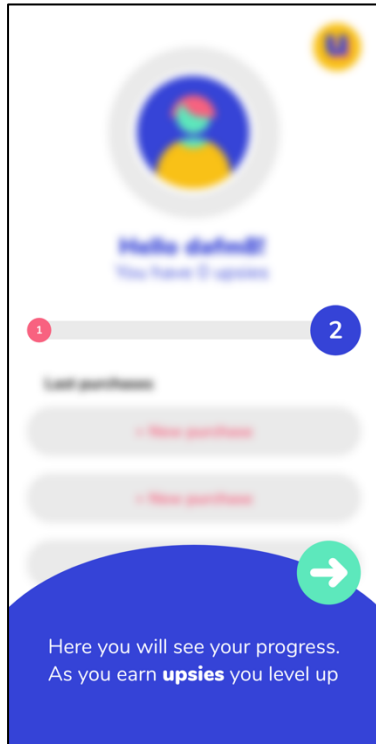
Tutorial: first screen



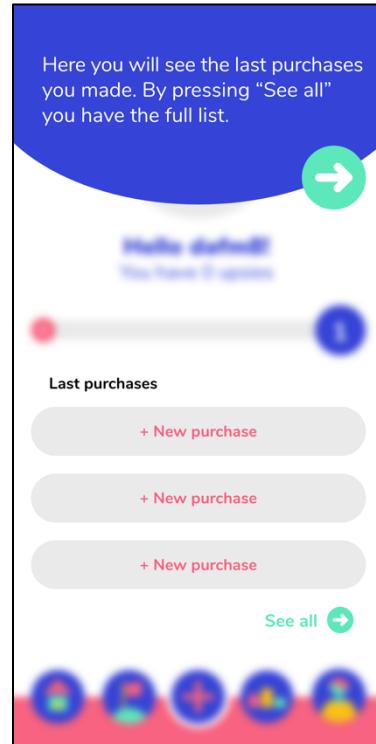
Tutorial: second screen



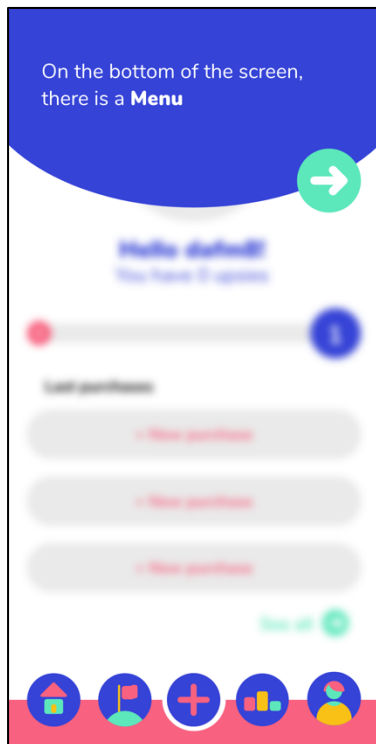
Tutorial: third screen



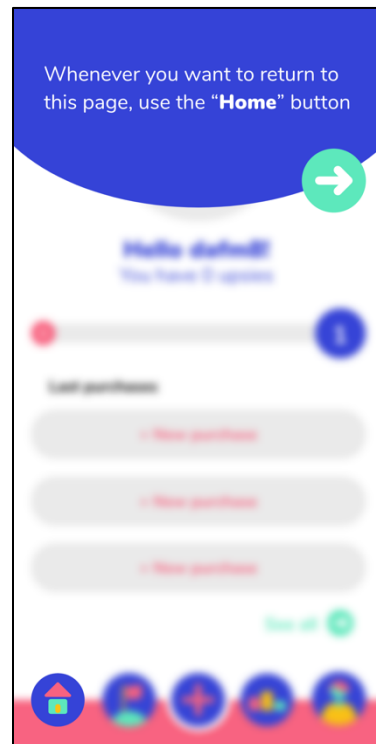
Tutorial: third screen



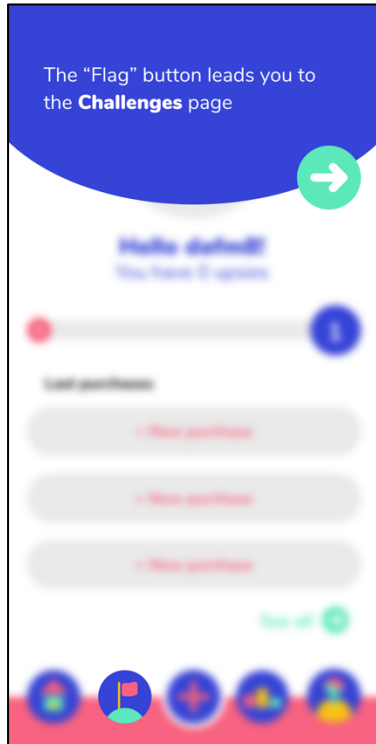
Tutorial: fourth screen



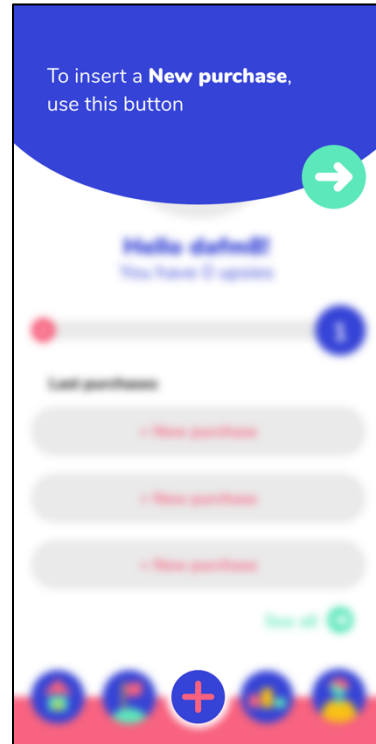
Tutorial: menu explanation



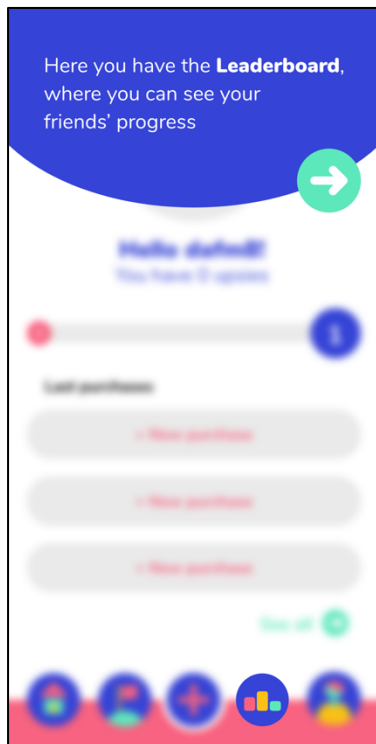
Tutorial: menu explanation "Home"



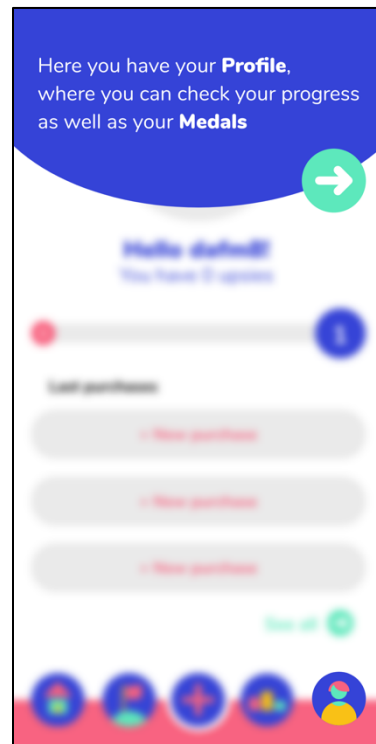
Tutorial: menu explanation "Challenges"



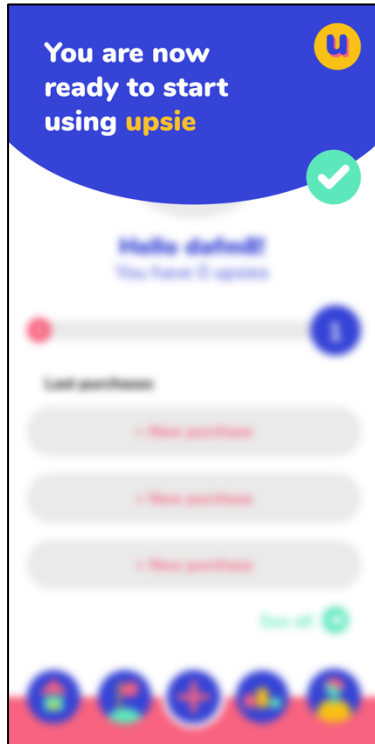
Tutorial: menu explanation "Upsie Simulator"



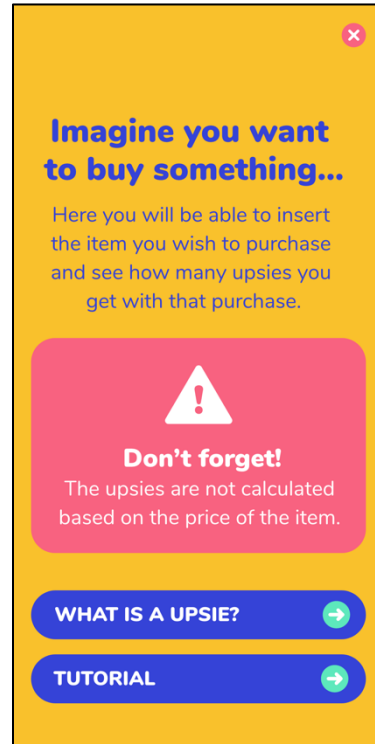
Tutorial: menu explanation "Leaderboard"



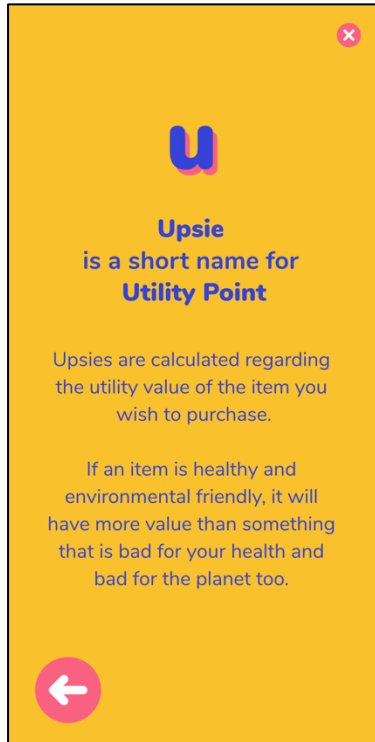
Tutorial: menu explanation "Profile"



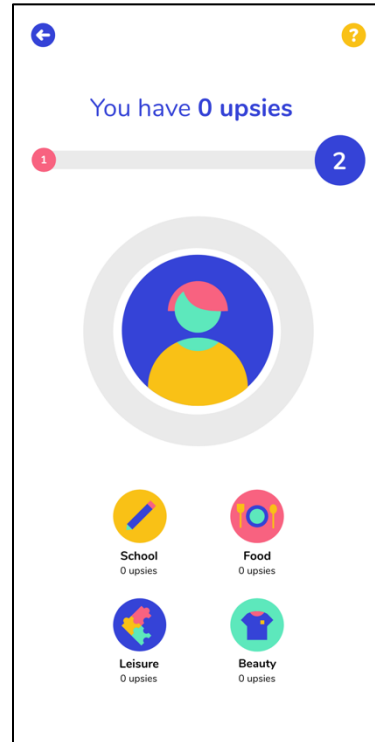
Tutorial: final screen



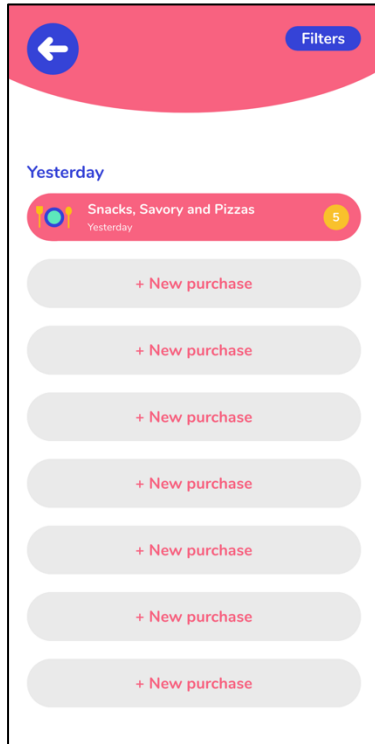
"?"



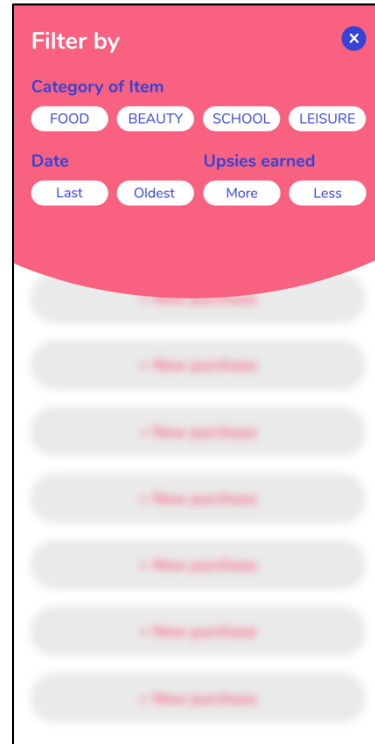
"?": what is a upsie



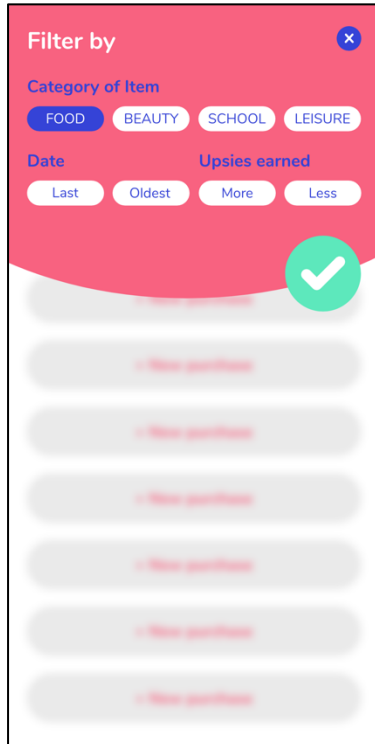
Upsies chart



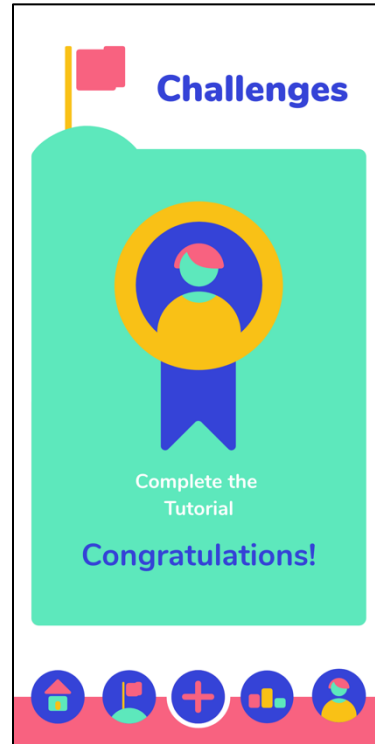
"See all" purchases



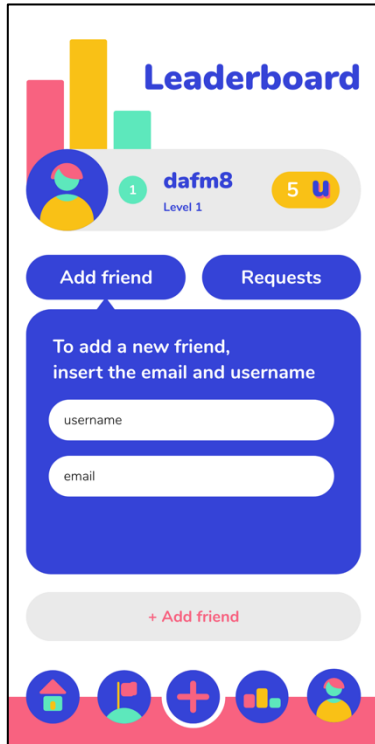
"See all" purchases: filters



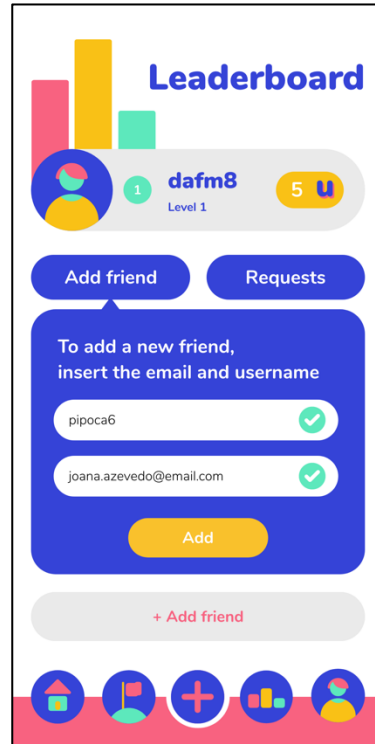
"See all" purchases: filter checked



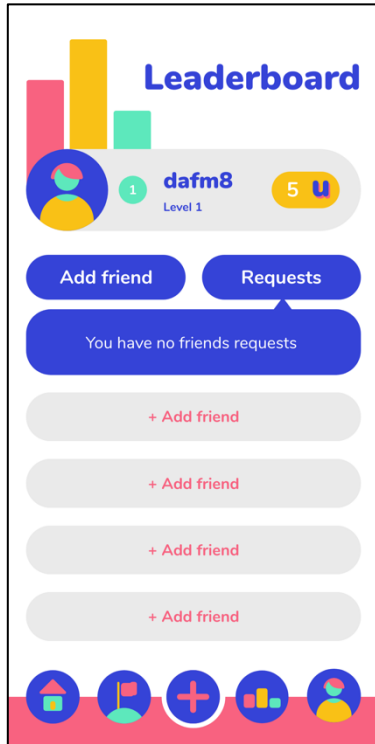
Challenge complete: badge received



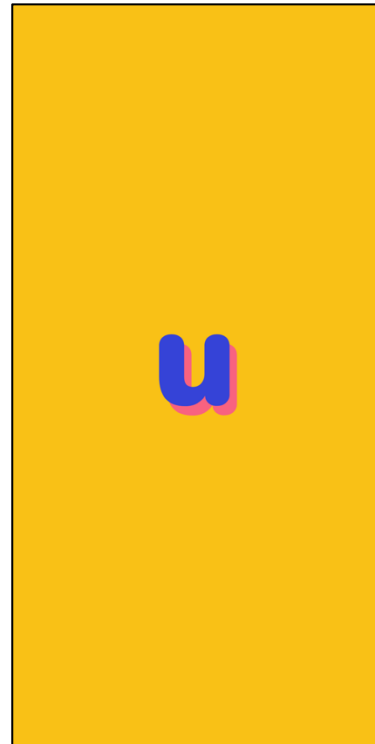
Leaderboard: add friend



Leaderboard: friend's username and email correct



Leaderboard: no friend requests



Splash Screen



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