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Teaching Kids Financial Education: The Digital Way

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Teaching Kids Financial Education: The Digital Way

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Abstract

The purpose of the research is to provide a financial education digital learning solution to parents that wants to raise financially fit children. We will explain how we implemented Design Thinking and Lean Startup methodologies, gained insight about the problem, built the hypothesis and developed a minimum viable product.

Keywords: digital learning, financial education, childhood financial education, lean startup, design thinking.

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1. Introduction

1.1. Motivation

The motivation for this study come up with the Brazilian financial crisis that started in 2015 and intensified during the next two years. This crisis elucidated how Brazilian people finances are in general at the mercy of the market or better yet, how unprepared a massive part of the population was, due to debts, lack of savings accounts or investments and consumerism.

As a computer science student is our duty to disrupt old and ineffective ways of teaching finance into new engaging and digital ones, using everything we can to make it accessible to the greatest number of people possible.

1.2. Goals

The goal of this research is to provide a digital solution to parents that wants to raise financially fit children in a way that is both engaging and accessible.

To develop this we will take advantage of the entrepreneur environment and the knowledge involved in developing and launching a product.

1.3. Chapters

The first two chapters contextualize the concepts of “Lean Startup” and “Design Thinking”. The third chapter presents the technology stack we have chosen for the project and explores its pros and cons. The fourth chapter documents the process of trying to validate an idea and clarifies the variables involved in the problem we are dealing. The goal of the fifth chapter is to find a good approach in scientific publications that would serve as our financial education theory. The “Developing the MVP” chapter talks about the development of the MVP and the choice of features that would be available. The seventh chapter documents the iterations we had, each one improving our product aiming to find the best solution possible for our clients. In “Conclusions” we have a data analysis of what we could accomplish. And finally, in “Subjective Part” we

make comments about our challenges throughout the project, the relevant courses and next steps.

2. Startups

In this chapter we will explore the entrepreneurship world, explore what an startup is and discuss some trending techniques to get a business running.

2.1. What is a startup?

Generally startups are defined as young small companies, usually fast-growing business with short money and people, which nowadays are becoming more popular, almost part of pop culture itself, often represented as some geeks working in a garage to develop some groundbreaking product.

Eric Ries, Lean Startup's^[26] author, has a fair definition on startups:

"A startup is a human institution designed to deliver a new product or service under conditions of extreme uncertainty."^[26]

By human institution Eric Ries emphasizes that the value of a company is not in the product itself but with the people and their organization who built it. We could have the proof of this, just looking at the results of the large majorities of corporate acquisitions of startups. In most cases, essential aspects of the startup are lost, even when the product, its brand, and even its employment contracts are preserved. A startup is greater than the sum of its parts; it is an acutely human enterprise.

The definition also put a lot of importance on innovation which should be the heart of a startup company and the one thing that differs from established companies.

In Steve Blank's words:

"A startup is a temporary organization used to search for a repeatable and scalable business model."^[3]

This definition exposes the main idea of a startup company which is search for an unknown business model, in order to disrupt existing markets or even create new ones. So, in this high uncertain environment, startups proceed doing tests designed for

proving or disproving hypotheses which lead them toward abandoning the idea completely or moving forward developing it.

2.2. The Lean Startup Methodology

2.2.1. Introduction

Lean Startup combines concepts from Lean Manufacturing (Toyota Lean manufacturing), Agile methodologies (XP, Scrum, etc...) and Customer Development (Steve Blank – Development of Customers).

2.2.2. History

Steve Blank started the movement after founding and working within eight companies at Silicon Valley, four of which have gone public, but at 1999 he retired and started to teach entrepreneurship at University of California: Berkeley in 2002. By 2003, he publishes the book *“The four steps to epiphany”* sharing with the world the “Customer Development methodology”, methodology which he had created in the mid 1990s.

In 2004, Blank invests in Eric Ries’ startup, called IMVU, who, by Blank’s words, was the first to understand the difference between the traditional model of running companies and Customer Developer methodology, which Ries proposed as an analogy with the Toyota Production System (Lean) – the term Lean Startup was created.

By 2010, Osterwalder and Pigneur publish the *“Business Model Canvas”*^[23], offering an excellent model to develop ideas about the business model for monetizing data. In 2011 Eric Ries publishes *“The Lean Startup”*^[26] book, becoming one of the bestsellers on business books and creating, what is now being described as “Lean Startup Movement”.

2.2.3. How to use the Lean Startup methodology?

This methodology can greatly help the entrepreneur to develop and launch new products in the market. According to Steve Blank^[4], the Lean Startup method is supported by three important pillars:

- The entrepreneur must be aware that before launching his product, even if he has done a lot of research, he has nothing but hypotheses that he needs to prove. So instead of consolidating a long report (the Business Plan, which in Brazil it takes generally three months to finish), the methodology proposes that the entrepreneur should use a tool called Canvas to set up their business model. Basically, Canvas is a diagram that shows how the company creates value for itself and its customers.
- The entrepreneur must test his hypotheses with the approach called “Customer development”. This means the company will talk to potential users, buyers, and partners to get their viewpoint on any and every element of the business model, including product features, pricing, distribution channels, and cost-effective customer acquisition strategies. To do this, the entrepreneur must showcase an MVP (we’ll go through it later).
- A lean startup adopts the so-called “agile development”, which goes hand in hand with developing the product along with the customer. In agile development, there is no loss of time or resources, since the product is developed iteratively and incrementally.

It all revolves around customer interaction, testing to validate hypotheses and improvements throughout the process, all this before definitely launching your product.

2.2.4. What is MVP?

One of the great mistakes made by entrepreneurs is not to test and validate their guesses before investing in new product launches. To avoid this and not waste time and money, understanding and applying the MVP concept is critical.

A MVP (Minimum Viable Product) is like a beta product, developed using agile principles and cost-effective to be presented to the audience and receive feedback as fast as possible. It is an excellent tool for gaining insight into the market and validating assumptions.

So, MVP will be our test instrument. It will help anticipate problems, or even redefine your business strategy. Here are some points to help develop the MVP:

- **Formulate hypotheses to validate:** The great goal of developing an MVP is to validate assumptions about the market before investing in a product and

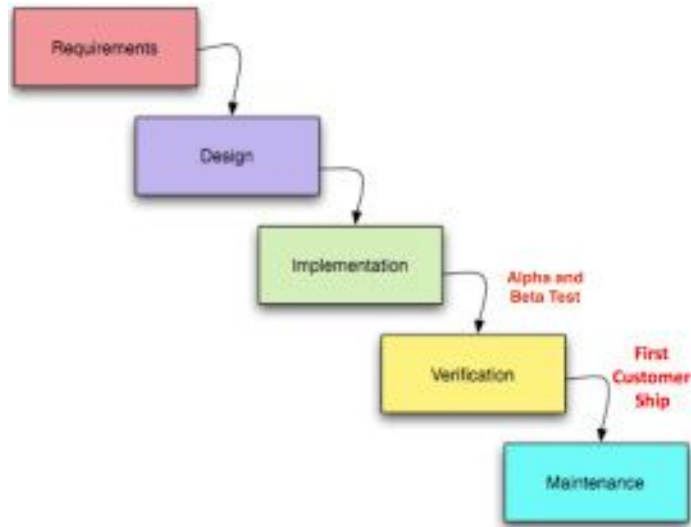
launching it, so before thinking about how the MVP will be, what about thinking about what we want to learn from it and formulate clear hypotheses? But, attention: if an entrepreneur is still not able to formulate hypotheses about its consumer public and its value proposition, then it is not yet time to make an MVP

- **Understand your market:** Immerse yourself in the macro and micro indicators of your audience, have an ideal customer profile clearly defined, understand the context in which your company is inserted, discover who your potential competitors are and what solutions they are offering. The more you delve into the universe of which your product and customers are part, the better for you.
- **Define metrics and establish metrics:** From data collected in your previous survey, define which indicators and metrics you will use to evaluate your MVP's performance from interacting with your audience.
- **Think about the features of your MVP:** the MVP needs to find a balance between the time, resources invested in its development, and how the product value proposition will be presented to the customer

2.2.5. Build-Measure-Learn cycle

The build-measure-learn cycle comes as a more customer-focused concept of continuous integration, practice that is widely used in software engineering and one of the main ideas of agile methodologies.

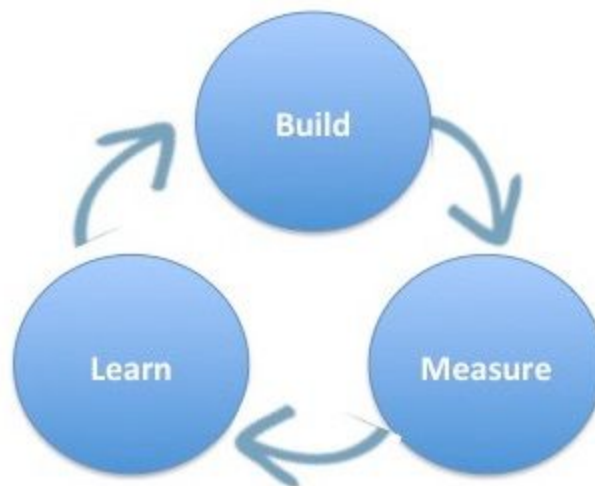
As continuous integration, build-measure-learn cycle comes in contrast with the once famous waterfall model, which was all about execution of the requirements document, built the product, test it and then introduce the product to the customer. Only after months, or even years of effort the product would receive some feedbacks, and in most cases, entrepreneurs learned the hard way that customers were not buying their product because they did not need or want most of its features.



[Figure 1. Waterfall model. Image downloaded from <<https://steveblank.com/2015/05/06/build-measure-learn-throw-things-against-the-wall-and-see-if-they-work>> in April 2017].

In the early 2000's software development started migrating to agile development, which improved the software quality, now that the systems were being build iteratively and involving the customer through the process. However it lacked a framework for testing all commercialization hypothesis.

That's why Build-Measure-Learn cycle was created, the goal was to maximize learning through incremental and interactive engineering. This can be accomplished by elaborating hypothesis to test and through each cycle improve the idea or the MVP.



[Figure 2. Build-Measure-Learn cycle. Image downloaded from <<https://steveblank.com/2015/05/06/build-measure-learn-throw-things-against-the-wall-and-see-if-they-work>> in April 2017].

It is important to emphasize that the cycle does not necessarily mean that something have to be developed, we could use the cycle to improve the business model, in other words, this mean that we are only improving the idea itself through interview or research.

2.2.6. Pivot or Persevere?

By following the feedbacks (quantitative and qualitative) of the clients through the cycle Build-Measure-Learn it is possible to acquire validated learning and decide whether to change (Pivot) or improve the product.

The goal is to arrive at the right concept of the product, identify who the customers are willing to pay for it and if it is possible to build a sustainable business, avoiding wasted resources (time, money, motivation, etc).

2.2.7. Wrapping up



[Figure 3. Lean Startup simplified. Image downloaded from <https://br.pinterest.com/pin/165296248795705371/> in April 2017].

Clearly, there is no formula for building a successful business. Each case is a case, it is not exact science. Subjective knowledge such as Vision, Sense, Leadership, Collaboration, etc, still matter.

Eric Ries' methodology and its simplicity helps a lot not to lose focus on the client, not to waste resources investing in false assumptions, to seek relevant metrics without wasting much time. The main focus is to help validate answers to 2 vital questions: Does our customer want this? Is it worth building and selling?

2.3. Design Thinking

2.3.1. Introduction

“Design Thinking is an anthropocentric approach to innovation that uses designers’ tools to integrate people’s needs, technology possibilities and requirements for business success”^[36]

2.3.2. History

In 1979, Bryan Lawson published the results from an empirical study to investigate the different problem-solving approaches of designers and scientists. He took two groups of students: final year undergraduate students in architecture and graduate science students, and asked them to create one-layer structures from a set of coloured blocks. The perimeter of the structure had to optimize either the red or the blue colour; however, there were unspecified rules governing the placement and relationship of some of the blocks.

Lawson concluded that the techniques adopted by the scientists were problem-focused, suggesting that scientists solve problems by analysis, on the other hand the architects’ approaches were solution-focused, solving the problem by synthesis.

Later, problem solve by synthesis was broken down showing that designers usually had two phases of thinking: divergent and convergent. They would employ divergent thinking as a way to ensure that many possible solutions are explored in the first instance, and then convergent thinking as a way to narrow these down to a final solution. Divergent thinking is the ability to offer different, unique or variant ideas adherent to one theme while convergent thinking is the ability to find the “correct” solution to the given problem. Design thinking encourages divergent thinking to ideate many solutions (possible or impossible) and then uses convergent thinking to prefer and realize the best resolution.

2.3.3. Why to use Design Thinking?

Design thinking is an approach that seeks to solve problems collectively and collaboratively, trying to provide maximum empathy between its stakeholders: people are placed in the center of product development, not only the final consumer, but everyone involved in the idea.

The popularization of Design Thinking applied to business is often credited to two Silicon Valley personalities: David Kelley, a Stanford University professor who founded the IDEO innovation consultancy, and his colleague Tim Brown, the current CEO of this consulting firm and author of the book *Change by Design*^[36].

The process consists in trying to map and merge the cultural experience, the world view and the processes presented in the life of each individual, in order to obtain a more complete vision in problem solving and, by this way, better identify the barriers and to generate viable alternatives to transpose them. It is not based on mathematical premises, it begins on the real needs of its consumer.

The reason for the existence of the approach is customer satisfaction, which can only be achieved when we know in depth the consumer needs, desires and perceptions of the world.

2.3.4. How to use Design Thinking?

The technique consist of five steps:

2.3.4.1. Empathy

This phase is all about understanding what are the needs of the people involved in the problem, what they need, what they like and what they want.

In the empathize process, we first **Observe**, analyse the users and their behavior in the context of their lives, **Engage** by interacting with users through both scheduled and random short encounters and lastly: **Immerse** by experiencing what your user generally experiences.

Empathy phase allows design thinkers to set aside their own assumptions in order to gain real insight into the users and their needs, which in the next stage will be used to

develop the best possible understanding of the users, their needs, and the problems that underlie the development of that particular product.

2.3.4.2. Define

During the Define stage, put together the information you have created and gathered during the Empathy stage. You will analyse your observations and synthesize them in order to define the core problems that you and your team have identified up to this point.

This stage will help the designers develop the best assumptions that would in the next stages turn into the features that will allow them to solve the user problems. The goal is by the end of this stage to have a human-centered problem statement.

2.3.4.3. Ideate

During the third stage of the Design Thinking process, designers are ready to start generating ideas. After understanding your user and nominating their problems you can start to “think outside the box” to identify new solutions to the problem statement you’ve created, and you can start to look for alternative ways of viewing the problem.

It is important to get as many ideas or problem solutions as possible at the beginning of the Ideation phase. You should pick some other brainstorming techniques and by the end of the Ideation phase you should have enough material to help you investigate and test your ideas to find the best way to either solve a problem, or provide the elements required to circumvent the problem.

2.3.4.4. Prototype

The design team will now produce a number of inexpensive prototypes, it can be scaled-down versions of the product or specific features found within the product, so they can investigate the problem solutions generated in the previous stage. Prototypes may be shared and tested within the team itself, in other departments, or on a small group of people outside the design team (it is always good to have people outside the design team to give their opinion).

The solutions are developed one-by-one, then they are investigated and either accepted, improved and re-examined, or rejected. By the end of this stage, the design

team will have a better understanding of the rules involved in the product and how it solves the user problem.

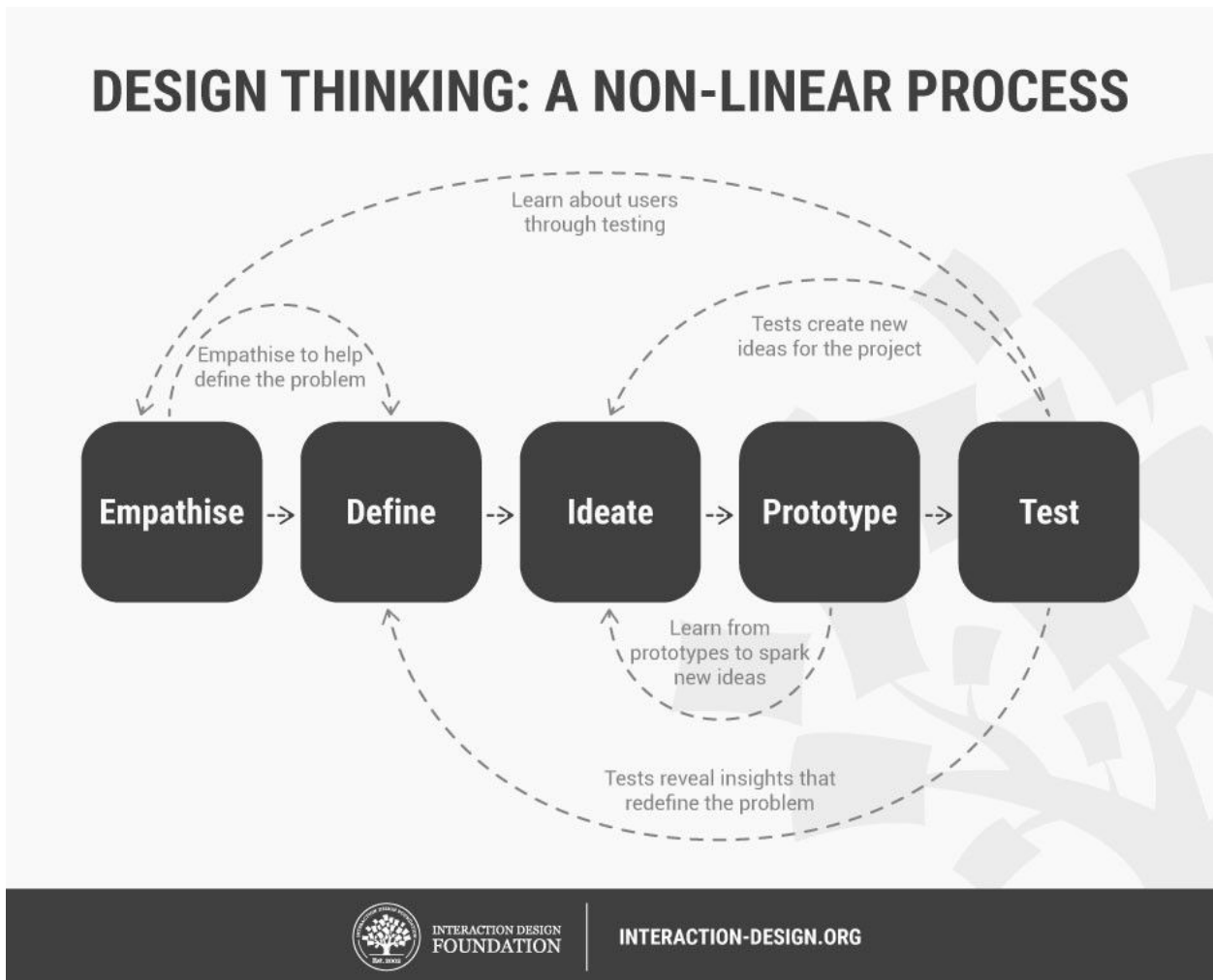
2.3.4.5. Test

Designers or evaluators rigorously test the complete product using the best solutions identified during the prototyping phase. In Design Thinking, the results generated during the testing phase are often used to redefine one or more problems and inform the understanding of the users, the conditions of use, how people think, behave, and feel, and to empathize. Even during this phase, alterations and refinements are made in order to rule out problem solutions and derive as deep an understanding of the product and its users as possible.

2.3.5. The Non-Linear Nature of Design Thinking

Design Thinking is usually presented as a direct and linear process in which one stage directly leads to the next with a logical conclusion at user testing. However, in practice, the process is carried out in a more flexible and non-linear way. For example, more than one stage may be conducted in parallel by different groups, or the designers may collect information and prototype during the entire project enabling them to bring their ideas to life and visualise the problem solutions. Also, results from the testing phase may reveal some insights about users, which in turn may lead to another brainstorming session (ideation) or the development of new prototypes.

This non-linear nature of design thinking usually leads to iterations like described in the image below:

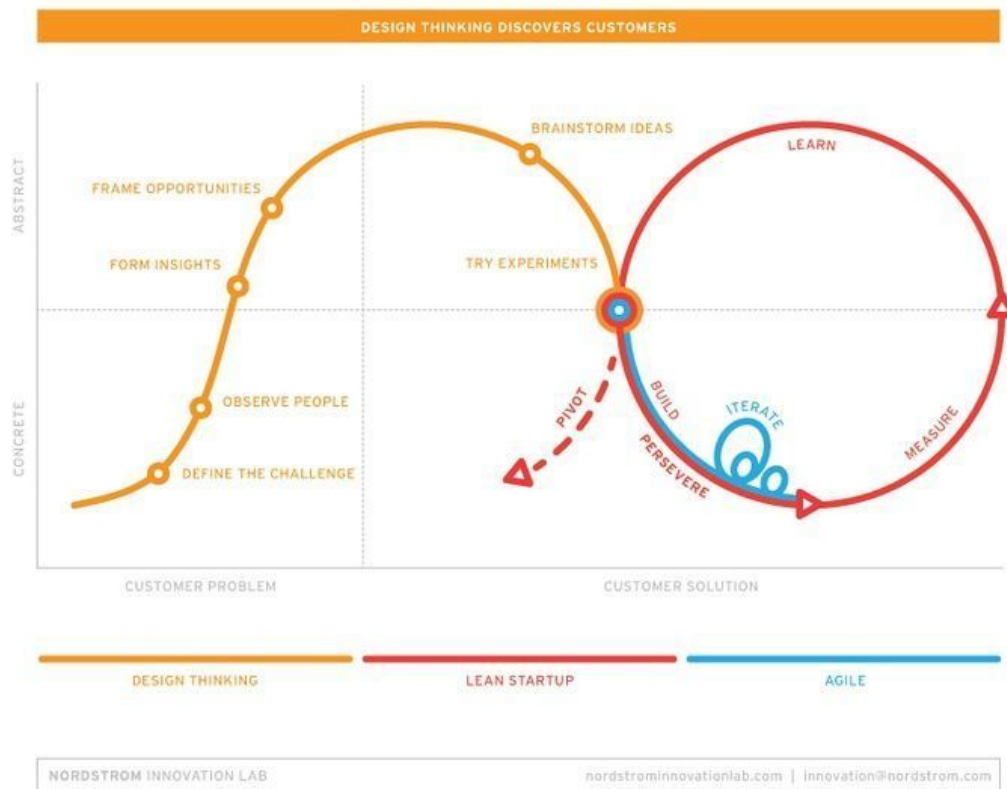


[Figure 4. The non-linear nature of Design Thinking. Image downloaded from <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process/> in May 2017].

2.4. Design Thinking meets Lean Startup

We could see that Design Thinking and Lean Startup can have a very strong relationship, they both have a lot in common and can complement each other. The goal of this section is to introduce some aspects of each approach that can work together, later on each step in the development we will highlight the techniques we are using.

Lean Startup is all about prove or disprove as many hypotheses as possible with minimum waste, but we do not always have these hypotheses to start the cycle, that is where Design Thinking comes in, it provides tools for discovering the users' needs. One way of developing a solution is to start with design thinking which is more inquiry-based and open-ended. We can define the customer problem and the hypothesis we want to test and then start iterating in Lean Startup cycle by building our first MVP and through the iterations gain deep knowledge at our problem. The image below exemplifies the process.



[Figure 5. Image describing Design Thinking, Lean Startup and Agile Development together.. Image downloaded from <<https://br.pinterest.com/pin/256283035019932954/>> in May 2017].

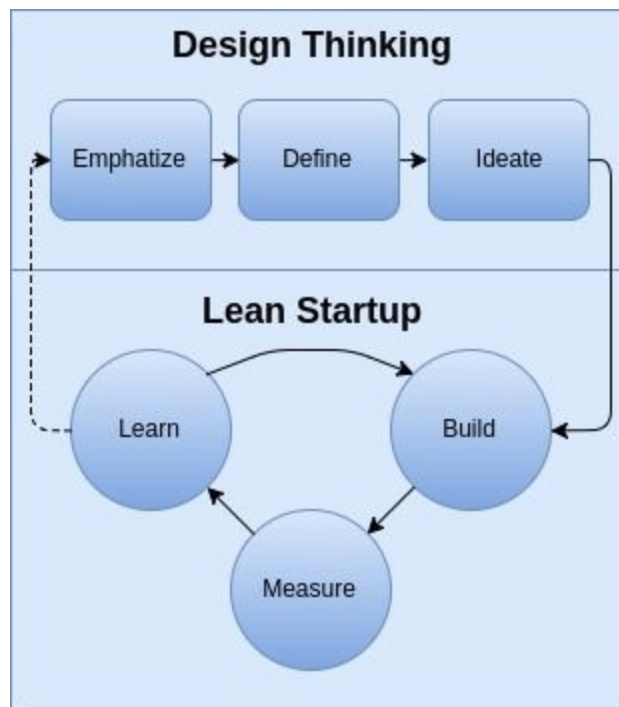
Along with Agile Software Development, design thinking with lean startup could turn a simple idea into a minimum viable product really fast, always maintaining the

knowledge gained along the way and using it to improve the product itself and satisfy the user needs.

2.5. Wrapping up

The whole process we took could be separated in two stages:

- **Understanding the problem:** Involves the three first phases of Design Thinking: Empathize, Define and Ideate. The goal in this first stage is to get as many information as possible from the problem we are dealing and come up with a reasonable solution that could be easily implemented.
- **Developing the solution:** Involves the whole Lean Startup approach: the Build-Measure-Learn cycle. With the features in the MVP designed, the goal in this stage is iterate as fast as possible and get feedback from users at each cycle, making improvements and pivoting when needed.



[Figure 6. Image explain the phases we took. Image by the author, 2017].

It is important to note that sometimes during the Lean Startup's Learn phase we face new information forcing us to start another Empathize phase and go on through the process again.

One point was a little bit cloudy, regarding the software quality, MVP should be a very quick solution to allow an early testing phase with customers, thus generally what happens is a macaroni-like software that is barely understandable and do not provide any scalability. On the other hand we tried to keep our software quality on high standards, using a well-thought architecture that, in the end, took us longer than we thought to develop our MVP. The correct balance between these two scenarios should be ideal, neither it takes too long in the beginning of the development nor it makes software improvements harder and harder.

3. Tech Stack

In this chapter will discuss the technology and frameworks used to develop the system.

3.1. Progressive Web Apps

“A Progressive Web App uses modern web capabilities to deliver an app-like user experience.”^{135]}

Progressive Web Apps describe a collection of technologies, design concepts, and Web APIs that work in tandem to provide an app-like experience on the mobile web. It bring features we expect from native apps to the mobile browser experience in a way that uses standards-based technologies and run in a secure container accessible to anyone on the web.

3.1.1. Why web apps instead of native apps?

By 2007, when Steve Jobs first introduced the iPhone to the world, his idea was not to have third-party native apps, instead this was his vision:

“The full Safari engine is inside of iPhone. And so, you can write amazing Web 2.0 and Ajax apps that look exactly and behave exactly like apps on the iPhone. And these apps can integrate perfectly with iPhone services. They can make a call, they can send an email, they can look up a location on Google Maps. And guess what? There’s no SDK that you need! You’ve got everything you need if you know how to write apps using the most modern web standards to write amazing apps for the iPhone today. So developers, we think we’ve got a very sweet story for you. You can begin building your iPhone apps today.”^{137]}

The App Store came later, apparently as a reaction to jailbreakers and developer awful response to web apps. Nowadays, almost ten years later, Google has understood Jobs’ words and started to provide Android users with native-like web apps.

The advantages are many: do not rely to an app store, possibility to update the software whenever you want, access it in any device and most important, when we had to test our app we could build a relationship with our user, we did not demand them to download our app, it was just “access this link please”.

3.2. Angular

Angular is an open-source MVC Javascript framework, which simplifies web development by offering automatic view/model synchronization. Along with other frameworks like React, Vue and Backbone, they were made in order to create some structure in a client application, it is difficult to have a large front-end system without a structured code and Angular provides a nice environment for this.

Angular was mandatory for us because of its portability, it is very simple to have a progressive web app and have an app like experience using the framework, so we decided to choose to our front-end.

Let's detail which features helped us the most:

3.2.1. Typescript

Typescript is defined by their own site as:

“Javascript that scales”³⁸¹

Which in fact is true. Typescript is a superset of Javascript that introduce typing to this language, which means that you can write code just like Javascript, but if you want (and you will do), you can use types to help you write the code and avoid errors at runtime.

We mainly used Typescript to declare interfaces and create new types, although this not seem much, it helps a lot when you remove a property from an object and your code identify the errors at compile-time.

Typescript is growing fast and being embraced by Javascript community, Angular team made a bold move to use it as default language for the framework, but it goes along with the scalable characteristic of Angular.

3.2.2. Two-way data binding

One feature that rocked the Javascript community was AngularJS' two-way data binding: changes in the application state is now automatically reflected into the view and vice-versa.

During early AngularJS days the change detection "listens" to view or app modification and every time a value change the view gets updated, it is usually a costly operation, that operation evolved to different strategies like React's Virtual DOM that compares the DOM at runtime and Angular that developed a tree structure change detection that acquired the speed of 1.6x plain Javascript speed, this is extremely fast given that in the background the framework is running a detection algorithm.

In our project we could, with this feature, maintain every information without caring when to update it, Angular did it by itself.

3.2.3. Scalable architecture

What is means to be scalable? It means that when I need to create new features it does not take a whole lot of time to build it, a scalable architecture allows every developer to easy understand the core of the system and improve it, it is easy to maintain and easy to modify.

Another great point is that in our view components CSS files are separate from HTML files that are separate from Typescript file, so each file handles what it has to. Services comes in hand to make functions common to other components, making every component reusable. Angular also provides an easy to use test framework, making possible to write unit tests and end-to-end tests in our application.

Of course it does not rely only on Angular to have a scalable system, the coders must use its characteristic to help them build the architecture.

3.3. Firebase

Firebase is a technology that allows you to make web applications with no server-side programming making development quicker and easier. In our case time is a valuable asset and having the option of not having any server-side code, focusing only in developing the client app and managing the business specs correct is a great

improvement. With Firebase, we don't have to stress over-provisioning servers or building RESTful APIs; with just a little bit of configuration, we can give Firebase a chance to take every necessary step: storing data, verifying users, and implementing access rules.

In my opinion Firebase is pretty good to develop MVPs solution. The decision to focus only on the client-side and business aspects is essential for an emerging company, the problem is that Firebase is limited to small size companies, it is difficult to rely your business model in a very restricted backend as Firebase. That been said it is important to remember that Firebase is perfect for our case which is validate an idea.

Let's detail what features we are using and why:

3.3.1. Hosting

Its hosting allowed us to deploy the whole app without having to configure network ports and etc, not just that but we needed a way our users interact with our app, as a web application Firebase provided us with a web URL.

3.3.2. Database

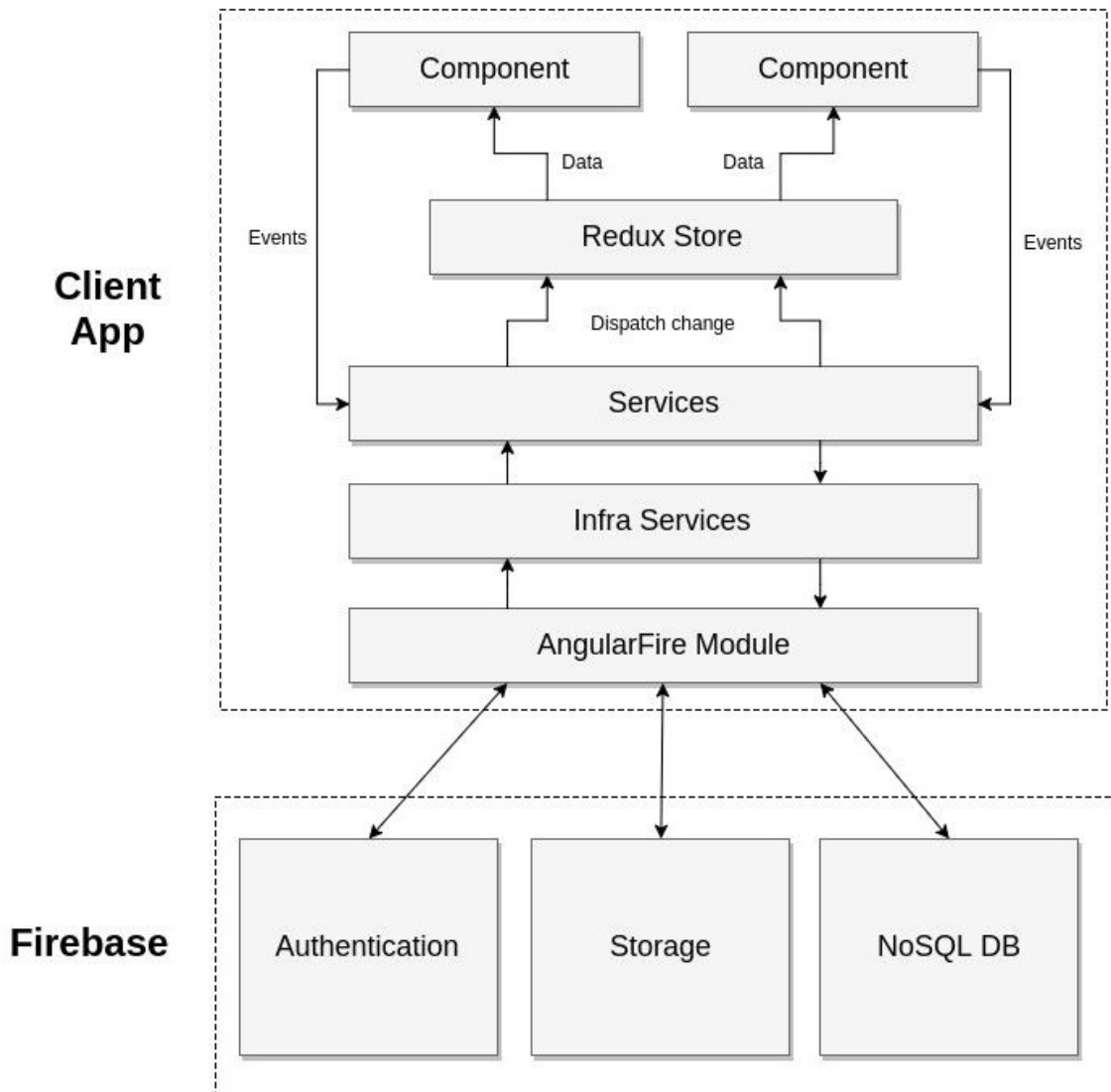
Storing data is essential for an application and Firebase provided a real time database, even the database being NoSQL (which have some disadvantages over SQL databases) we could use the Angular + Firebase integration which allowed us to use the database in real time, so every time the content in the database changed the client received the new version in a JSON file that reduced drastically the object rehydrate complexity.

3.3.3. Authentication

Firebase provided a simple-to-use interface to authenticate users, the user could choose to authenticate using Google, Facebook or creating a new user by email.

3.3.4. Prototype Architecture

3.3.5. MVP Architecture



[Figure 7. Image showing the MVP architecture. Image by the author, 2017].

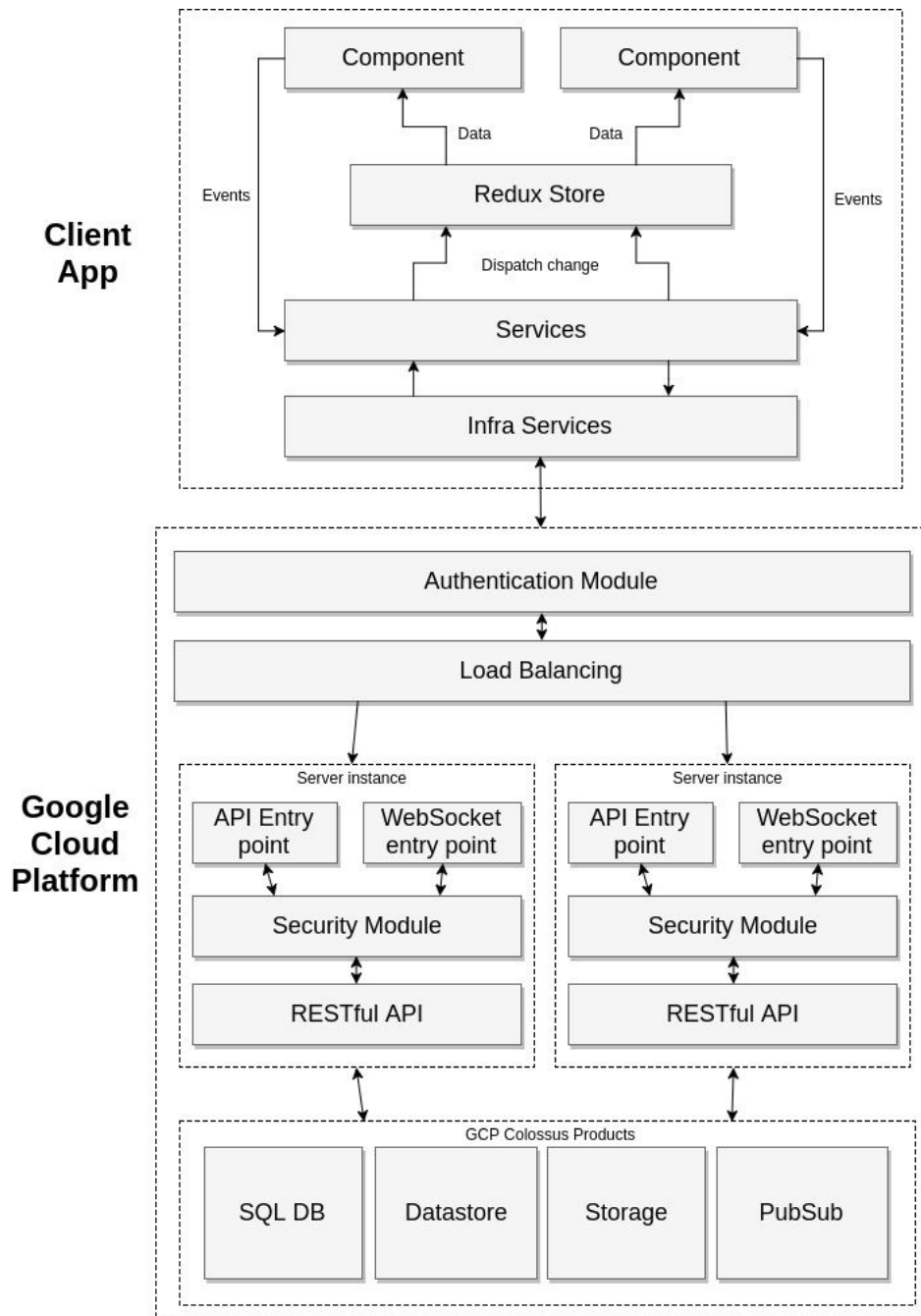
The architecture was thought to not rely on Firebase, by its prototype nature, so our client app allows WebSocket and API communication outside Firebase, thinking that in the future the software would evolve to have a RESTful API and a cloud platform too (like Amazon Web Services or Google Cloud Platform).

With Redux we implemented a one-way data flow, that is: the component (views) are showing the content available in the store, when the user interacts with something or the server send a value update the information is dispatched to the store, handled there and the value gets updated, only then the views gets the new info. That architecture makes more clear when the data gets updated and it makes easier to debug, hence it improves the maintainability and the software quality.

Firebase provides an integration module with Angular called AngularFire, this allows us to connect with Firebase products much easier, a great improvement in MVP developing. But how our philosophy was not to rely on Firebase, we have separated the business-related services with the infrastructure-related ones (server communication, for example), that way we could manage the information a little bit better and it totally decouples the firebase module from our application, making it easier to change from Firebase to another server.

3.3.6. Future Application Architecture

We want to provide a sense of what can be accomplished with the architecture we have developed, so we are going to simulate a complete RESTful API hosted in Google Cloud Platform.



[Figure 8. A simulation of what would it be if we had a RESTful API hosted in Google Cloud Platform. Image by the author, 2017].

We could observe that the server architecture is pretty complicated, it handles WebSocket and API events, Cache and Session data, but the client is pretty much the same. This happens because we have decoupled the server communication from the

rest of the application, we do not need to create another module to handle our new server, it is just using what we already had minus the AngularFire module.

4. Validating an idea

In this chapter will discuss the process of having an idea, develop and then validate it.

4.1. Why teach kids about finance is the right thing to do

The idea came up after reading about a man who withdrew R\$15k from FTGS (like a Brazilian employee's dismissal fund) and spent half of it in one weekend in a five-star hotel^[22]. For me it sounded as stupid as possible, Brazil was going through a huge crisis, people were losing their jobs, the default rate was going up each month, so the government decided to allow people withdraw their innative FTGS accounts, in the past it was only available for home finance or other long-term financing, but now the goal was to allow Brazilians clear their debts.

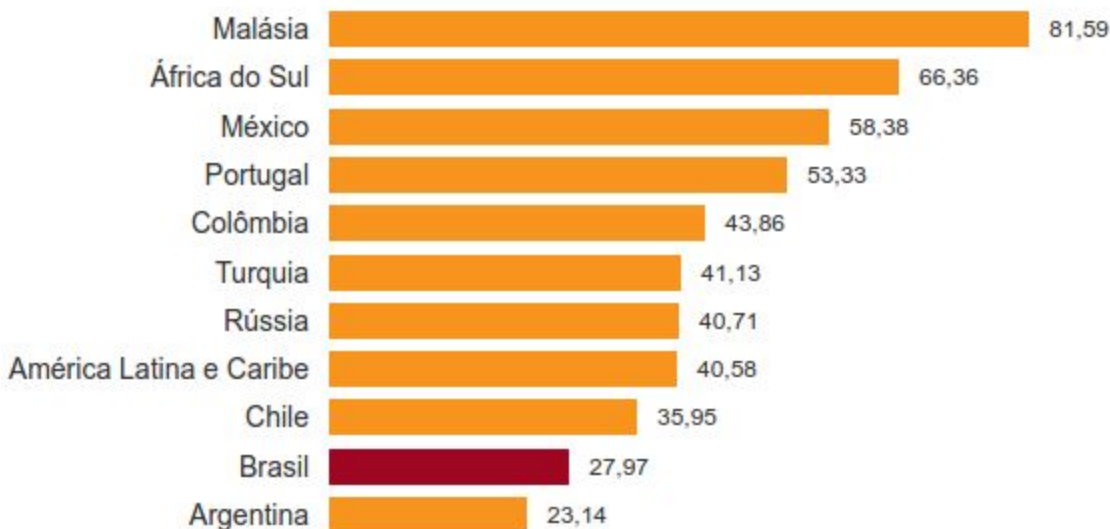
Although, that man, who did not make more than R\$60k a year, decided to spent R\$7k in a luxury weekend. Throughout the interview we can see that probably this money was not intended to be spent like this, the man confessed that it was not a good idea.

At this time it became clear that this man did not have a clue of how that money was spent that fast and furthermore he probably did not have any type of expense control or investment planning, it was just: money comes in, let's spend it.

4.1.1. A whole country problem

Digging deeper it was possible to find out that Brazilians have some serious financial problems, a research on September of 2016 showed that almost 60% of all Brazilian families had debts on that month^[13] and even when sometimes this percentage became lower at certain months, at least in the last ten years, not once the percentage was below 50% in a month, so we can conclude that one out of two families have unpaid debts.

Researches made by World Bank showed that only 28% of Brazilian population have saved any amount in the last 12 months (14° worst in the world)^[24] and that only 4 out of 100 brazilians save money for retirement (12° worst in the world)^[24].



[Figure 9. Research showing the percentage of the country's population that saved any amount in the last 12 months. Image downloaded from <http://www1.folha.uol.com.br/mercado/2017/01/1847930- apenas-4-dos-brasileiros-poupam-para-a-aposentadoria.shtml> in May 2017].

We can easily find some explanations for this phenomenon like the heritage of high-inflation era, the lack of surplus or restrict credit access, but it all converges to little knowledge of finance, even among the upper classes. In a society based in consumption it is easy to lose yourself in shopping, but financial education has a high correlation with savings. Even savings being the number one problem, the A/B classes, which theoretically, are schooled and therefore have a better financial education, struggle at concepts like diversification, compound interest and relationship between risk and profit.

4.1.2. Innovative approaches

Innovative methods for stimulating savings are being studied around the world because the traditional approach, telling people they need to save for the future, is simply not working.

One of them, is a research made by Stern Business School^[39], in which a team of researchers tested the effects of showing young people in their 20's how they will look when they are old. They exhibited images of older people to a first group. A second group interacted, in a virtual environment, with versions of themselves, aged by computer graphics, like their old avatars.

After three series of questionnaires, the researchers were cheerful by the greater willingness of the second group to save for retirement. The study was published in November, 2012. "We wanted to see if the photo-aging experience could make someone feel more connected to themselves in the future"^[39]. It worked, says Hal Hershfield, a marketing professor at Stern Business School in New York and lead author of the research. One of the mechanisms that prevent savings is that young people find it difficult to exchange immediate pleasure in the name of the comfort of a "stranger" – himself, in 40 or 50 years. By bringing the young man closer to the old man who will become, the avatar breaks this distancing.

Another interesting approach that has been developed is the idea of preparing children for the need to save money. "Education in childhood is very important. Having fictitious banks in Japanese schools encouraged children to save more"^[19] says Annamaria Lusardi, an economics professor at George Washington School of Business.

4.1.3. Why children?

Seeing the statistics on debts and savings it is pretty clear adults do not know much about money, but to help the next generation avoid the mistakes of their elders, and to live financially fit lives, they need to be taught the essentials about finance.

Usually parents start teaching kids at home some values on working with money, providing an allowance, stimulating savings so they can buy something they want, but it all comes to the point that is the parent responsibility to teach it. So, is not funny that parents who struggle in this matter teach their kids about it? Even leaning in some book on financial education, it seems difficult to both of them.

Nowadays some schools identified the importance of the subject in kids' life and created finance classes, but as almost every class in regular school grid they are theoretical and this subject is essentially practical.

Some research on the internet showed me a lot of books and games teaching kids the principles of finance, so I came up with the idea that joining school's theoretical

lessons and parents' practical method would be the best of the two worlds, but instead of a game or a book, I would provide a whole experience to the kid with its parent and go along throughout its childhood, creating a platform where they both work together maximizing the content learned, producing solutions to teach kids the importance of work: for example letting parents create a small price to some household chores; or savings: where the kid can administrate its allowance and establish goals. The goal of the solution is not suffocate children with content, just provide some tips and guide them to the right path in a practical way.

4.2. Getting off the building

So now we have a problem to focus on and the first thing that comes to mind is start creating a revolutionary solution to these people, although design thinking provides a wiser approach: understand your audience.

It is very common to put yourself in a position of higher knowledge than you audience and consider your solution what they are looking for. That is not true for almost all cases, there are lots of ideas who struggled because, after all efforts, all time and money spent, the audience simply did not want the solution.

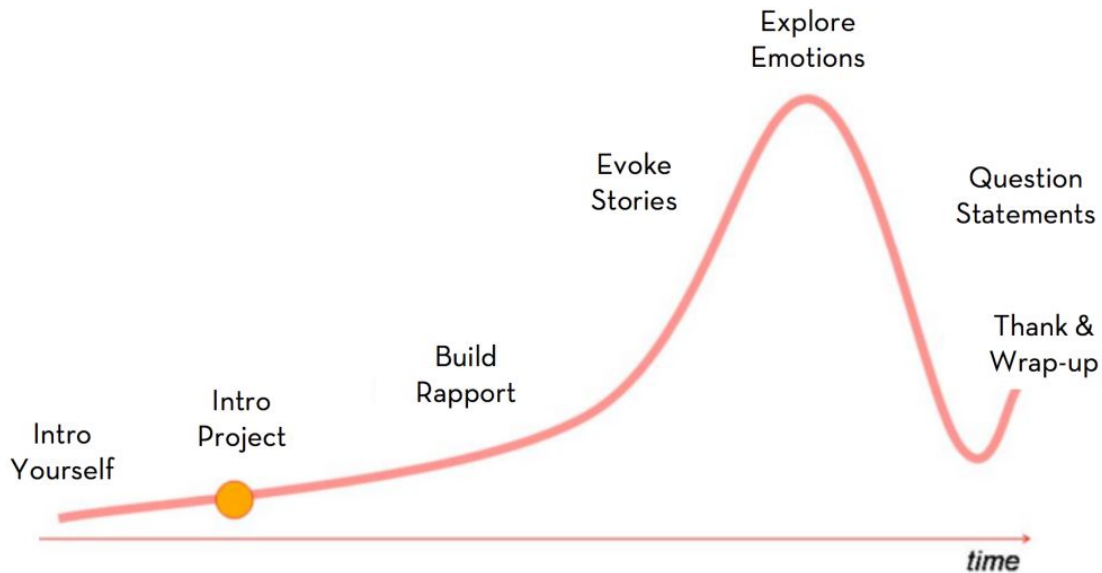
A deep engagement in audience reality can surprise both the designers and the designee by the unanticipated insights that are revealed. Making an effort in empathizing we are able to evoke stories that would guide the innovation efforts, identify the right user to design for and discover the emotions that guide behaviours.

So in our problem we want to dive deeper than any other approach, trying to understand what are their reasons and why they do what they do. The first step to do it it requires almost no effort from the researches, which is simply listen to your audience; get close to them and prepare a few open questions that can trigger emotions and evoke stories in order to expose the problem we are dealing and give us a lot of insights.

4.2.1. How to interview

Time with user was precious and we needed to make the most of it, so it was important to prepare an interview but always making room for the spontaneous conversation.

We kept in mind that we are interviewing because we wanted to know about how parents teach finances for their children but also trying to identify if they consider it a really big matter so they would pay some third-party application to teach their kids.



[Figure 10. This image sum up all the phases in an empathy interview. Image downloaded from The bootcamp bootleg available at <<https://dschool.stanford.edu/resources/the-bootcamp-bootleg>>, 2017].

We followed some rules in preparing the questions:

- Trying to make the questions as open as possible but keeping our goal
- Asking why even when we knew the answer, for example when people say that they give allowance to their children, it was important to ask why, even if it was a little bit awkward, because it made the parent stop and think for a while why they did it.
- Never say “usually”, instead we asked for an instance, such as “tell me about the last time you have a financial problem?”
- We decided to watch closely to the emotions expressed, sometimes it is even more interesting then the answer given.
- Do not suggest any answer to our questions, this would probably influence the audience and unintentionally get people to say things that agree with our expectations

- Do not ask something hypothetically focus on what the audience are doing or has done in the past.
- Do not pitch. This is really hard, but it was important for us to keep in my mind that we were there to learn, not to validate our preconceived ideas.

4.2.2. Interview script

4.2.2.1. Identifying the person being interviewed

It is important to decide before the interview the approach you will make, in our case, we wanted to identify families who seemed to have children and try to understand how they deal with finance and if financial struggle was really a “pain” to them, so real that they even want to buy a solution for their children.

So it was important to interview parents because they would be the final customer and would only bought the solution if they consider financial problem a real problem for their kids, but it was very important to listen to the children too and try to understand how they deal with money and what urges they have.

4.2.2.2. Dividing audience in subclasses

In order to identify our target audience we chose to start the interview with a few questions that would divide them in a few social classes, like:

- Which neighborhood you live in?
- How many rooms does your house have?
- Do your kids study in a public or private school?

These three questions would explicit the interviewed’s social class without asking awkward or too direct questions.

4.2.2.3. Trying to evoke stories

The questions were thought to evoke stories, not all questions were asked to one person, we tried to ask them all, but to different person, the list of questions:

- How the parents teach the kids how to deal with the money?
- Does the kids have an allowance? When they receive it? What frequency?
- How the kids spend the allowance? They save any money? Why?

- Ask the kid when were the last time he wanted to buy something but did not had the money. Why they wanted it? Did the parents help?
- Which are the first consumer good you want you children to have?
- Tell me about the last time you son/daughter asked you to buy something and you denied. Why you denied? Which was the worst part?
- Tell me about a financial problem you went through. Why? Which was the worst part? How did you get out of it?
- Does the parents have any financial control system? (Excel, app, notebook?)
- Does the parents have investments? Which one?
- Have you ever heard of any way of teaching kids how to deal with money?

4.3. Interviewing - part 1 (warming up)

The first iteration of the interview, we decided to go to paulista avenue and do some interviews, luckily or not the weather was awful, it was raining all day and our hopes of finding lots of people on the street were low, so we focus on experimenting the interview to measure how good it was and study how could we improve it.

Inside a building we approached a person, introduced and start asking the questions we had prepared for categorizing my audience, one of the questions was to ask for the “monthly budget of the family”, that question was way too invasive and for us it was important to always be respectful with the person being interviewed and we instantly knew that question had to be changed or removed, so we added to the person that if she did not want to answer the question it was ok. It was very important in this case to observe and understand people’s reactions, act accordingly and the most important: register what we learned.

The first weekend of interviews was very important, although we did not interview many people we had gained a lot of knowledge for the next weekend. The script we had was very long, we had predicted to last only ten minutes, but asking all the questions in the first interview lasted 16 minutes and it was clear that in the last questions (which had the most importance) the person was tired and giving very short answers, so we registered and modify to a shorter beginning (asking just two questions

to categorize the audience) and jump straight to the open questions (which were our goal), leaving to the end some more specific question.

With shorter time with the person being interviewed we decided to sit down again and rethink what were our goal and we decided to focus on investing in the parent-child financial education relationship which are the backbone of our solution and leave questions related to the kid itself and how he/she handles his/her money to the end, not because they are not important, but because they are less important for now, in our opinion that decision had a huge positive impact to our results, we no longer care so much about if the parents have a financial fit life, but were caring if they thought it was important to teach their kids and how they were doing it.

So we think the best thing it occurred to us was this unexpected rain, which give us a more experimental environment to improve the interview.

4.4. Interviewing - part 2 (results)

Here is the compilation of all interviews we had:

4.4.1. Interview 1

- Mother with a 3 years old son, probably upper-middle class
- The kid does not receive an allowance yet, but mother intends to give it when her “son starts to understand the value of money”
- The first consumer good she wants her son to have is his superhero costumes and she wishes he can pay for all he wants in the future.
- One asset that your child wishes momentarily in which she can not afford is a trip to Disney
- Controls spending on paper and does not make investments.
- The school provides financial education classes, besides the school, she intends to teach her son.

4.4.2. Interview 2

- Refugees of Syria, middle class family with 4 members: father, mother and two children (3 and 8 years)

- The children do not receive allowance because right now they do not understand the meaning of money
- They want their children to have no financial difficulty, to understand the value of money in the future
- His eldest son wanted money to buy school supplies, but he could not afford it. Another unfeasible desire would be the Playstation 4

4.4.3. Interview 3

- Lower-middle class father with 20 year old daughter
- His daughter does not receive allowance right now (already an adult and has to learn to live on her own), but when she was a teenager, she received but had a poor control over it
- The first thing she wants to see her daughter conquer is an iPhone 7 (which she wants)
- In the past the father went through financial problems (loans) resulting in the impossibility of giving the daughter things she wanted and he does not really want her daughter to go through the same situation
- At the time he worked at a bank, he had influence at work for investments (conscious credit)
- He started to teach his daughter about financial education but without success

4.4.4. Interview 4

- Upper-middle class single woman without children
- She received an allowance when she was a child, but not intended to be about financial education
- It is important that financial education be implemented as early as in the middle school. Because she believes children today are extremely consumerist and do not know the value of things

4.4.5. Interview 5

- Middle class group of ladies (almost all of them with kids) being one of them with a 12-years-old daughter present

- Mistress 1 said she never gave money to her daughter because she was not used to or did not have enough money and she was used to give her money when she asked. She thinks giving money when children ask is bad because they do not value the money they receive
- Mistress 2 dreamed of seeing her daughters graduated and she conquered it because the two of them graduated in college
- Mistress 2 had serious difficulties when her daughters were adolescents, making it impossible at the time to fulfill his daughters' wishes
- Mistress 1 points that schools teach about financial education (basic financial education)
- Mistress 2 gave an example of a school that his daughter studies which take kids to the market to teach them how shopping works (Escola Viva Vida Feliz).

4.4.6. Interview 6

- Lower-middle class mother with 5-year-old daughter
- Her daughter does not receive allowance, but intends to give her in the near future by applying some methodologies (like removing allowance as a punishment)
- She understands that it is important for the children to learn the value of work
- Hopes her daughter does not go through any financial problem in the future
- She denied taking her daughter to the movies because she had not done well at school (nothing related to financial problems)
- She had a recent financial problem, she maxed out her credit card
- She believes that the school does NOT provide this type of basic education (her daughter studies in a public school). So she thinks that education from parents is fundamental

4.4.7. Interview 7

- Middle-class mother with a baby son
- The mother intends to start giving the allowance when the kid starts to want consumer goods

- She believes that the parents have a key role in training the child when it comes to financial education. Does not expect schools or third parties to teach financial education

4.5. Interviewing - part 3 (understanding the users)

With the results, we dived deep in data analysis.

4.5.1. Affinity Diagram

- Important citation from users
 - “I do not want my daughter to go through what I’ve been, if only I had the knowledge I have now (the user had financial problems related with a series of unplanned loans)”
 - “I do not expect this knowledge being taught by the school or government, so it is my responsibility to do it”
- Patterns
 - All users understand the importance of financial education for children
 - All children under ~10yo do not receive allowance
 - All users wants their children to have a financially stable life
- Surprises and contradiction noted
 - The user do recognize the importance of some financial rules, like register the spendings but does not do it
 - Some schools have a few classes along the year on the subject and one of them have a more explicit class, taking the kids to the market and so
 - Some users have the allowance as a form of education, like if the kid does something bad the parent removes a value from the allowance
- What we want to explore
 - Besides all users understand the importance of teaching their kids the general solution is to give them an allowance
 - Explore allowance as a form of education too
 - Kids who generally have a poor control over the allowance

4.5.2. Personas

4.5.2.1. Persona 1

Name: Carolina

Age: 35 yo

Occupation: Saleswoman

Obs: Has a little daughter (10yo) and belongs to the lower-middle class

Personality: Hard Worker, rigid, hands-on

“I’m going to do whatever I got to do to give my daughter a better life”

Motivations:

1. Give her daughter a better life

Goals:

1. See her daughter happy and successful

Problems and frustrations:

1. Little time to be with her daughter (time scarcity)
2. No surplus in the end of the month due to a credit card debit (money scarcity)
3. No financial knowledge

What she does:

1. Not an expert in technology, but can use a cellphone without problems
2. Does not have a financial control system
3. Does not have many self-control and is always susceptible to spend more than she earns

4.5.2.2. Persona 2

Name: Marcos

Age: 50 yo

Occupation: Banker

Obs: Has two kids (12 and 15 yo) and belongs to the upper-middle class

Personality: Calm, experienced, studious

“Rich dad poor dad is my bedside reading”

Motivations:

1. Give his children a better life

2. Form financially fit children

Goals:

1. Wants to teach his kids that money doesn't grow on trees
2. Wants to teach his kids how to invest

Problems and frustrations:

1. Has some financial knowledge, but could not get the kids to learn it

What he does:

1. He is used to gadgets and electronic devices
2. Reads a lot
3. Has some experience with investments

4.5.3. Empathy map

4.5.3.1. Persona 1

Carolina

- Hear (What are friends, family and influencer are saying to her that impacts her thinking?)
 - Friends telling her about their new consumer good
 - Read newspapers who often produce some information on how to teach finance to children
 - Daughter telling her about her friends' acquisitions
- Think and feel (What really matters to her? What occupies her thinking? What worries and aspirations does she have?)
 - She wants a better life for her daughter and for her
 - Aspires to have more money so she can buy the things she wants
 - Aspires to have more time to spend with her daughter
- See (What things in her environment influences her? What competitors is she seeing? What is she seeing friends do?)
 - Highly influenced by a consumerism driven society
- Say and do (What is her attitude towards others? What does she do in public? How has her behaviour changed?)

- She surrenders to any type of black-friday-frenesi like and buys more than she can.

4.5.3.2. Persona 2

Marcos

- Hear (What are friends, family and influencer are saying to him that impacts his thinking?)
 - Sees a lot of financial education programs and materials
 - Talk about finance and investments with friends
- Think and feel (What really matters to him? What occupies his thinking? What worries and aspirations does he have?)
 - He wants a better life for his children
- See (What things in her environment influences him? What competitors is he seeing? What is he seeing friends do?)
 - Gets excited about financial magazines and follow the content advises
- Say and do (What is his attitude towards others? What does he do in public? How has his behaviour changed?)
 - Try to warn friends about financial struggle of them
 - Try to teach kids about finance

4.5.4. Client Journey

1. Client understands the need of financial education for his children
2. Client starts giving a monthly allowance to them
3. The children often have a poor control over it
4. Children continue to ask for more money to their parents
5. Parents do not provide a deep financial knowledge to their children
6. Children grow up and have poor control over debts

4.5.5. POV

- Carolina needs a way to delegate to someone else her daughter financial lessons because she does not have the knowledge or time required for it

- Marcos needs a more complex financial program for his children so they can walk by their own feet

5. Identifying methods and approaches available

In this chapter we will we will dive deep to discover what solutions we might have - now that we have an hypothesis of what our clients problem would be - and explore which methods already exists in scientific papers that we can use as a nice financial education learning content.

5.1. The Effectiveness of Youth Financial Education

According to Martha Henn McCormick^[19], there's no consensus on what financial capability really means, while most of the programs attempt to teach minimum money management skills regarding, banking, finance, savings, credit, and so on, in the concept of education, the implementation or use of the knowledge is so important as the knowledge itself and Johnson and Sherraden^[40] suggests that financial literacy should include the access to financial services and institutions.

Hogarth^[41] explains that the themes when we talk about financial education include:

- being knowledgeable, educated, and informed on how to manage money, assets, banking, investments, credit, insurance, and taxes
- understanding the basic concepts of money management and assets
- using that knowledge and understanding to plan, implement, and evaluate financial decisions

In Brazil the Department of Education do not have widely accepted standards of excellence in financial education, they just have a guidance to organizations on how to develop programs^[20]. So our culture of financial literacy for children is in the very beginning and therefore we cannot take any measure from it. Although, we might look to what results other countries had.

5.1.1. The Current State of Financial Education for Youth in United States

In United States, every two years, the National Council on Economic Education's (NCEE) Survey of the States: Economics and Personal Finance Education in Our Nation's Schools provides a snapshot of national progress in implementing a K–12 personal financial education agenda.

In 2007 their report^[42] revealed the following informations:

1. Personal finance is included to some extent in the educational standards of 40 states.
2. Twenty-eight states now require these standards to be implemented.
3. Only seven states require students to take a personal finance course as a high school graduation requirement.
4. Only nine states require the testing of student knowledge in the area of personal finance

5.1.2. Promising Practices in Youth Financial Education

We can see that the picture there is a lot better and some data could already reveal a lot of insights, we will point some of them:

- **Timing of Financial Education:** The poor performance over time of high school students on personal financial knowledge tests, as indicated by the Jump\$tart^[19] surveys, suggests that the current model of waiting until high school to introduce personal money management concepts is too late; the model needs to be implemented into earlier grades.
- **Incorporate Savings Tools to Make Education Relevant:** Three policy documents from the New America Foundation^[19] reinforced best practices for youth financial education. Their suggestions included the establishment of savings and investments accounts at birth that can be used by the children in their school-based financial education programs.
- **Evaluation and Assessment:** Pre and post tests appear to be the most effective approach to use as measurement. The research by Lyons, Cheng, and Scherpf^[43] also described retrospective pretests (RPTs), in which participants are asked to answer questions about their level of financial literacy, measuring their knowledge and behavior before and after the program. After the program they are also asked to think back to their level of knowledge and behavior prior to the program.

5.1.3. Results in United States and insights

In McCormick's^[19] research she exposes some important data for us, that were collected as a result of financial education programs in the United States, we will highlight here:

- “In sum, male teens reinforced their existing knowledge, whereas female teens learned significantly more about finances in areas with which they were unfamiliar prior to the curriculum.”
- “Regression analysis shows that certain socialization factors, such as having a part-time job of 10–20 hours per week, having a savings account, and being from a family with a relatively higher level of family income, yielded improved quiz performance.”

These data is extremely important for us, we could for example decide to divide our audience by genre or maybe use the fact that people with a savings account perform better in a quiz to try to persuade parents in opening a savings account to their children.

5.2. The basis for financial health

Débora Patrícia de Souza explores in her research^[30] the importance of financial education for children and elucidates some good information on children learning process and what is the parents' role, so we could use it as the main material for our MVP.

5.2.1. Characteristics of each phases

In the first place, it is essential to understand that, for each age, the child's vision for money changes, and secondly, to become aware that children are exposed from the earliest years to consumerism and based on the idea that money sometimes is more important than ethics and moral principles. In this sense, it is important for the children to have different material according to the phases of their life.

Cerbasi^[7], in his processes of accompanying financial education, has set up a table showing the main behavioral characteristics of different ages:

Age	Main behavioural characteristics	Parents' role
0 – 2 yo	Desires are not associated with money yet, but the interest in parents' attitudes is intense and growing.	Give examples through your attitudes, as these will be copied by the children and will make them more disciplined.
3 – 4 yo	The realization of desires is associated with the act of buying, which depends essentially on the will and the money of the parents.	Avoid banalize consumption and establish rules for the use of money, such as budget limits and dates for celebration and gifts.
5 – 6 yo	Perception that it is possible to interact with strangers without adult intervention.	Cultivate independence, allow children to interact with sellers, and manipulate money into small amounts.
7 – 10 yo	Perception of social roles and quantification of values, such as learning mathematics.	Talk about money, family work, study goals and choice of professions.
11 – 14 yo	Perception of the responsibilities and first typical adolescence conflicts.	Cultivate autonomy, with an allowance or the offer of resources of free use by the children. Include the children in family financial organization tasks.
Above 15 yo	Need to take on typical adult roles	Talk about personal management issues, use of banks, greater incentives to training savings and desires versus investments.

5.2.2. Principles

Cerbasi^[7], supports, in infant financial teaching, six principles should be considered:

- **Valuing:** Teaching that having is no more important than being, that the most important and valuable things in the human life cost nothing: like caring, attention, respect.

- **Celebrate:** Presenting the child constantly without really existing a real need of the child induces them to be consuming and unsatisfied adults. Create meaning for each achievement, present only when there is a reason or when a “real” need for the child arises. Thus, in the future, young people will be trained knowing the difference between wanting and needing and the kind of people that are dissatisfied with everything, seeking their satisfaction in drugs and stuff. Stuffing the child with toys is not a good strategy. The kid should learn the opportunity in each occasion and date to win them. You must realize that it is not possible to satisfy all kid’s desires.
- **Budget:** The child knows that in order to consume she needs money and a work to have that money. Over time she will learn, with adults, that with financing and loans she can have more than her money. Understanding the meaning of the word budget in childhood stimulates planning and control. The awareness that if you save a certain amount per month today at interest rates, from now on she will buy a house and she will not need to enter into a financing paying absurd rates.
- **Investing:** When parents overvalue their jobs and forget to value their ventures, they are forming adults who will be money slaves in the future (inside the “rat race” as defined by Robert Kiyosaki in his book *Rich Dad, Poor Dad*^[17], in which someone sunk in debts and the only reason he works is to pay his debts). Working is not the only way to get rich and have a peaceful life. Using wisdom, applying a share of the salary on some investment, is really recommended. A child who knows that the money saved grows by itself knows how to differentiate two very distinct situations found in banks: “Interest rate working for us, increasing our wealth, when we use the investment services of banks” or “We work for interest rates by lowering our wealth when we use loan and financing services”
- **Negotiate:** Make every purchase next to your child a striking event, differentiate the trips to the mall at leisure from the trips for purchases. It recommends a cooler and more calculating persona in consumer situations. Trading is the ability to convince a seller, that their dollar is worth more than the dollar of the other customer. This happens only when the person himself knows the real value of his

money and the awareness that: a dollar saved today plus a dollar saved tomorrow give an amount of two dollars (his money doubled);

- **Balancing:** The lack of each of the above principles is one more burden to pull our young adults into the world of financial hardship. However, the excesses can be as damaging as the lack. Balance is learned over time. A healthy financial life includes ability to save and also to consume, both in balance.

Along with Cerbasi's principles, D'Aquino^[10] shares her point of view on her books, she says that the process of educating children to deal with money must cover four broad areas:

- **How to win:** The kid has to know that money does not come from parents, but from work. It is critical for children to understand that money is received in exchange for some activity, some effort and that making money is the ability to solve problems.
- **How to Save:** Children should be led to realize that the pleasure of saving is similar to the one when money is spent. They are complementary pleasures. Beware of over-attachment to money that is also harmful in adulthood and it is important to teach them to recognize the duality of these pleasures.
- **How to spend:** Children are exposed to consumption all the time. They need to know that consuming is a process of choices with consequences, so teaching children to discern the consequences of following this or that option makes them responsible for the destiny they construct. Spending is ability to make choices.
- **How to Donate:** Donating money is the easiest and most uncompromising form of generosity. It is essential to teach children that the gain and use of money must be governed by the precepts of ethics and social responsibility, without this main condition, nothing else that is taught about money makes any sense or is really worth it.

D'Aquino also exposes some important principles that should be given to children, they are:

- **The value of money:** Recognize and properly handle coins and banknotes, teach caring with cash (do not tear or knead), where money comes from, what is false money, ...

- **Wanting and needing:** Being able to distinguish what we buy because we want and what we consume because we need and that the one we need must always come first from what we want.
- **Expensive and cheap:** The mere fact of using such expressions in the child's presence is enough. Teach, later when an object is really worth the price it has.
- **Best of the party:** The best thing about the party is waiting for it. In this sense, set dates to give, for example. So the kid could think what to choose, make plans and distinguish the real desire from the immediate desire.
- **Love and Consumption:** The more the child asks, the more gifts he receives, the less satisfied she become. The more parents buy the more they want to feel loved, the less confirmation of love they receive. Gifts are expressions of affection and never surrogates. At this point it is also suggested the weekly toy rotation (establish limits on toys) and encourage toys that involve the invention of toys from scraps (like Lego). Most important get used to not being adored all the time for your child because he needs you to be able to resist tantrums and not fall into affective bribery.
- **United Consumption Family:** Inducing the child to participate in the home budget. In preparing the list and shopping at the supermarket.

The last principles and practices gives us a great start when searching for a material to use, it is important to follow these principles. The goal here of educating children in relation to money must be to achieve financial maturity: the ability to postpone future desires for future benefits. It is in human nature to obtain immediate satisfaction in every way. Financial education for children should be a permanent project, there is no right age to start, the need appears in the lives of all parents, usually along with the famous purchase orders, the typical "I want that".

5.3. Practical techniques for financial education of each phase

It is essential to understand that, for each age of the kids' development, their vision for money changes, so to have a maximum effectiveness we have to go along with the phases and know exactly what we could do to improve the learning process.

Ana Carolina Cervieri Kassardjian^[16] in her paper brings together two widely known researches in the area: Cássia D'Aquino^[10] and Joline Godfrey^[44] and make a compilation of practices for each age that we will use in our approach.

5.3.1. From 5 to 8 years old

- How to save:
 - Define the three possibilities for remuneration (preferably weekly): expenses, savings and donations.
 - Take the kid to visit a bank, open a savings account, and return often to make deposits or withdraw money
- How to keep control of money
 - Encourage the kid to count the money they receive and put the values on a chart or table, making it a regular task.
 - Identify some product that the child likes and let her know its value.
 - Count the change received in the purchases and ask the child to keep these small amounts in a safe deposit box and bring it to the bank once a month to deposit into the savings account.
- How to be rewarded by what you deserve
 - Make a list of “extra credit” that can be obtained by helping with household chores, and the range of value that can be obtained with each activity. Once a week, the child must choose one of the activities listed and negotiate the amount to be received.
- How to spend with wisdom
 - Plan the next visit to a toy store or other intriguing destination for the child: you need to talk to the child to set parameters for how much money they will have to spend, and discuss existing alternatives (the amount will be spent on one product only or several products?).
 - Give the child a calculator when she follows up on the buying process so that she can add up the costs and know the value of each good bought.
 - Be a conscious consumer model for the child.
- How to talk about money
 - Encourage the child to talk about different ways to use money.
 - Do not be afraid to say “we can not buy because we do not have money”.

- Do not be afraid to say “we have money to buy, but this is not the way I would like to spend our money” and then explain the reasons for such behavior.
- How to deal with a limited budget
 - Begin an allowance program (preferably weekly earnings that evolve along with the child’s age – a six-year-old child, for example, will earn six dollars a week), and check how the child is dealing with the money received and the lessons learned (every three months, for example).
 - When there is an opportunity to eat out of the house, give the child the menu and set a sum to be spent, and ask her to make the family’s requests without extrapolating the defined budget.
- How to invest
 - Introduce the concept of “interest rate”, showing the evolution of money deposited in the bank over time.
 - Introduce the concepts of partnership and equity
- How to exercise entrepreneurship
 - Encourage entrepreneurship projects and help the child in the pricing of products (lemonade bank or sale of homemade wristbands, for example), and value the initiatives congratulating the child.
- How to deal with credit
 - Encourage the child to take small amounts of money borrowed from you, and get her to pay back with her own earnings (allowance).
 - When you buy something for the child with your credit card, show the statement when you arrive and explain how you paid for the product
- How to use money to change the world
 - On special occasions, such as Christmas, encourage the child to contribute toys for needy children.
 - Set a special day for all family members to volunteer

5.3.2. From 9 to 12 years old

- How to save:

- Help the child to establish a saving scheme for any occasion or special interest for it. Make this an “account” in which the child makes regular deposits and will not be able to move until the combined date arrives.
- Introduce the concepts of other savings vehicles, such as investing in government bonds.
- How to keep control of money
 - If the child already has an allowance and a bank account, start making the deposits directly into her account, and expose the change to the child by showing the account statement.
 - Let the child help fill out checks and encourage them to deduct the final value of an account to be paid.
 - Institute a fictitious currency in the family to explain how the major monetary exchanges in the economy work.
- How to be rewarded by what you deserve
 - Help the children research how they could make money out of home, such as working for an aunt caring for a younger cousin, for example.
 - State the different salaries of each profession and explain the main reasons for the differences.
- How to spend with wisdom
 - Encourage the child to know how to read the differences between shopping modes: is it cheaper to buy individual units, multi-unit packages, or buy per kilo?
 - Discuss the differences between needs, wants and desires.
 - Alert the child about the danger of accumulating interest on different purchases. A useful tool here is to charge small interest on loans made to the children.
- How to talk about money
 - Encourage the child to write a short story in which she lends money to a friend and the friend does not return it on the combined date.
 - Set a time when the family will meet to talk about money
- How to deal with a limited budget

- Create a list of your child's school supplies and set a budget to spend on these items, then get your child to shopping and ask for help buying the goods without running out of the predefined amount.
- Introduce the concept of family spending, and ask for ideas to reduce those costs. Make sure you explore how these fixed expenses can affect some choices and decisions.
- How to invest
 - Find the annual reports of companies associated with your child's favorite brands, and ask them a few questions, such as asking them to find the name of the company president, revenue generated in the year, and how much money was spent on marketing by the company.
 - Encourage the child to collect something that will acquire value over time, such as CDs for example.
- How to exercise entrepreneurship
 - Read stories from entrepreneurs who have transformed their passions into profitable business.
 - Encourage the child to seek out stories from other entrepreneurs and build a "hall of fame"
- How to deal with credit
 - Offer a loan for some special request from the child, and write a contract that must be signed by the two. If the child exceeds the payment term, it will pay interest for the delay.
- How to use money to change the world
 - Show the child your income tax return and how you documented the total amount intended for charity in the year.

5.3.3. From 13 to 15 years old

- How to save:
 - Find a goal related to the child's independence (travel with friends, for example) and establish what the contribution will be to reach the goal. It should convey the message that "financial planning equals independence."

- Write a letter or email to the child telling their own experience about how you learned (or did not) save money and the effect it had on your life and your independence.
- Reinforce the effect of the interest rate on the child's savings.
- How to keep control of money
 - If the child does not already have it, take it to the bank and open an account for it. Give the remuneration (weekly or monthly) in the form of a deposit or check, and plan regular trips to the bank so that it can carry out the transactions on its own.
 - Have the child write down for a day everything he spent, earned or spared, and review with him at the end of the day. Then extend it to three days, then a week and then a month. Ask the child to make observations about their own monetary style and spending and saving habits.
- How to be rewarded by what you deserve
 - Ask someone to request a service for the child, reminding him that you want the child to first research a suitable price and negotiate it.
 - Give the child a list of ten professions and ask him to search the internet for the average income of each one, both for beginners and experienced in the market (10 years of profession, for example).
- How to spend with wisdom
 - Explain the concept of indirect costs.
 - Introduce the concept of impulse buying, explaining, for example, why candies are always near the pay box.
- How to talk about money
 - Talk about advertisements that are shown in the intervals of the child's favorite programs, and ask them to identify parameters such as honesty, accuracy and consistency of the message and value of the asset explored.
- How to deal with a limited budget
 - Ask the child to set a budget for a whole family day. Give her the money at the beginning of the day and state that she will be responsible for all payments. If the money ends before the end of the day, do not criticize, just come home early and try again in a month

- How to invest
 - When you find an article about a company that your child likes, ask them to read and comment on whether they feel the company appears to be a solid or risky investment alternative.
 - Introduce the idea of socially responsible investment. Ask the child to research three companies and point out which one is the most socially responsible and the reasons for their choice.
 - Buy shares of a company whose brand has meaning for the child, read the annual reports with it and enter the site to search for more news.
- How to exercise entrepreneurship
 - Give the child the biography of an entrepreneur.
 - Suggest to the child to organize with friends a neighborhood car wash program to raise money for the end of year gifts.
- How to deal with credit
 - Show the child's credit card bills and ask the child to identify the monthly interest expenses.
 - Ask the child to look on the internet if there are any credit cards with better rates than what they currently charge. If it finds, make the exchange
- How to use money to change the world
 - On Valentine's Day, give the child an amount to contribute to some cause that "moves your heart".

5.3.4. From 16 to 18 years old

- How to save:
 - Suggest the youth to research how much a home is worth and calculate how much it would need to save each month for the next ten years to get the amount.
- How to keep control of money
 - Establish an annual budget for the youth, subject to evaluations and possible revisions every three months.
 - When the budget is to be renewed, make this time both a rite of passage and celebration.

- Expose the financial situation of the family, ensuring that the youths understands their part in the family plan.
- How to be rewarded by what you deserve
 - Ask the youth to list three skills or talents he has and ask what he considers a fair payment for each. Ask him to search the internet and compare prices.
 - Introduce the concepts of salary, commission, bonus, and profit sharing as forms of payment. Ask the youth which he considers the best way.
 - Practice with the youth a negotiation scenario before your first job interview
- How to spend with wisdom
 - Take the youth to the next purchase of a car, computer or other item of high cost, and when this happens again, ask him to research and help in the choice.
 - If the youth has a cell phone, ask him to research the available plan options and which is the most cost-effective
- How to talk about money
 - Ask the youth to list his top five money-related concerns, and then encourage him to chart a plan to reduce anxiety.
 - Have the youth estimate the budget for some important rites of passage, such as graduation, marriage, or any other great celebration.
- How to deal with a limited budget
 - Introduce the concept of pension funds.
 - Show the youth three hypothetical annual income, and ask him to picture the lifestyle related to each
- How to invest
 - Take the youth to a meeting with a financial advisor or bank account manager, and have him explain to the youth his role.
 - Give the youth an economics and finances newspaper subscription.
- How to exercise entrepreneurship
 - Take the youth to a entrepreneurs conference or meeting.

- Explain to the youth that entrepreneurs are people who come up with ideas from a few resources and can be found both within a church's staff or at a science and technology institute.
- Remind the youth of things he does that are entrepreneurs by nature.
- How to deal with credit
 - If the youth already has a credit card, be sure to alert them to the risks involved.
 - Always covers interest when lending money to your child. Even if it's a small fee, it's important that he knows that borrowing money costs.
- How to use money to change the world
 - Ask the youth to list three social causes that matter to him, and ask him to come up with a plan to help those causes.
 - Ask the youth to research and identify which of the companies behind his favorite brands actually carry out socially responsible business.

5.4. Conclusion

We could take several lessons from these researches in order to develop our solution to teach financial education to youth. We have to develop a solution which can be used as early as possible by children, using some method to differentiate between contents that should be linked with the age of the kid, for example, a younger kid should learn basics concepts in finances while a more mature one should learn more advanced concepts and create a way to use it.

It is important to follow Hogarth^[41] suggestions on what to children should be able to accomplish throughout the method:

- being knowledgeable, educated, and informed on the issues of managing money and assets, banking, investments, credit, insurance, and taxes
- understanding the basic concepts underlying the management of money and assets (e.g., the time value of money in investments and the pooling of risks in insurance)
- using that knowledge and understanding to plan, implement, and evaluate financial decisions

And lastly, we should develop a way to measure the kid progress, one of the strategies is the pre and post test, but as a long-term solution it should be possible to use some kind of gamification strategy along with tests to evaluate a kid progress.

6. Developing the MVP

In this chapter we will merge every information we have until now to develop our MVP

6.1. Introduction

The goal here is to solve our problem the best and cheapest way possible. We have created two personas as potential clients and created two problems that they have (described in our POV section), so let's look back at what these problems:

- Carolina needs a way to delegate to someone else her daughter financial lessons because she does not have the knowledge or time required for it
- Marcos needs a more complex financial program for his children so they can walk by their own feet

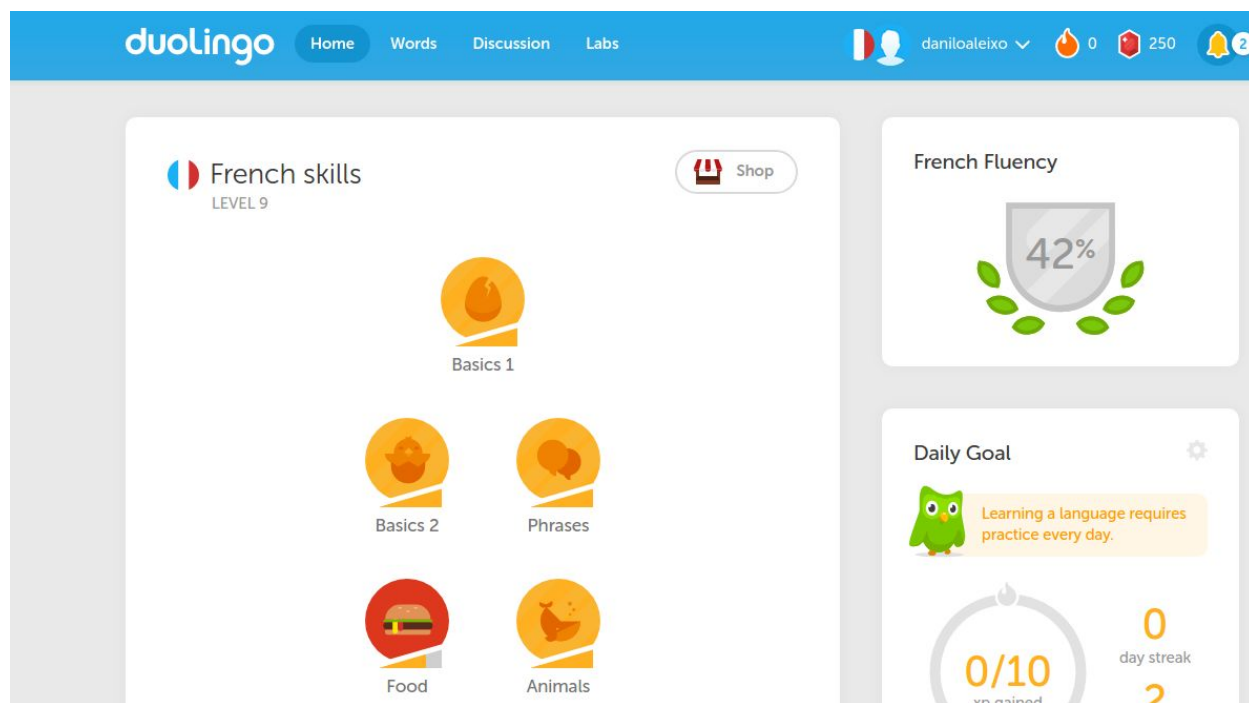
So what we are going to propose in this chapter is a solution that would solve these two problems and a way to prove it.

6.2. Minimum Viable Product

Our solution is based on the concept of missions or challenges that the kid must assign to himself, each mission will be based on the theory that we presented in chapter 5 and the kid will be rewarded with some points.

The mission or challenge was the simplest way for us to validate the theory, the goal would be to have each mission according with the age of each child, what social status she is inserted into, what her genre is, but for MVP purposes we are using only the theory's stage that ranges between five and eight years old, ie, the first stage of the material we have. This does not mean that we are restricting our product to kids in this age range, only that the kids that get in touch with the product will have the material's first stage.

This approach let us in the future use the model that was solidified by Duolingo^[45] (a free language-learning platform that uses gamification to improve engagement), by using each stage as a level that the kid has to go through, only by completing all the missions she is allowed to move to the next level.



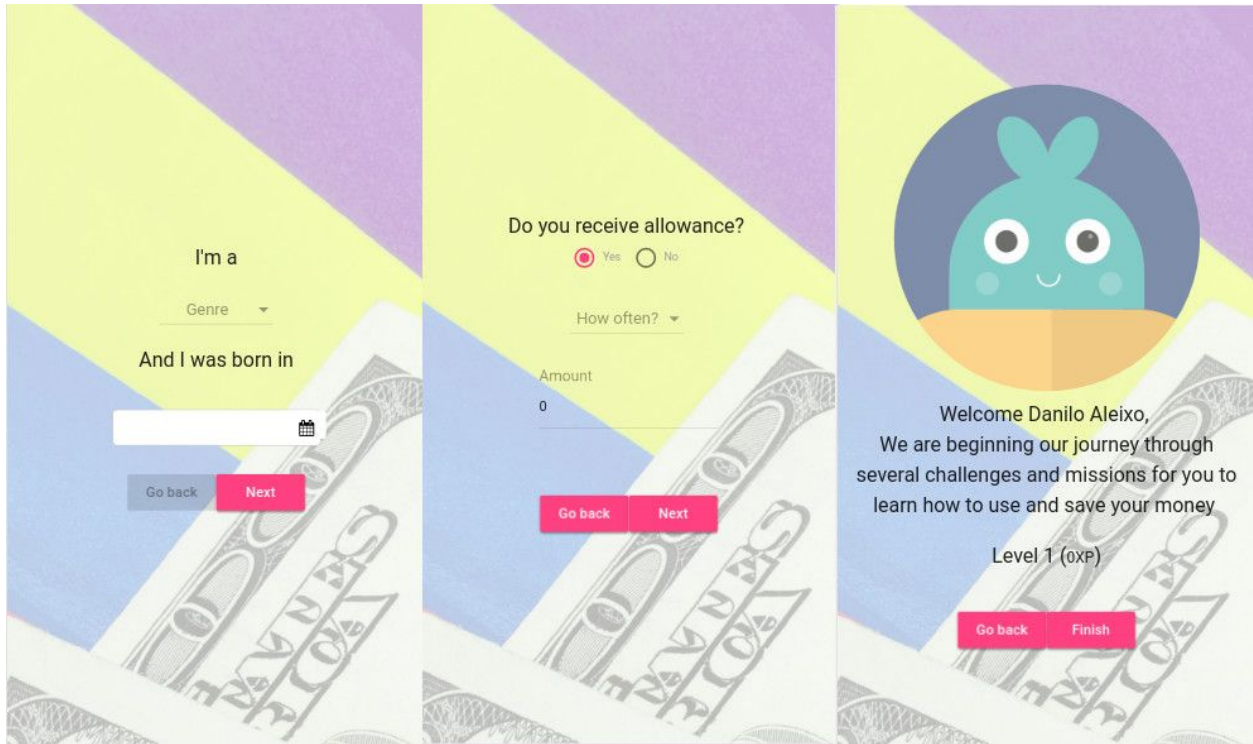
[Figure 11. Duolingo with its level proposal, it is important to note that the user can only advance if he completes the actual level. Image taken by the author from Duolingo^[45], 2017].

Gamification is defined as the process of taking something that already exists and improve it using game mechanics, generally to increase participation and engagement rates. These strategy is what keeps Duolingo engaging and why we spent some time studying its system, because in the end one of the most difficult parts of developing any kind of system to infants are the fact that they are not easily engaged, we could not rely on the child's will to learn financial education by herself. So our strategy for now was to use points of experience to each mission the user completes, it is important to say that we are not exploring these points yet, the goal is, in the future, to have a nice gamification strategy.

We also thought of another way of trying to engage kids to participate in the platform that would be using their own allowance as a hook to keep them coming back. The way it works is by letting the parents stipulating a maximum amount of money they would give each month, then the platform would use this credit as reward for the kid. This idea was put aside for now, we did not like the fact of money being the reward and the reason of infants keep coming back, it was kind of unethical and its implementation was a little bit tricky.

6.3. Understanding the product

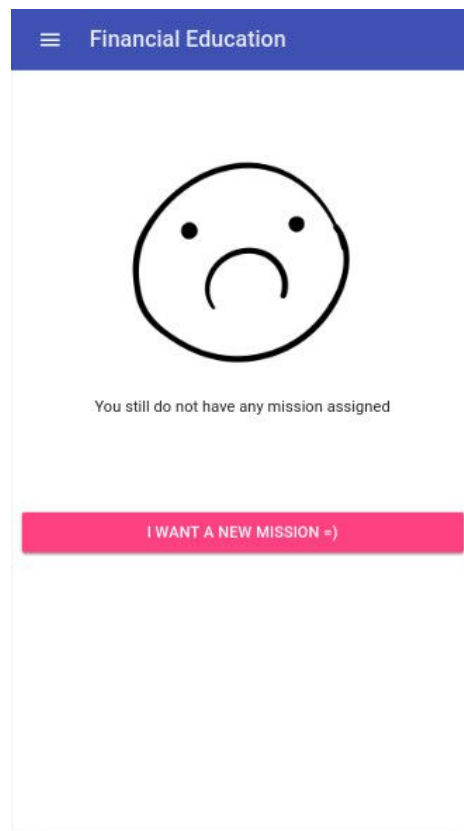
6.3.1. Welcome screen



[Figure 12. The first screen was made to get information about the kid the we are trying to help. Image taken by the author, 2017].

When the user logs in for the first time we will ask him a few questions, the goal of the questions is to know our user better and in the future provide a more specific solution for each case we identify.

6.3.2. Home screen



[Figure 13. Screen showing the home screen, when the user does not have any mission yet. Image taken by the author, 2017].

The home screen will be the starting point for our user, here he can view all the missions he has assigned and what are the progress of each one. When the user does not have any mission yet this large “I want a mission” button will be shown trying to force the user to get a new mission.

6.3.3. Choosing a mission



[Figure 14. Screen showing all the missions available to the user to choose. Image taken by the author, 2017].

The user has the ability to choose between the missions in the system, for now, we are showing all of them, but the goal is to use a system like Duolingo, so we only show the missions that are linked to the user's previous mission making a link between the content learned in the content that will be learned.

6.3.4. Participating of a mission



≡ Missões

Helping in domestic chores

Progress: 0%

Domestic chores are a great opportunity to learn a little about work value, your goal is to negotiate what will be the money that you will receive from the domestic chore you pick => think about the effort you are making.

Domestic chore I chose

Amount negotiated

Completed

Update

[Figure 15. Screen showing the process of completing a mission. Image taken by the author, 2017].

The user has the ability to update its mission status, it is important to note that when the kid finished the mission we do not know for sure if he has really did what he had to do, so we update the status of the mission to “in analysis” and then asks the parents trying to validate the mission. We could try to force the kid to upload a picture proving it, but the learning process involves the parents and it is important to make that bond, between the platform and both children and parents.

6.4. Conclusion

The MVP development was thought to be as quick as possible, so we tried not to fill the prototype with lots of features that we would not be able to analyse, although we chose to have a scalable architecture, that is, during development we focused on getting the system as malleable as possible and implemented design patterns that would help the system scale, they are:

- **Single entry point:** by doing so we guarantee that every server communication comes in by a single function, not caring if the communication was built via WebSocket or via API calls.
- **Object-oriented interfaces:** by using object-oriented programming we can take advantage of interface inheritance to abstract code and possibility to build tons of classical design patterns, like factory and facade.
- **Redux-like store:** redux store provided a one-way data flow, so when the user make a request to the server, the response is dispatched to the store that handles the change and updates the data, because all our views is listening to the single store they just update by themselves.
- **Polymorphic web components:** the system avoid code repetition even on html components by using polymorphism and abstracting shared code.
- **Sass structure:** Sass extends CSS by letting us define functions and variables, which helps a lot when you have a large system with a lot of styles spread throughout the project, I also make sure that the system had global styles that would be “inherited” by the specific classes.

No matter how much I liked developing a technically beautiful and scalable application, I still thinks that maybe I spent a considerable amount of time in this process, I could have developed a really low-cost prototype by coding faster and not really caring about system’s architecture, I would have reached the audience faster, but the tradeoff is that probably each step would take more effort than the previous one. A good question would be what to choose: scalable prototype or low-cost prototype? And I still did not have this answer, only experience in both approaches would help.

7. Product and development

In this chapter we will specify each iteration we have and what we could learn.

7.1. Iteration #1

With the MVP ready we could proceed to the first iteration with real users. We decided to take two children at first, give them a brief explanation and watch them use the app for a while, then ask some questions to how was the experience. Another important point happened while talking to the parents when I decided to ask what they expect from a solution like this.

We could conclude that the most difficult thing would be to make an iterative and engaging content for the kids, it was just so hard to keep a child focused in the app. Of course the layout does not help much, but what we could observe was more than that, children are used to highly addictive games with a clear sense of progression developed, it would be pretty difficult to create a really engaging gamification experience (and would probably cost some money).

So we will need to explore some other approaches to deal with this fact. One way is to have the money as a hook to keep children coming back to the platform, we could reward every mission a kid accomplished with some value in the kid's own allowance that would be paid by its parents, although this approach is a little bit controversial we could introduce some money concepts, like when you have a mission that is based on teaching "work" or "negotiating".

But the approach that seems definitely better is bringing together the parent-child relationship inside the platform, the parents who have interest in teaching their children financial education could (in the near future) learn some content themselves through our solution too and share some activities with their kids. That approach also puts the one who is paying (the parent) aware of the progress of their children and could also work as a "homework".

So for the next step of our project the main idea is to benefit from the parents role in this journey and provide them with some kind of dashboard to follow their kids progress and see if it impacts the children response to the solution.

7.2. Iteration #2

Our second iteration was focused on solving the problem we identified in the first iteration: bring the parents closer to the children progress and try to create a bond between the two that will motivate their progress.

Our approach here was creating a “wizard of oz” system that the parents would think were autonomous but in reality we were operating manually behind the curtains. So we took our two families from earlier and explained to them that this week we would provide a twice a week follow-up of what their kid had accomplished that week. The follow-up was just an email explaining what the kid had done, what it had learned and some small tips to the parents when talking about financial education based on our theory.

After the week was over we interviewed both families to ask them about the experience and the funny fact was that the results were divergent.

The parents of one family completely forgot about the email we had sent, they explained that the email was lost in the midst of all the other arriving at their mailbox, hence we could not evaluate the parents influence in the kid development.

On the other hand, the second family was younger and they got all excited about truly accompanying their kid progress and the influence had the positive bias we expected: during the week they kept asking about things their kid was learning and also could help him because they knew what was his mission. The family were asked if their tips were helpful and, although they said it was, they could not provide a scenario they use it.

We can conclude in this second cycle that we have to explore this parent-child bond, when the parents are concerned about their kids learning they would really help him achieve what he wants and the kid get a better mood interacting with the platform. It is important to note that maybe the email approach was a good idea to validate the hypothesis, but another way of communicating with parents should be developed, maybe a different kind of login in our platform for example, showing them the actual status of their kids' learning process and I think that would be the subject of our next iteration.

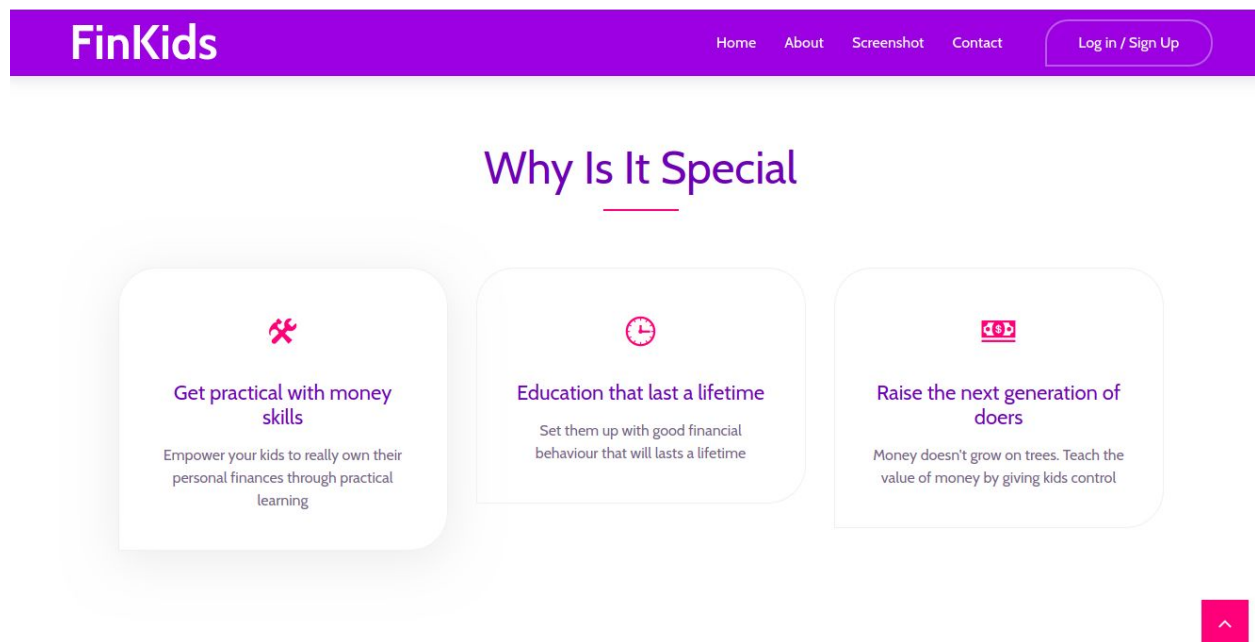
8. Product and development: Part 2

The goal of this chapter is to describe the second round of development where the focus was to increase the application size and its features.

8.1. Iteration #1

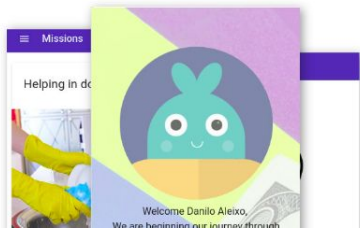
In this iteration the focus was to deliver a presentable web page, often called landing page, that could introduce the platform goal and ideas.

The landing page was developed to explain what features the platform has, what can be accomplished using it, try to engage other people to collaborate to the project and also to follow the site traffic, estimating how many users saw the page and register in the platform.



[Figure 16. Screen showing why to use the application. Image taken by the author, 2018].

The page was developed apart from the app, firstly because it needed to be fast and a 10-second-wait on slow connections was unbearable to a landing page. Second, because there was no need to send a full web app with all the application pages and content to a user who was just passing by to know a little more.



Build a brighter future for your kid!

Our solution is based on the concept of missions or challenges that the kid must assign to himself, each mission will be based on our financial theory which focus on each phase of the children's growth.

[Figure 17. Screen showing the idea and mission of the project. Image taken by the author, 2018].

The development was made basically in HTML, CSS and JavaScript and the inclusion of a contact form and Google analytics were the way to track the leads.

8.2. Iteration #2

In this iteration the application allowed parents to subscribe and follow their children activities.

With this change we allowed parents to register in the application and include how many children they want in their dashboard.

They were also allowed to search all the child-role users in the application and track their progress, the application does not define any type of restriction here, that was actually a tough decision and pondering what would be the consequences to each case, on one hand, if the system make a restriction to families (meaning that the app would only allow relatives to track a child progress), there could be a case in the future where a parent delegates to somebody else this task, making the search business logic to crash, on the other hand if a confirmation was sent to the child, he would now have the power to deny it, making it frustrating to parents and decreasing application's success rates. The decision was to expect the users to act properly then.

It is important to note that the dashboard at this stage had only information about each child: how many missions each one has accomplished and what was the missions that are being done, and they were showed poorly.



Danilo Aleixo

Numero de missões: 1

Numero de missões completadas: 0

Numero de missões sendo feitas: 1

Missões sendo feitas

1 - Ajudando nas compras para a casa

Descrição: Vamos às compras \o/, sua tarefa é ajudar seus pais nas compras do supermercado, para isso leve sua calculadora e some o valor de cada produto comprado e tente acertar o total da compra =)

Progresso: 0%

[Figure 18. Screen showing a parent's dashboard. Image taken by the author, 2018].

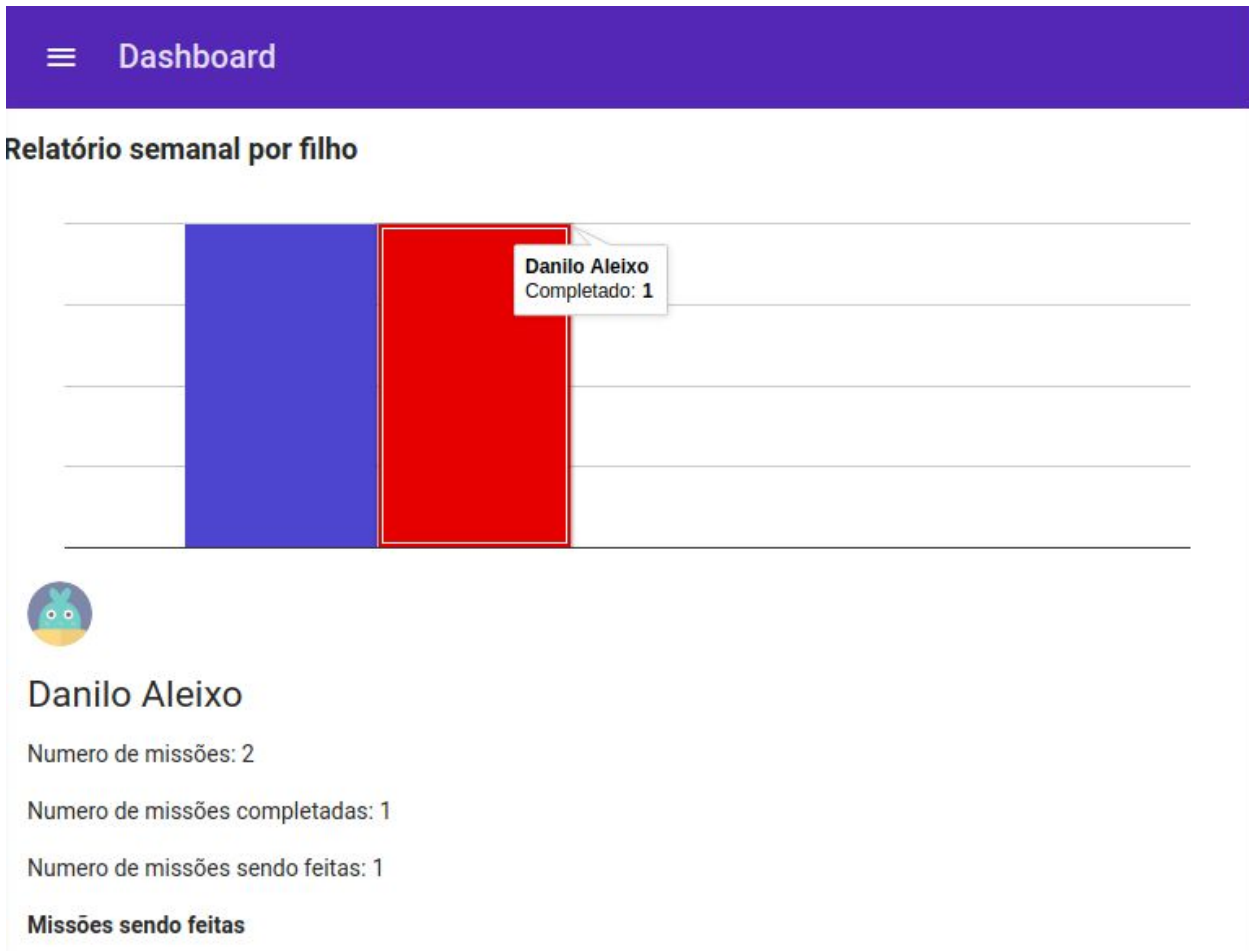
8.3. Iteration #3

In this iteration the parent application received charts to help parents visualize children progress.

There is a lot of libraries to create charts in HTML, one of the most famous is D3.js, it provides a lot of tools to visualize data, it can simulate liquid flow, generate graphs and lots of pretty complicate stuff. Although D3.js seems to be the best option, the system need just simple charts, so Google charts was selected because it provides an easier implementation.

The model has to be updated to save the date when the user assigns a mission or finish it to make it possible to show each child personal weekly progress.

The decision was to concentrate in showing absolute numbers of missions completed or in progress per kid.



[Figure 19. Screen showing a parent's dashboard with the chart showing child's weekly progress. Image taken by the author, 2018].

9. Conclusion

We chose Lean Startup and Design Thinking approaches because of the client focus they have, this choice fitted very well this project's goal: to provide a digital solution to parents that wants to raise financially fit children in a way that is both engaging and accessible.

The interviews were decisive to identify the user needs and the build-measure-learn cycle kept the development of features close to the user needs, always aiming to solve the problem they have.

During the iteration phase it became clear that we could have saved more time in earlier stages like development and ideate to have more iterations with the user, because that

is where we gain more knowledge than any other phase, but overall I think we had a great knowledge gain along with a great product, as we do not intend to finish the project now, we have a long way ahead.

The first meetings we were reminded of how difficult this problem would be, there is no easy way to teach someone how to handle his finances in a society based on consumerism, is like swimming upstream. Focusing on infants was our best bet to overcome the society bias since kids would be more open to new ideas.

What we find out is that parents do recognize the importance to raise financially educated kids, they understand that money management would leads to a happier life and that they would help their children accomplish this.

The really hard part was the fact that kids are actually much more difficult to engage in a learning experience than adults and a software which has the purpose of teaching an infant has to be really engaging and intuitive.

I believe a real nice solution could come up to life, with more time and more people, as Duolingo has successfully built in language-learning, of course it will not be easy, engaging parents and children now is problem that we need to overcome, but others will arise, we need to find out a viable business model and what partners we would have to make the product succeed.

10. Subjective part

10.1. Challenges we faced

In contrast of what we usually have as undergraduate dissertation thesis I decided to get a real-world problem and develop a solution using the knowledge I had in computer science and of course the difficult here was not applying the concepts that we learned during college, the hardest part was learning how to handle different problems that came up when you are dealing with real-world cases.

The greatest challenge we had was to handle with problems that are related to other types of intelligences other than logical-mathematical, like observing the body language of the people who were being interviewed, looking for an inconsistency that would gave us more info of what we were getting by spoken language; or being able to manage the

project and separate the milestones for each stage. And I think that was the most satisfying part of this project, finish a project that taught not only computer science but developed us an individual too and which also provided a great knowledge to future problem-solving situations.

10.2. Relevant Subjects

Throughout college we always end up asking ourselves if some subjects are really necessary - it is not exclusive to computer science students, all students at least one time had the same feeling, the only thing that varies are the subjects, in our case the subjects would usually be Physics or Software Engineer - but now at the finish line I admit that these subjects has their values and somewhere during my career I would use them. However I will point some of them that I consider essential:

- **Introduction to Computer Science and Principles of Algorithm Design:** are the ground base to any computer science student.
- **Data Structures:** gave me the tools to develop a great system and taught me which data structure to choose and when to choose.
- **Operating Systems:** was one of the most difficult classes I took and had to do it twice, but I thank the opportunity, because the projects I had were unquestionable valuable to computer understanding.
- **Database Lab:** gave me hands-on knowledge on how to develop and maintain a database system.
- **Innovation and Entrepreneurship:** this subject gave me a better understanding of Design Thinking and Lean Startup that I helped in this project.
- **Extreme Programming Lab:** finally, XP Lab was one of the most important subjects I took, mainly because was the first time I could interact with a real-world problem and work with a team towards a goal. Also taught techniques in software developing that I could use during this project.

10.3. Next steps

My goal in this project was and continue to be the same: help parents raise financially educated kids. Of course there is a long way towards the goal, but I could anticipate that this project will not end here.

During the final months in this project I was approached by Caio Marcelo, by a friend in common. Caio has recently graduated at Founders Institute^[46], Founders can be defined as an idea-stage accelerator and startup launch program, that is they take an idea and turn in something that can be called an early-stage startup, for Caio the program culminated in the developing of a startup called *Finkids* which has a purpose very alike with this project.

So my goal for the next months are join forces with Caio and search for a viable business model and turn our product in something more sellable. And then, try to make a partnership with banks or private schools to use their force to spread our solution.

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