

Title: Designing a better debit card experience for teenagers Course: ETM 556 - User Centered Innovation

Year: 2017

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Report No.:

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#### 1. Introduction

The initial design challenge proposed was to investigate "human interaction with money." With this broad starting point, the teams were set out to go through the design thinking process studied in class. Our initial approach was use children as our target, so we set out to observe and learn how children deal with money. The shopping mall on a busy Saturday afternoon was the site of the fieldwork. In addition to that, we also interviewed children and teenagers. From the observation stage we came up with three possible problems to work with, namely (1) the gumball machine, (2) the vending machine, and (3) teenagers and debit card.

At the problem definition stage, we decided to focus on the teenagers and debit card. We developed personas for our main target (the teenager) as well as the secondary target (her parent), to help the group better understand the real humans we were designing for. During this stage, we used some of IDEO and d.school's tools and methodologies [1, 3] to frame our problem.

Finally, when we reached the solution space, where we explored different possible ways to solve the design problem until we settled on our final solution. In this stage, we used other tools provided by David and Tom Kelley [1]. As a last step, we reached out to one of the teenagers interviewed at the beginning of the project in order to gather feedback on our first prototype, however we did not reach an iterative stage. In this paper, we will describe in detail our design process and how it relates to the theories studied in class.

## 2. Literature Review

#### Human-Centered Innovation (or User-Centered Innovation)

While there has been a discussion regarding the most appropriate terminology when it comes to the proposed innovation approach of this course, for the purposes of this paper we will treat User-Centered Innovation and Human-Centered Innovation as equivalents. The main idea is that a deeper understanding of human unmet needs provides design opportunities for breakthrough innovation [2, 3]. This understanding is reached through various methodologies (some of them adapted from ethnographic research) to enhance the designer's empathy in order to extract powerful insights from observation and fieldwork.

In a world where so many corporate decisions are motivated by big data analytics, putting the humans at the center does seem to break with the current approach. But instead of radically breaking from quantitative research in favor of a purely ethnographic or qualitative research, what design thinking practitioners propose is a hybrid approach that mixes the best of worlds, "coupling insights based on empathy with analytic confidence within relevant target markets may be a way to take the best of both research approaches" [1].

Throughout the term and the development of this project, the team was encouraged to learn about the human-centered approach to innovation both from a theoretical and practical points-of-view. On the theory side, we were exposed to the various ways different disciplines represent people. Biological / ergonomic, cognitive, psychometric, humanistic, ethnographic, market segments, and others. In *The Design of Everyday Things* [2], Don Norman explores some of those representations, but focuses on the cognitive approach. His seven fundamental principles of design (discoverability, feedback, conceptual)

model, affordances, signifiers, mappings, and constraints) are helpful guides for untrained observers to get the best out of the practical fieldwork, as a starting point for what to look for and what questions to ask.

#### **Double Diamond process**

Created by the British Design Council, the Double Diamond is a synthesis of the creative process used by many professionals in the area (see Figure 1 below). The first diamond is considered the "problem space" and the second, the "solution space". Each of the two diamonds is divided in two, the four resulting pieces represent the four stages of the design process: discover, define, develop, and deliver [4].



Figure 1: The Double Diamond Design [4]

This visual representation of the four stages follow the divergent-convergent and once again divergent-convergent processes of design thinking. This may suggest a linear process, however design practitioners defend a cyclical and iterative process, where multiple hypotheses are constantly created, tested, refined or discarded in each phase. The British Design Council definition of the four phases combined with our group experience are summarized below:

**Discover** – The first quarter of the Double Diamond model is a divergent phase, where the team uses empathy to get a better understanding of the people they are designing for. They seek a fresh outlook into the world through exploratory observations, fieldwork, interviews, and sometimes more advanced techniques such as ethnographic studies. The objective is to gather insights and understand people and their motivations, identifying possible design opportunities.

**Define** – The second quarter is where the information gathered is synthesized, converging into the creative brief that clearly frames the design opportunity and problem to be solved. The challenge here is to avoid jumping into the solution space, instead focusing on desired outcomes.

**Develop** – The third quarter is another diverging phase, but now into the solution space. This is where various solutions to the design brief are created, prototyped, tested and iterated. Validating concepts at the early stages of development is essential to this process, therefore practitioners

value failure at early stages because it leads to more learning opportunities until the right or best solution is found.

**Delivery** – The final quarter of the double diamond model is what most engineers are familiar with - ensuring an efficient delivery of the proposed solution.

### 3. Methodology and Results

The initial design challenge for this project was "human interaction with money". During the first meeting, the team decided to focus on children. How do they interact with money? How do they learn about money? When do they learn? What is the meaning of money for them? Cash or card? What is the advantages and disadvantages of each?

For this course specially, it was important to focus on the design process instead of the solution. We were encouraged to follow the Double Diamond process, mainly the first three phases, with a deliverable at the end of each phase. In this report, we summarize and reflect upon the entire project, correlating our learnings from theory to practice.

#### **Discover: Fieldwork Observation/Empathy**

This is a crucial phase in the Human-Centered design process. The goal is to do exploratory observations to uncover unmet user needs, view problems from another perspective, adopt different points of view, and understand motivations behind people's actions [1, 2]. Sketching as a form of communicating and making sense of the observation was encouraged as part of the challenge (see Appendix A for one of the sketches produced during the fieldwork observation).

For this part of the project, the team did interviews and fieldwork observations at Lloyd Center, as well as secondary research. The interviews were conducted in person. We prepared a few questions to get started, then we asked more questions based on their answers. Below are some of the initial questions we had prepared. A more comprehensive list of questions asked during the interview are in Appendix D. Overall, we had a total of eight interviews, four 14-year-old girls, one 13-year-old girl, one 11-year-old boy, one 8-year-old boy, and a parent.

- What's the first thing that comes to mind when you think of money? What about it? Why?
- Do you have money? Where did it come from? How much?
- What's the most annoying thing about your money? Tell me more about it.

During the interviews, the first problem we identified was about how some of the teenagers dealt with their debit or gift cards. Most of them said they prefer to use cash, even if almost all of them do have a debit card. The main reasons are because of lack of security and not knowing the exact balance available. The lack of security refers to the possibility of losing the card and therefore being unable to pay for their immediate purchases as well as taking a long time to receive a new one. Additionally, some of them felt like losing the card meant losing "all of their money." The balance issue refers to the fact that they do not have access to the mobile bank application connected to the account, since the account is usually in their parent's name. So in order to know how much money they have left, they have to either call the bank or ask their parents to consult online. As for the balance in gift cards, they may consult online themselves, or check the balance on the receipt after the purchase.

The fieldwork at Lloyd Center, observations, and a few more interviews led to another two possible design problems to be explored - the gumball machine and the vending machine. Regarding the first one, the team identified a few problems. (1) when the user inserted coins that were not quarters, the machine did not return them, so users lost their money, (2) when users successfully operated the machine, the candy fell into a tiny compartment that when opened, would sometimes overflow and spill candy on the floor. One parent seemed to be prepared for that situation, and brought a small plastic container to retrieve the candy, but this is not something that should be expected from all customers. Regarding the second observation, we noticed that the vending machines near the children play area had buttons that were difficult to operate by women and children. The button that is supposed to return the change to the customer is very hard to push, so it required the young mother who was trying to use it to ask for help from her male friend. That situation is not ideal, especially given the position of that vending machine in the mall.

As part of the synthesis of this phase, the team shared three possible design problems to be work on: teenagers and debit cards, the vending machine, and gumball machine. The following tables provide a summary of our findings.

Teenagers and debit or gift cards				
Who	What	When	Why	
Teenagers	Planning to use their debit or gift card, not knowing the balance	Balance not readily available, inconvenient	In order to consult the balance, they need to use their computer, ask parent, or call the 800 number	
Teenagers	Carrying their debit card around all the time everywhere	Fear of losing the debit card	Associates it with losing all their money	

Table 1: Possible design problem 1 - teenagers and debit or gift cards

Vending Machines				
Who	What	When	Why	
Women and children	Getting coins or change back	Not able to push the button all the way	It requires a lot of strength	

Table 2: Possible design problem 2 - vending machines

Gumball Machines				
Who	What	When	Why	
Parents and children	When user inserts coins that are not quarters	They lose their coins	Machine "eats up" the wrong coins	
Parents and children	When user opens the lid to retrieve candy	Candy may fall on the floor when the user opens the lid	Too much candy for the small compartment?	

 Table 3: Possible design problem 3 - gumball machines

#### **Define: Problem Definition**

Following the fieldwork, our task was to develop a design brief that clearly articulates the right problem to be solved. We decided to focus on the issue of teenagers and debit cards. In order to create the design brief, the group met at the PSU Library, used brainstorming tips learned in class and sticky-notes to initially record all ideas and subsequently organize them.

Personas were created to represent our key audience. The introduction of the use of personas in design is attributed to Alan Cooper [5, 6], and it is widely used to "help designers understand, describe, focus and clarify user's goals and behavior patterns" [6]. Personas portray a general picture of the users and their backgrounds, focusing on their needs and expectations regarding the issue we are addressing. They are fictional representations based on quantitative and qualitative research, as well as designer's assumptions [6] regarding the user. They are not meant to represent the totality of users nor to strictly reflect the data gathered, instead they are useful to communicate and guide design decisions by focusing the process on the user's needs, expectations, and how the final design will fit into his or her life.

For this project, we created two personas: Sam (the teenager and main user) and Grace (Sam's mother, considered a secondary user). Sam's profile reflects a teenager who goes to high school, based on the user studies done in the first phase, we tried to imagine what a day in her life is like, how she was raised, what kind of responsibilities she has, what her social life is like, her relationship with her family, what she likes and dislikes. Furthermore, we also explored how and when she interacts with money, what kinds of difficulties the debit card poses in her life, and other such aspects. For Grace's persona, we also thought about her personal life and how she views financial education as a parent. As the adult responsible for the teenager as well as the account holder with which Sam's debit card is affiliated, Grace plays an important role as a decision-maker in the process, even though the design is intended for Sam.

The following tables (Table 4 and Table 5) contain an overview of the two personas as well as an image that represents them.



Table 4: Main persona - Sam [7]



Table 5: Secondary persona - Grace [8]

With the help of the personas, the team looked back into the initial design problem to try to reframe it as a Point-of-View (POV) statement, following the d.school's methodology [9]. But before reaching a POV statement, we needed to refine our User Need statement (typically comprised of "user + need + insight" [9]) in order to get to the "real" goal or underlying need. As studied in The Design of Everyday Things [2], a lot of what happens in the human mind does so at a subconscious level, for that reason designers must make an extra effort to really understand the reasons behind the design problem they are trying to solve.

In our case, we started with "teenagers don't like using debit cards because they are afraid of losing them and they don't know the balance." While that statement does contain the user and hints at the need, it does not contain a real insight, but merely an observation or a superficial reason. So we went back to the personas and kept asking ourselves why. Why are they afraid? Why is losing the debit card worse than losing actual cash? Why does not knowing the balance make them uncomfortable? Maybe because they don't understand how debit cards really work, maybe they just lose track of the money they already spent, maybe they think it's too inconvenient to call the bank every time they need a service, maybe it's something about responsibility. Finally, after going through this exercise, we arrived at our User Need statement: Teenagers need a way to safely manage their money because for the first time in their lives, they are starting to be responsible for many money transactions.

The insight about new responsibilities was crucial and helped us look at the situation with new eyes, or in the other words of Tom and David Kelley: "reframing the problem not only gives you more successful solutions but also allows you to address bigger, more important problems" [1]. With the user need more broadly and clearly defined, the team was able to explore the POV statement, which is "the question to answer that need" [9]. Again using tools from the d.school and IDEO [10], we set out to find a question that opened up more possible design opportunities instead of pointing to a particular solution. We iterated between many possible statements. How might we help teenagers feel safe about their debit card? How might we provide better information to teenagers about their debit card? Finally, we arrived at

# How might we design a better bank debit card experience so that teenagers feel safe about managing their money?

The final step in our problem definition was to define success criteria, against which our solutions would be judged. Taking into consideration the user needs and expectations, we listed out important principles that would guide our designs and the evaluation of our designs:

- Easy way to get the balance info
- Real time tracking of transactions
- A way to alert the teens when card is lost
- Easy way to temporarily block the card
- Secure
- Simple
- Easy way to undo mistakes

#### Develop: Ideate

The next phase was ideation, which is where we brainstormed many ideas and validated them against our criteria to decide which one to move forward with. Along with brainstorming to generate multiple possible solutions, design thinking practitioners advocate rapid prototyping as a way of learning and testing concepts, eventually even refining the problem. This is where the non-linearity of the process seems to play a key role. In a design thinking process, there is a loop between idea generation, concept prototyping, testing and feedback, from which the final solution emerges.

To get started, the team experimented with the Mindmap exercise proposed in Creative Confidence [1] (see our mindmap in Appendix B). We mixed some components of brainstorming with components of Mindmap. We wrote the POV Statement in the center of the page and started writing solution ideas branching out from the center. Some of the initial ideas seemed obvious, but we wrote them down anyway as they could spur new thoughts from other team members. Some ideas were obviously connected to others, and the mindmap structure provided a good way to visualize that connection.

In order to decide which idea to move forward with, we evaluated them against the success criteria defined in the previous stage. Table 6 below contains a summary of this initial evaluation.

Success Criteria	LCD screen on the debit card	Text messaging	Balance Shown at POS	RFID on the debit card + Smartphone App	Bluetooth on the debit card + Smartphone App
Easy way to get the balance info	yes	yes	yes		yes
Real time tracking of transactions	yes	yes	yes		yes
A way to alert the teens when card is lost	no	no	no		yes
Easy way to temporarily block the card			-		yes
Secure	-		0. <del></del>		challenge accepted
Simple	-		70 <del>4</del>		challenge accepted
Easy to undo mistakes	: ===				yes
Other Notes / Observations	design cannot be just on the card itself, cannot address lost situations	can have negative user experience - annoying, might get lost with all their other messages - teens are heavy text users	at this point, we noticed we should address the lost card situation first	limited range	good range, low energy, bluetooth already in smartphones, teens familiar with apps and smartphones

Table 6: Evaluating possible solutions according to success criteria

Based on this preliminary evaluation, we decided to further explore the "Bluetooth on the debit card plus Smartphone App" option in the next phase. Ideally, we would have prototyped multiple ideas, but considering the time constraints of this project, we decided to focus on the solution we believed would better solve our design problem.

#### Deliver: Design

This section of the report will discuss the details about the proposed solution which is the Bluetooth plus Smartphone App design. In designing for a better bank debit card experience for the teenagers, we addressed two things about their current debit card experience that triggers negative emotions for them the most which are (1) not able to get card balance conveniently and (2) fear of losing the card. The Bluetooth technology is for tracking the actual physical card and the smartphone app is for providing information and course of action. Bluetooth is a good choice for tracking and proximity alert because of its range and low energy features. In addition, smartphones conveniently also already have Bluetooth in it. The app facilitates the communication between the two devices. Smartphone app is a good choice for communication platform because teenagers nowadays are very familiar using it. In addition, this section will point out features that are intentionally not added to the design as it helps further illustrate the strength of the design features. The design keywords are teens, informative, preventative, forgiving/temporary, convenient, safe, and secure.

The first time the users load the app, they are prompted to synchronize the card with the phone via Bluetooth. After this one-time setup, the app shows the main page with easy access to control, balance, and block settings. The control setting is where the user can adjust the other features to their preference.

Here are the main features of the design proposal (see Appendix C for app mockups):

- Proximity Alert
- Balance Quick Peek
- Transaction History
- Temporary Block
- Usage Notification

For **proximity alert**, users can choose phone vibration or get a notification every time they cross the proximity boundary. This proximity alert feature is a preventive measure to help with left behind situations. Or if the unfortunate event of losing the card happens, the proximity alert can double as a search tool to help find the card. It will at least provide the user a clue when the card is somewhere within the proximity range. The data sent through the Bluetooth technology will contain just that - proximity data. There will be no access to account data for security measures. In addition, although some of the trackers currently available in the market provides close to exact location of the missing item, this feature was not considered in our design to protect the users from the potential danger of pursuing the card from unfamiliar locations.

From the control settings, users can also turn on/off the **balance quick peek** feature. For convenience, the quick peek feature provides users the card balance information without the need to login. This technology actually already exists in other bank apps. A more detailed **transaction history** can be viewed if the balance is questionable. However, for security reasons, a login is required. This feature also gives the users timely and convenient way to review their recent transactions. The extent of account data available through the app is limited to recent transaction history and current balance. Again, this is part of the security feature, ensuring no access to money through the app.

Login is also required to access the **temporary block** feature. In the event that the user lose track of their debit card whereabouts, the card can be temporarily blocked. The users are then given 24 hours to look for it and unblock the card from the app if found. No harm done. This allows users to make some mistakes as they learn and grow to be more responsible. Last but not the least, a **usage notification** feature sends alerts to the phone when debit card is being used. This can get annoying and unnecessary if done for every transaction, therefore, alerts are sent only if the card is being used outside the proximity range of the phone. This gives the user the confirmation that someone has their lost card. In this situation, they can stop searching and start reporting the situation. To permanently block the card due to this fraudulent transaction, they will be prompted to call the bank's customer service. Two things that the usage notification feature does not do - it does not stop the transaction from going through and it does not report the location of where the transaction is being done. The latter goes back to the security feature and discourages pursuing the card from strangers. The former has two reasons behind it. One is card use is protected by a 4-digit pin code so it shouldn't go through without the code. Second, in case the user is having a really bad day (smartphone not available for use due to low battery or broken), they should be able to use their debit card to get through the day.

To end, the proposed design shows great potential for small scale success to enhance user experience by adding an extra layer of convenience and security. The design does not alter the current bank offerings, which further facilitates implementation. This may seem like a small detail, however design thinking practitioners would counsel against underestimating the value of small scale success, in fact, they highly encourage it as a way to gain confidence and achieve buy-in towards bigger large-scale success [11].

#### User feedback

Although the proposed solution passed the success criteria, it is always a good idea to get feedback from the end user. Not surprisingly, gathering user feedback is an essential part of Human-Centered Design, as it ensures that the user's needs and expectations are present at all stages of innovation. So here's a snippet of their reaction after showing the final design:

"This is actually a good idea. It gives the cardholder a better reassurance that his/her money and info is safe and secure." "I like the proposal, it talks about what you're trying to fix and how we can fix it in a fast and easy way."

We also asked if the design is simple enough and that it helps reduce the fear of losing the card, and here's the response:

"Of course! Especially since I'm still a minor, it makes it easier to keep track of the card and money. As a teenager, we will ALWAYS have our phone on us making it a lot more convenient."

## 4. Limitations and Future Work

In interpreting the findings and insights of this project, certain limitations must be kept in mind. The most notable one is the sample size of the children and parents interviewed and observed. As reported, we conducted a total of 8 interviews - four 14-year-old girls, one 13-year-old girl, one 11-year-old boy, one 8-year-old boy, and a parent. Although we managed to cover a pretty good range of ages, we noticed that the older children are all girls and the younger children are boys. This might have potentially skewed the observed behaviors hence it is recommended to get a good mix of age and gender for sample size for future work. In addition, more secondary user (parents) interviews are encouraged. Talking with the parents gave additional insights and validation of the children's responses, or a different perspective.

## 5. Reflections

Here are some of the key lessons our team learned as well as some reflections from this whole experience.

**Plenty of design opportunities - be intentional**. We started this journey with a very broad topic human interaction with money. The team decided to focus on the extreme user and chose the path to children's interaction with money. This topic is still broad but we decided to just have an open mind and go do some fieldwork. We were not really sure what we were looking for. Perhaps, we also were not sure if we would find something to design for with the limited time we have. To our surprise, we found a lot of opportunities just from a couple of hours of fieldwork. Being intentional definitely helped. This is exciting and very encouraging experience.

Use empathy to identify user needs - keep asking why? Many times, we find that the users might not even be aware of their needs or might not have completely rationalized them. It is up to us to investigate and interpret the underlying problem, need, or motivation. This ensures that we are addressing the right problem. As part of our plan, we prepared some initial interview questions to get the conversation started. We aimed for open ended questions and just started asking more follow up questions based on initial answers, most ended with a lot of why questions. Approaching the interviewees is a very intimidating experience. Doing the interviews together as a team helps a lot. We also have to be quick as children's attention span is very short, especially when they sometimes have a hard time answering the why questions. A lot of the things they haven't really thought about.

**Take good notes - for reference.** Throughout the whole process, we found ourselves referring to our notes quite often. During our brainstorming sessions, we needed to be clear where certain information came from. Is it from the children? From parent? Or is it something we assumed? Carrying a journal and keeping all the notes in one place also helps.

Avoid jumping to solution space too early - hard to do. As engineers, it was hard to step back and not let our thoughts wander into the solution space too early in the process. When it happens, we quickly just wrote it down on the journal, then cleared our minds and went back to focus on the current stage of the design process. This is also hardest to do during the second diamond stage where brainstorming for possible solutions happen. Jumping too early to the final solution, the team might miss out on a great idea and opportunity. We wish we had more time though to brainstorm more possible solutions and go through the iterative process of rapid prototyping.

**Don't forget the other users - it's an ecosystem.** In processing our data and finding opportunities there, we paused quite often and found ourselves raising the question - who is the intended "user" for this product? Same questions surfaced during the fieldwork brief presentation we had in class. For example, the gumball machine. The designer's customer is the gumball machine's business owner but the end user are the children. Who should they design for? It is important to be able to clearly separate the 'main user' from 'related or secondary users' but consider the effect of the proposed design to all affected users.

**Gather feedback - class presentations are very helpful.** Our team received valuable feedback from the class presentations. Observing the other teams and listening to feedbacks given to them are also helpful. Preparing and explaining our process and results in class forced us to analyze things over and over again and guided us back to the right path when needed. Doing it on every stage is a good idea, instead of waiting on the final stage. Getting some feedback from the end user is also as important. Fortunately, one of the team members has access to one user. It would be nice if we could have gotten feedback from the parent as well. The takeaway from this is maybe next time, we could get their contact info if they are okay with it, so that we can get their feedback or if we have follow-up questions or clarifications.

**Take advantage of available design tools.** Why not? The tools are there to help guide us in the process. As this is our first time, we did not know where to start. The tools helped a lot specially during the brainstorming sessions and class presentations. It is easy to get lost with all the data. The tools helped a lot in organization and analysis of data.

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# Appendix

## Appendix A: Sketch from fieldwork



## Appendix B: Mindmap





## Appendix C: Proposed Solution (Bluetooth plus Smartphone App Technology)



#### **Appendix D: Interview Questions**

- How old are you?
- What's the first thing that comes to mind when you think about money? What about it? Why?
- Do you have money right now? Where did it come from? How much?
- Do you carry all of them with you all the time?
- Do you want money? Would you work for money? Do you have savings?
- Do your parents talk to you about money? Where they come from?
- What's the most annoying thing about your money?
- What about gift card, credit card, etc? Do you consider those as money?
- How do you track balance on the debit card?
- Any strong feeling about the debit card?
- How the bank makes money from the debit card?
- Do you prefer cash, gift card, or debit card?
- Anything else you want to add?
- Why? Why? Why? Why? Why?

#### Appendix E: Summary of Interview and Fieldwork Observations

- Mix of first thoughts about money between saving and spending
- The savers currently have a lot more money than the spenders
- Older children get money from allowance
- All children get money (cash and gift cards) from gifts
- They prefer cash more than gift cards
- Gift cards can only be used at specific stores
- Knowing how much they have is important, be it cash, gift card, or debit card
- Easiest to know the cash balance, so they prefer cash
- The 14-year-olds have bank debit card connected to parent's account
- The debit card comes with monthly statements sent to email
- The debit card comes with an app but just for the parents
- They like debit cards for convenience of getting their allowance
- They like debit cards for record keeping of where the money went
- They like debit cards because they can shop online
- The school cafeteria does not accept debit cards, cash only
- They like to carry some cash for everything else
- All only carry some cash (~\$20) and leave the rest at home
- They don't count or check that they got the right change
- They hate carrying coins, especially pennies
- Cashier typically not very happy about customers paying coins as it slows down the line
- They lose some of their cash, but not bothered much because of the low amount
- Scared to lose the debit card because then they lose all their money (a lot)
- Financial education is not taught at school
- Parents wants financial education for their children