Piggy Pennies: An Interactive Piggy Bank to Help Children Learn Money Management

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Abstract

Wealth management skill has turned out to be one of the most crucial skills for every young person. A good habit of wealth management would benefit people on a larger scale in wealth growth and life quality. In this case, it would be most beneficial to educate people as early as when they are still children. Children usually do not understand where money comes from and how to spend it by nature. However, multiple challenges arise when parents realize the importance of the education of money management skills and teach their children. These challenges include but are not limited to, shortage of time, being short of suitable teaching tools, and being afraid of misleading. A few solutions and their final products have already hit the market. By conducting thorough research on those products, it is evident that almost none of them puts its concentration on the collaboration among parents and their children, whereas parents could act as a crucial role in guiding their children, in most cases.

To facilitate the collaboration of parents and children, this thesis provides a revolutionary solution called Piggy Pennies. Piggy Pennies provides a platform that integrates abilities to teach kids the concept of money itself and cultivating good, controlled spending habits. This solution consists of two parts. First, there is an interactive Piggy Bank, which is a real-entity terminal for kids to handle real cash, for example, depositing, withdrawing, making purchasing plans, and taking care of chores. In addition, a mobile application is another terminal for parents to set up chores, send allowance, and monitor the profile of their children, which is a perfect all-in-one tool to help their children on demand. The solution described in this thesis, not only addresses the problems parents may encounter during the wealth management education process but provides chances and tools to engage children and their parents together in this education process.
The solution of Piggy Pennies is a significant breakthrough by filling the gap where the market fails to provide a solution concentrating on parent-children collaboration and adapting both real entity and a virtual mobile application. The design of this solution maximized the achievement of educating children into wealth management.

**Keyword:**

*Money Management, Children, Wise Shopping, User Experience, Interactive System, Parents, Savings, Spending, Purchase Decision, Piggy Bank, Allowance*
Situation Analysis

Handling money and managing expenses are one of the most valuable skills for almost everyone throughout his or her entire life. The ability to control spending and save money directly affects well-being and quality-of-life. It is important to teach children how to use money intelligently when they are young, so when they grow into adulthood, they already have the skills to succeed. Adults of young children can help them form a strong concept of money by playing imaginary games with them, like shopping at a pretend store or restaurant [1].

According to a survey[2], about 78% percent of the children involved rated their knowledge of money management as average or even poor. The study demonstrates that most parents or teachers haven't taught their child how to handle money well.

Kids between the ages of eight to twelve years spend most of their time with their parents and learn almost all of their behavioral patterns from them. Therefore, parents are the most important role models in their children's lives. A parent's attitudes, values, and beliefs about money will likely pass onto their kids, so it is vital that they try to relay good habits rather than destructive ones. It is not as difficult as some people believe to get children thinking about money, and they will understand a surprising amount as toddlers and young kids. For example, if a child receives a regular allowance in his/her first year of school, it covers two lessons: they learn to choose what to spend their limited money on, and they learn to save the money, even if they do not know what they are keeping. At an older age, it may be a good idea to start a bank account for a child, since many don't understand why they need to put money into the bank[3].

Problem Statement

“How to use interactive design to help parents teach their children money management?”

For many adults, economic failures and poor budgeting stem from a lack of understanding of the basic principles of money as children or adolescents. The responsibility of teaching kids how to think about money at a young age falls mainly on parents, but many parents do not have the time or patience to pass this knowledge onto their children. Although it is crucial to start teaching kids about money as early as three years old, it can be difficult to communicate valuable lessons to a young child effectively. These experiences include saving money and shopping wisely.

Money management is a collection of knowledge that develops throughout all stages of life, children between 8-12-year-old receive allowance each week. The allowance is a good way to teach children to learn how to make a necessary purchase decision and how to save for things they want. As for parents, it is a good idea to see how much money their children spend and what they buy with their money. It is important to find a way that can teach children the basics of money management and cultivate them in a good shopping habit.

Thesis Statement

Combining an interactive piggy bank and a mobile application is to offer a money management learning platform for kids to manage their allowance and cultivate a good shopping habit to achieve their financial goals with parents’ cooperation.
Survey of Literature

**Learning their numbers: how to teach your kids money management skills**

Dan Bortolotti  
August 2010  
Today’s Parent  
Volume 27, Issue 8: 31

This article shows that a good way to teach kids about financial skills is to take them shopping because it emphasizes the importance of letting kids handle real money. It also introduces some financial skills children need to master like saving and investing. This article supports the idea of the thesis by encouraging children to handle real money instead of managing virtual money through a financial app.

**Teaching Children Money Management**

Mary Rudie and Merrill Lynch  
July 1988  
Manage  
Volume 40, Issue 2: 31

This article explains the current situation of kids and money management, and why it is problematic. It offers some data to support the problem statement which has been laid out. This article also tells the reader how to teach children saving and investing to help them build a stable financial future. Overall, the article is inspiring and lends itself to the idea of the thesis in this proposal.
Implementing a Digital Asset Management System: For Animation, Computer Games, and Web Development
Jens Jacobsen, Tilman Schlenker and Lisa Edwards
2005
Focus Press
Page 31-45

The article covers a computer game called the AweSum Challenge for children ages 8 to 11. The game helps kids learn money management skills and boosts their analytical capabilities. The article shows the whole process of children testing the game. This article makes a significant contribution to the design ideation of this thesis project and plans for user testing for the match.

How Children Learn to Buy: The Development of Consumer Information-processing Skills
Ward Scott, Daniel B. Wackman, and Ellen Wartella
March 1, 1977
Sage Publications
Page 23-25

The chapter is talking about how children cost their money. It mentions that several elements will effect on children's decision, including advertisement from TV, families, their friends and children with similar ages. It shows the evaluation and effect for shopping decision in different ages group. It shows that what will effect children shopping decision and how to help children do their goal and how to avoid them from the attraction.
Kid piggy bank takes money management to new highs, or lows
Brittany wallman
December 14, 2009
South Florida Sun - Sentinel
http://search.proquest.com.ezproxy.rit.edu/docview/387490009?
accountid=108
Accessed November 15, 2016

The article based on a personal experience involving educating the
author's kids about saving money by using a piggy bank. In the
author's experience, there are four segments: save, spend, donate and
invest. It offers insight into how parents deal with educating their kids
and how they react to it.

Finding lucre in kids’ finance
Shobhana Chadha
March 12, 2012
Business Insights: Essentials
http://bi.galegroup.com/essentials/article/GALE%7CA2827018347
u=nysl_ro_rrlib
Accessed November 15, 2016

The article includes survey analysis and results regarding offering kids
in the age group of 5-16 years financial education. The author teaches
kids by using an interactive format storyboard, role-play, and visual
games. This article offers a look at children's learning styles and
preferences when it comes to learning about money management.
UX for Kids’ Products: Designing for the Youngest of Users
Georgia Gallavin
April 29, 2009
User testing blog
https://www.usertesting.com/blog/2015/04/29/ux-for-kids/
Accessed November 15, 2016

The article is talking about how children interactive with website and apps, as well as the importance of break down age groups to do usability testing. The author mentions that how to use character and color to hold the attention of children and help them navigate. It gives a guide and principle to how to do usability testing for the thesis target audience, and it also offers some analysis about the internet skill of children during 8-12 years old.

Designing For Kids Is Not Child’s Play
Becky White
January 20th, 2016
Smashing Magazine
https://www.smashingmagazine.com/2016/01/designing-apps-for-kids-is-not-childs-play/
Accessed November 15, 2016

This article focuses on the process of how to do the user research of children. It divided into several parts, including observation, participatory design and usability testing. It has proposed several methods that can act as references to the thesis project. It is helpful for the design research and determines the target age range.
The Development of Children Ages 6 to 14
Jacquelynne S. Eccles
Fall, 1999
The future of children
https://www.princeton.edu/futureofchildren/publications/docs/09_02_02.pdf
Accessed November 15, 2016

It introduces the developmental, and social changes between 6-14 are dramatic. Children development is driven by basic psychological needs. Thus they seek chances to show new skills, make independent decisions and control their behaviors. And cognitive changes mark children in each stage. It offers a lot of behaviors of children as references to the thesis, including how they learn, and how to respond challenges and learning opportunities.

Designing User Experiences for Children
Heather Nam
May 17, 2010
UX matters
Accessed November 15, 2016

The study shows how children interact with a user interface by observing them watching video clips and playing the interactive game online. And it indicates that it is difficult for children to use scroll bars and down arrows. For this thesis, this study offers challenging
Habit Formation and Learning in Young Children

David Whitebread, Sue Bingham
June 26, 2006
University of Cambridge
Accessed November 15, 2016

This report is to provide insight and ideas about how to prepare for children to learn money management. It introduces the stages of children learning and developing process, and the key influences in children's habit-of-mind formation. It shows how children can be taught at home, school. It is helpful to have an idea about how to help children to cultivate a real purchasing habit.
Competitive Analysis

Digital Design

**Allowance & Chores Bot**


The app can be used by the whole family and allow them easy to track chores and save. Kids can see how much they have saved and how much they’ve spent, and the time accordingly. They can see how their saving grows in a graphic way. It has a simple calendar that shows what tasks they have to finish to get their allowance. This app can help children learn the money management and enable their parents to track what do their children spend on so that they can teach their children to manage their money.

**iAllowance**

http://www.jumpgapsoftware.com/allowance/index.html

The app allows children to manage their finances, chores, and rewards. It is an app that their parents can trust to teach their children about earnings, savings, and spendings. It can show their children the process that their chores start and get done. And it also can use stars to mark it.

**RoosterMoney**

https://www.roostermoney.com/

This app is designed for parents and children to helps their families to control allowance, chores, and rewards. Parents to help their children to learn the value of money. Kids can create a goal and save money via it.
Piggy Bank

Piggy bank is a learning game for 5-9 years old children to help them to learn everything about money. Children can learn money knowledge from playing puzzle game. It uses cute characters, graphics, typeface to help children understand the concepts.

iEarn

iEarn integrates with family chores with children's allowances, banks, goals. It has clean and straightforward user interface, and it can motivate children to save money by aims and rewards. It will give children the sense of finance by the process of earning and saving before purchasing. Parents can set up a list of work and assign it to their children.

Bankaroo
https://www.bankaroo.com/

Bankaroo can help parents for their children to manage allowance and expense. It has a nice logo and clear interface. Parents can teach them basic money tracking and checkbook balancing skill. Children can set a saving goal and report how much they have spent. And parents can also send allowance directly through the app.
Physical Design

**Zillionz Savings Goal ATM Bank**


This ATM Bank is recommending for children five years of age and older. Children will have their card for this ATM, and they can deposit money, check balance, and make a withdrawal. Children can learn the process of collecting money and saving money. It is a good idea to let children have their card. It will provide them the feeling that they have their account. But it cannot help children to cultivate shopping habit and forbid they overspend.

**YOUUniverse ATM Machine Bank**


This ATM bank is similar to the Zillionz Saving Goal ATM bank. It includes an electronic screen, an alpha-numeric keypad, and a slot for kids. They can insert their card and type their password, and the machine will show their name and the amount of money they have. But if they forgot their password, they have to take out batteries and reset their account again. And if the child wants to make a withdrawal, it would prevent them from overdrawing. But this cannot help children to set a goal. It seems like a tool to help children to put their money.
Monopoly Game: Ultimate Banking Edition

https://www.amazon.com/Hasbro-A7444-Monopoly-Electronic-Banking/dp/B00EDBZ9F8/ref=sr_1_1?ie=UTF8&qid=1480788367&sr=8-1&keywords=Monopoly+Electronic+Banking+Game

It is a board game with card-swipe banking and cashless for children. They can use debit cards instead of money. Kids can use the card to collect rent, buy goods in a fast and easy way. It is good that family can play together. There is some good point, for example, the game pawns colored and plastic, and the card color matches the color pawn. So if the user forgets which bank card belongs to, they can recognize it by matching the color. But the user needs to set up all card when they first use it, and the instruction book is very long. The game can help kids understand basic money concepts, but the idea of money is more abstract and harder to understand without real cash.

Digital Coin Bank Savings Jar

https://www.amazon.com/dp/B01D0ST5UE?psc=1

The coin bank only can take dollars, and half dollars coins and the jar is easy to hold by any hand size. It can teach children to save coins and keep count of their coins. According to reviews by users who bought the products; they said their kids enjoys putting money into the bank and watching the number on the screen.
Comparing to other similar products, Piggy Pennies concentrate more on combining personal ATMs and user interfaces. In comparison with the existing Apps, the most advantage of PiggyPennies is similar to saving pots, using real cash to do the deposit and withdrawal, which teaches children the concept of money. Also, it can record the history of the transactions made. For personal ATMs, it can help children get used to the procedure of withdrawing and depositing cash, but it won’t be able to help children manage their pocket money.

The target users of most similar products are obscure. Children’s cognition and behavior differ a lot among different age groups, which results in the difference in the need of different user experience. The thesis is mostly for the children aged from 8 to 12, who already have the experience of using mouse and browsing web pages, and are also starting to get their pocket money regularly. In this case, the age group from 8 to 12 is in the important period to develop their shopping habits and money management skills.
User Research

User Survey

After understanding the goals and objectives, a survey with a set of questions was conducted. This helps designers understand the end user better to create useful end products. The following are samples of the feedback and data gathered. (figure 1, figure 2, figure 3, figure 4)

- **How much allowance do you get weekly?**
  - less than $5
  - $5 - $10
  - $10 - $20
  - $21 or more

*figure 2: Allowance amount weekly*

- **Did you save money instead of spending?**
  - Save
  - Spend

*figure 3: Money save amount*
Did you know the value of money when you were a kid?

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Figure 4: Understanding about money value*

How often did your parents talk to you about money?

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60%</td>
<td>100%</td>
</tr>
<tr>
<td>Occasionally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequently</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Figure 5: Frequency of talking about money*

Here are some points from the survey:
- Most parents are not talking about money to their kids
- Around 68% of kids don’t know the value of money
- Most kids get 5 dollars to 10 dollars as allowance weekly
User Interview

To understand users’ behavior and context, 14 interviews were conducted, including seven parents and their children. Here are several questions were asked:

**For kids:**

- Basic information (age, name)
- Do you know where money comes from?
- What do you know about money?
- Have your parents given you any allowance?
- How much allowance do you get from your parents weekly?
- What would you spend Your allowance on?
- Do you save money?

**For parents:**

- Basic information (age, name)
- How many kids do you have?
- Do you give your kids allowance weekly?
- When did you start to give your kids allowance?
- Why do you give your kids allowance?
- Will you teach your kids about money concepts, saving and spending?
- What financial knowledge do you want your kids to know?
- What is your expectation for our products?
Here are some points concluded from the interview and the online research.

Why parents give their kids allowance?

• Build financial literacy
• Encourage independent thinking
• Reinforce good habits about controlled spending and saving
• Teach life lessons; kids will learn significantly from their minor mistakes.
• Learn the importance of saving

What are kids understanding about money?

• Money can buy anything you want
• Cannot identify bills, coins, and their value
• Got free money from a machine in the wall after inserting a card

What lessons do parents want kids to learn?

• The concept of saving, spending, investing and borrowing
• How to count and use money
• Borrowing allows kids to buy things now and pay in the future
• Need money to buy things
• Earn money by working
• There’s a difference between things you want and things you need
Target Audiences

Persona 1

The target audience is children from 8-12 years old. Often, children in this age group receive an allowance, which is a great starting point to teach about saving and spending money. It is the best time to help and encourage kids to make a regular deposit and right purchase decisions. Using data from the user surveys and research, three personas were created to help deeply understand the potential users’ behaviors, goals, and needs. The target audience (figure 6, figure 7) for the product is kids between 8 and 12 years old, although parents are important users of the product too. Parents (figure 8) will be training their kids and helping them learn money management.

Name: Alex Mowbray
Age: 7
Occupation: Students
Nation: USA
Language: English
Location: Rochester, NY
Outgoing Adventurous Naughty

Motivations
Achievement
Growth
Social

Goals
- Cultivate good purchase decision
- To save money regularly
- To learn knowledge about money

Frustrations
- Hard to learn to knowledge from book
- Doesn’t have a phone
- Doesn’t have motivation to save money

Biography
Alex was born in the United States. He is a student in elementary school. He has basic understanding and counting ability for numbers. He save money for his goal, which is a new bike.

Technology
- mobile skills
- social media
- internet skills

Personality
- Extrovert: Introvert
- Sensing: Intuition
- Thinking: Feeling
- Judging: Perceiving

Brands
- Lays
- Häagen-Dasz
- Ty
- PBS
- Huggies
- HEROS
Persona 2

Name: Amy Smith  
Age: 7  
Occupation: Student  
Nation: USA  
Language: English  
Location: Rochester, NY

Motivations
- Incentive
- Achievement
- Growth
- Social

Goals
- To earn some money by doing chores.
- To save money for a goal.

Frustrations
- Buy something which is not her needs.
- Cannot get allowance on time.

Biography
Amy is 7 years old now and she is in pre-school. Her mom gives her allowance weekly and she also gets some money by doing chores in home. She likes to saving for her wish list because she thinks it is happier to get things she want using her own money.

Technology
- Mobile skills
- Social media
- Internet skills

Personality
- Extravert
- Introvert
- Sensing
- Intuition
- Thinking
- Feeling
- Judging
- Perceiving

Brands
- Brio
- Lego
- Toys R Us
- Playmobil

"I would like to set a goal for buying gift to my grandma."

Figure 7: Persona for kids 2

Persona 3

Name: Teresa Williams  
Age: 36  
Occupation: Staff  
Nation: USA  
Language: English  
Status: Married, has two kids  
Location: Rochester, NY

Motivations
- Incentive
- Achievement
- Growth
- Social

Goals
- Help children to learn the value of money.
- Help kids to learn saving, spending.

Frustrations
- Don’t want to talk money with kids.
- Worried about her children bother by financial problem in the future.

Biography
Amy was born in the United States. She is a mother with two children. One of children is 7 years old and another one is 5 years old. She wants their children learn money management in case they would stuck in financial problem in the future.

Technology
- Mobile skills
- Social media
- Internet skills

Personality
- Extravert
- Introvert
- Sensing
- Intuition
- Thinking
- Feeling
- Judging
- Perceiving

Brands
- Apple
- Starbucks
- The Body Shop
- Sephora

"I don’t know how to start to talk money with my kids."

Figure 8: Persona for parents
Pain points

All the user research helps identify the customer’s pain points. With this information, the goal of this thesis is to create solutions to those pain points. Solving pain points can be the most influential driving force behind the effort to make a product better and more successful.

Pain points from kids

• Don't have a chance to learn how to count money
• Have misconception about where the money comes from
• Don't get exposed to actual cash and know the value of money

Pain points from parents

• Hard to explain the whole earning and spending to kids
• More than two-thirds of parents are still a reluctance to talk about money with their kids[4]
• Struggling with teaching their child about coins and bills
• Hard to teach what they want and what their needs are

Insights

• Kids can manage physical cash
• Set a topic for parents to talk about money with kids
• Doing chores to teach kids money is exchanged for labor
• Help kids to set a goal to learn how to save
• Help kids to cultivate a controlled spending habit
• Teach kids how to count money and calculate the value of money

Design Ideation

Solution Exploration

To cover all aspects of money management, many solutions were explored, such as the mobile app and tablet functionality. Figure 9 shows an app to teach kids how to deposit and withdraw money. Figure 10 shows an app for iPad, considering that lots of children use tablets and are familiar with them. This iPad application can help them manage their money, organize tasks, and so on. Figure 11 shows a digital piggy bank and the mobile application. The digital piggy bank is a recognizable symbol of saving money and will encourage kids to keep saving. Parents can also use the mobile app to assist in their child’s journey. Continuous user feedback will drive me to make final edits, like implementing and exploring more details.
**Brainstorming**

*Figure 12* is an exercise in adding lots of details based on the initial version. Physical cash is vital in teaching children the value of money[5]. Every person receives a piggy bank at some point in his or her childhood; it’s one of the most effective ways for parents to teach their children the value of saving money rather than spending it[6]. Because of this, the Piggy bank is the ideal focal point of this money management app. The kids can set goals, withdraw cash, and save money through the digital piggy bank. At the same time, their parents can monitor activity, assign chores, and teach kids to set goals through the mobile app, which is connected with the piggy bank.

---


Scenarios

Two storyboards were built to show how parents can get involved in their kid’s effort to cultivate the habit of controlled spending and saving. Figure 13 and Figure 14 shows how the current solution will affect the experience of real users.

**Scenarios 1**

1. Alice saw an ice cream van coming.
2. She ran to her room and tried to get money from Piggy.
3. The system would remind her two options to withdraw the money or continue to save the money.
4. Alice made up her decision to save the money in order to achieve her goal.
5. Alice learned how to spend and make money wisely.

**figure 13: Scenarios solution is to save money for goals**

**Scenarios 2**

1. Alice saw an ice cream van coming.
2. She ran to her room and tried to get money from Piggy.
3. The system would remind her two options to withdraw the money or continue to save the money.
4. Alice withdrew the money.
5. After she purchased the ice cream, the system would remind her several options to earn extra money to achieve her goal.
6. Alice chose one of the option and the system notified her mom.

**figure 14: Scenarios solution is to perform a chore to earn the money**
Flowchart

Flowchart (Kids)

The flowchart in figure 15 explained the process clearly of how the kids interact with the digital piggy bank. Kids can take money out and put money in, set goals and pick chores up.

---

*figure 15: Final flowchart for kids*
Flowchart (Parents)

The flowchart in figure 16 shows the workflow of how parents get involved in their kid’s money management process. It has several features, such as assigning chores and assisting with setting reasonable goals.

figure 16: Final flowchart for parents
Wireframe

Wireframe (Piggy Bank Interface)

What would you like to do?

Amy
$24.56
Progress towards goal

Chores  Put Money In
Wish List  Balance

Figure 17: Loading screen

Figure 18: Piggy bank homepage
Wireframe (Piggy Bank Interface)

**Figure 19: Final chore page**

**Figure 20: Final goal page**
How will you use this money?

Choose:

For Spending
For My Wish List
For Paying Back
For Others

How much you want to deposit today?

Input the Amount

1 2 3
4 5 6
7 8 9
. 0

Wireframe (Piggy Bank Interface)
Flowchart (Parents)

---

**How to Connect**
Open the Bluetooth setting to connect with Piggy Pennies Bank.

**Piggy Pennies**

- Amy
- Alex

- Wish List
- Chores
- Allowance
- Message

**Piggy Settings**

- Approve
- Spend Analysis
- Reward
- Loan
- My children
- Add Allowance

**Toy Bear**

- Toy Bear
  - $20
  - $40.00
- Gift for Alex
  - $11
  - $15.00

**My Children**

- Amy
  - 2000/01/21
  - Female
- Alex
  - 1999/04/23
  - Male

**Flowchart (Parents)**

---

**Figure 23: Final wireframe for the mobile app**
Paper Prototyping

Paper prototyping is the fastest way to test the design idea in the early stages, while also having a relatively low cost to implement. It allows designers to gather test data from users as early as possible, and work out bugs before they become a more significant problem.

Problem: It is hard for kids to understand the meaning of withdrawing and depositing

Solutions: Change the word to get money out and put money in

Problem: It is hard for kids to understand the meaning of Bluetooth

Solutions: Change the words to connecting
Visual Style

Typography

Poppins (figure 26) is a Geometric sans serif typeface published by Indian Type foundry in 2014, which gives the feeling of friendliness and softness to the user. It matches the concept of usability and friendliness for digital screens.

Poppins

Color Palette

Green is the color of paper money in the United States and therefore associated with currency and wealth. Most financial institutions and websites use green as their main color. Piggy Pennies is a financial tool to teach kids money management, so choosing green as the main color aligns with the goal of the thesis, and reinforces the money-managing aspect of the product. (figure 27)

# 7AC8C6  # 038B71  # 5B7900  # F97373  # C2DDDE

figure 27: Final color palette
Logo Design

Logos, names, and concepts (figure 29) were generated in the ideation process. The final decision for the name was based on user’s feedback and understanding. The final logo (figure 28) was chosen because it resembles a digital piggy bank.

Piggy Pennies

- Coins Pig
- Piggy Piggy
- Pennies
- E-Piggy
- Pig Wallet
- Piggy Money

figure 28: Piggy pennies logo  
figure 29: Logo sketch
Grid System

**Figure 30:** Grid for piggy bank interface

**Figure 31:** Grid for mobile app IOS 10
Icon Design

A set of icons (figure 32, figure 33) was designed for the interface on the digital piggy bank app. It helps users quickly recognize actions at a glance instead of spending time on reading text. The fun and colorful cartoon icon style was chosen to appeal to kids' attention and help them understand the functionalities without the need to read a lot of text.

figure 32: Final Icons for piggy bank

figure 33: Final Icons for mobile app
A friendly character (figure 34) inside the teaching tool can guide kids towards achieving their goals and make sure they never get lost. A pig character was chosen, which is the closest figure related to the piggy bank concept, among all other characters. With a cartoon character as a guide, it would be a great enhancement towards user-friendliness, while also meeting the goal of usability.

figure 34: Pig character
There (*figure 35, figure 36*) are illustrations to accompany the step-by-step guide page within the mobile app. Line style was chosen to meet the simple and clear visual style. The illustrations are easy to comprehend and let parents quickly get a sense of the functions provided by the mobile app, without having to spend time reading.
Piggy Bank

A piggy bank model was created in Maya after lots of sketch exploration. Different types of materials were researched for the construction of the model, such as Beech, ABS, PP, Dutch wood, PVC, and PP. PVC was chosen as the best material for the cover of the piggy bank due to the low price and durable features. The final shape is a perfect match for both considerations of screen placement and exterior design. To prevent children from getting hurt, products designed for children mostly adopt the rounded style to reduce the risk of injury. (figure 37)
3D Model

figure 38: 3d model render

figure 39: 3d model process
3 Dimensional

Here is the 3-dimensional size (figure 40) of the digital piggy bank. The viewing angle of the screen is 7 degrees from the horizontal axis. It offers the better experience for users to view and operate it efficiently based on human ergonomics.

*figure 40: Model size*
Final User Interface

Log In

When the piggy bank is hibernating (figure 41), the application shows a piggy animation, which can guide users to unlock the interface. Kids can use a 4-digit number to log in.

![figure 41: Interface hibernating](image)

Homepage

When the user accesses the homepage, they can take money out, put money in, and many other actions. All profile information is synced with the mobile application for parents to view. For the layout of the kids' information, the text items are arranged on the left, and the icons on the right. This was done to meet people's intuitive way of reading, from left to right. (figure 42)

![figure 42: Final homepage kids](image)
Wish List

*Figure 43* shows the interface for the user to check their wish list. If the child wants to add a goal, the system will send a notification to their parents, so parents have a chance to talk with them about wants and needs. The progress bar and orange marker were chosen to show a visual representation of progress towards meeting a goal. The user can easily see how far they’ve come, and how much they still have to do.

![Wish List Interface](image)

**figure 43: Wish List**

Chores

On this page, the kids can check what chores they need to do. *(figure 44)* Cards are a more intuitive way to convey tasks and their status. The icons are helpful for kids to understand the details of the chores that are assigned to them.

![Chore Cards](image)

**figure 44: Check Chores**
Put Money In

When the user puts money in the piggy bank, it will display animation and make sounds of falling coins (figure 45). The decision was driven by giving kids a sense of achievement and encouraging them to save money. The question was asked in a conversation with the pig, showing the friendliness with kids.

Balance

(figure 46: Balance)
Get Money Out

To help kids to form a controlled habit of spending, they have to go through several steps to take money out (figure 47). This process helps to avoid irrational spending by giving the child more time to think and weigh the options presented to them. Showing the corresponding amount with numeric figures helps to display the value of money intuitively, which boosts the learning process of counting. The pig character acts as a friend to guide kids to withdraw money while helping them cultivate controlled spending habits through animation.
**Message & Notification**

A blurred background can block out distractions, but it also allows the user to see the background contents and makes the message or notification stand out. *(figure 48)*

*figure 48: Final notification*

**Settings**

The illustration is an intuitive way to show the connection status between a phone and piggy bank clearly. The slide button allows the user to control the connection simply. *(figure 49)*

*figure 49: Settings*
User Interface for parents

Guide Page

The guide page (figure 50) displays some features of the product. It includes setting an allowance, connecting piggy bank, and more. Iconography makes it easy for parents to go through the app's features effectively. The three dots are a direct way to show the status of the page.

figure 50: Final guide page
For a first-time user, they can sign up an account with Gmail (figure 51). After they have signed up, it would pop up a step-by-step guide for them to add their kids’ information, and connect with the digital piggy bank. After that, the progress bar was shown for the better display of the onboarding status.

*Sign Up & Sign In*

![Sign Up & Sign In](image)

*figure 51: Sign in & Sign up*
Set a Goal

Parents can create a goal for their kids. Information input for this includes the goal's name, price, and where it can be purchased. It also shows the progress toward reaching the goal. The interface style and the progress bar were chosen to keep consistency with the digital piggy bank in style. (figure 52)

(figure 52: Set a goal)
Assign Chore

The mobile application allows parents to create chores and assign them to their kids. Information input for this includes the chore’s name, reward, and deadline (figure 53). After parents release the duties, the piggy bank will get the notification. Putting all information on one screen can make the user feel overwhelmed, so the creation process was divided into three parts with manageable chunks of information.

figure 53: Final assign chore
Manage Chore

Parents can regularly check the list of chores (figure 54). After the kids have finished their task and marked it as done, the app would refresh the information and wait for parents to review the task and approve the status. Swiping the tab bar is an effective interactive way to let users view all contents quickly and naturally.

*figure 54: Manage chore*
For meeting different users’ needs, the mobile app offers a simple way for users to access multiple kids’ profiles on the homepage quickly (figure 55). The Hamburger menu can hide all other functionalities on the left-hand side, keeping the user interface looking slick and minimal.

figure 55: Homepage
Other Features

The loan feature allows kids to borrow money from their parents and pay it back in the future. This is useful to teach them how a credit card works. A different color was chosen for showing information from different kids, for a direct way to tell the difference. (figure 56)
Allowance

The app helps the parent control and manage a weekly allowance. They can check whether they paid the allowance or not (figure 57). After they paid the allowance, the system would send a notification to the digital piggy bank.

figure 57: Allowance
Usability Testing

Software
A high-quality prototype was created in InVision. Five kids and their parents participated in the usability testing that took place at Imagine RIT 2017. Feedback was gathered for improving the interface to offer a better experience.

Tester
Five kids with 8 to 12 years old
Five adults include four mothers and a father

Task Scenarios
Here are several task scenarios which created for testing different features. Here are the details of it:

Task1
You gifted a Piggy Pennies for your kid’s birthday. After that, you want to set up the Piggy Bank and added a kid from your app.

Task2
You had to go out, but you forgot to feed your dog. You realize that you can ask your kid for help and remind him/her to feed the dog.

Task3
Your kid wanted to buy a toy. She asked you to set a saving plan for her.

Task4
You got a message that your kids over-withdrew money from Piggy Bank. You want to check what she would spend the money on.
Feedback was gathered from observation when the user performed the task scenarios. Several small changes were made for improving the interface after the usability testing.

Three testers didn’t notice the button for signing up at first glance. One person thought the button did not look like a button (figure 58).

Five testers thought the “add” button is not obvious, and three testers were confused about the meaning of “pending” (figure 59).
Prototype Link

InVision:

The prototype for Piggy Bank
https://invis.io/Q7BPG9EX4

The prototype for the mobile app
https://invis.io/T6HD2HNWVZ5

figure 60: Prototype for piggy bank

figure 61: Prototype for mobile app
Motion Graphic

A video was created for showing the prototype and how the solution solves the problem in different scenarios. Also, it is a great way to show the relationship between the mobile app and the digital piggy bank. It also demonstrates how they interact with each other, and how they would impact people's life.

figure 62: The connection between parents with kids

figure 63: How interactive platform works
User Scenario 1

- One day, David walks past a shop and he likes a bike in it, he wants to buy the bike. But he doesn't have enough money for it, so he uses the piggy pennies to set a goal for the bike.

figure 64: The scenario for setting a goal

User Scenario 2

- David asks for more money for his goal from his mom. But his mom asks him a question, do you know where the money comes from.

figure 65: The scenario for the concept of money

User Scenario 2

- Alex starts to set a chore and assign to David.

figure 66: The scenario for assigning a chore
Video Link

Youtube:

https://youtu.be/VQZWHyEoMZg

figure 67: Final video
Conclusion

This thesis proposed an interactive solution to the money management education for children. Although there are lots of products and mobile apps that educate kids about money management, there are few products that involve parents in their kids' money management learning processing. The thesis project filled the gap utilizing both physical and digital products, by designing a platform for parents to teach their children money management skills, with an outstanding approach.

The most significant challenge of the thesis project is to find a right solution to combine a personal saver with the digital interactive system to let parents and children participate together. User needs, behaviors and context help designers to find out a right solution to set a cooperation relationship between parents and their kids. Considering those factors, it also helps to craft a playful and usable experience in the learning process for both parents and children. The thesis project is focusing on cultivating good money management habits for kids, teaching them how to earn money by doing chores, and helping kids to learn the amount of money.

The analysis and observation in the usability testing contributed to the implementation of this thesis project, rather than just an initial design. The usability testing also helped the designer to improve the actual design based on user's behavior, and understand what kind of interface is needed. Many improvements are adapted in this thesis project, offering a friendly and playful user experience for both children and parents to achieve the goal.
In Conclusion, the thesis project is not only a usable, but very effective teaching tools that allow children to grasp the concepts of money, and decision-making skills in a natural, painless, and self-satisfying approach. The thesis project successfully solved those head-aching problems in teaching kids money management by designing an intuitive, interactive and user-friendly learning process for kids. This thesis project gifted children the skill of money management, which would benefit them in wealth growth and life quality when they grow up.
Bibliography

**Online Reference**


Books and Journals


