

Family Member Learning Mobile Application on Android Platform

By
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CERTIFICATION OF APPROVAL

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Approved by,

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

CHAN MING HAN

ABSTRACT

From generation to generation, the issue of politeness and respectful decrease in the society has been getting serious. This problem is discovered to be caused by lack of exposure to family titles at a young age, inconsistent naming in different languages and uninteresting teaching and learning approaches demotivate learners. This project aims to develop an Android app in English and Malay to motivate and nurture family titles learning in children of age one to three with the supervision of their parents, thus creating a better society with respects. Eclipse SDK is used in developing the Android app prototype and tested with a smart phone of Samsung Galaxy Note 5.3 inch. Positive results are received from the conducted user perception study and System Usability Scale (SUS) study which shoes that users (parents) are satisfied with the app prototype in improving their child's learning towards family titles and relationships learning.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

What is Family Member Learning application? This application aims to provide simple and interesting family addressing education through mobile phone. Why through mobile application? In this technology advanced world of 21st century, smart phones and tablets has become one of the most important devices in human's life especially since the boom year of mobile phone industry in 2010. Smart phones and tablets are not only used for common phone calls and messaging, but now as a device for resource keeping, social networking, online operations as well as GPS tracking and many more.

The price of these smart devices is range about as low as RM100 to as expensive as RM2500 in Malaysia. The wide range of offerings in the market results in rapidly declining prices which makes smart phones affordable to both elders and youngsters. There are children as young as 8 years old who has started to own mobile phones due to security purpose as explained by their parents but children below 8 years old are advised to use mobile phones under their guardian's supervision.

Who are the target users? This project targets young parent of Android smart device users and their young children of age one and above since young children start to

talk in their first to second years in life, about the age of 12 to 20 months. This is the crucial time to educate them with proper knowledge of family addressing, nurturing the respect within family. Most of the parents nowadays find ways to entertain their children by using mobile and this is one of the smart ways to follow with.

1.2 Problem Statement

1.2.1 Lack of exposure to family titles at a young age

There is no proper teaching of family titles in the family especially when the parents are married young, where they are not even taught properly during their young age. Moreover, parents of new generation tend to have busy working hours therefore they give less emphasis on the knowledge of family to their children. “Pressure of early parenthood thus impacts on their children’s behavior and achievement”, as mentioned in the article Teenage Parents Next Steps.

Significant: This free-for-download Android application is developed to help young parents to recall the family titles and is a perfect mobile application for both young parents and their young children to immerse themselves into learning family titles together, as an entertainment while learning.

1.2.2 Inconsistent Naming in Different Language

The article Naming Grandparents (Dr. E. Mestheneos, 2004) says that “language usage and the plasticity of languages vary”. Different race has different naming for the family titles, some with different calling for the father side and the mother side while the others maintain the same calling for both parents side. For an example, title of father in the Malay family could be “Ayah” or “Bapa”.

Significant: This application is developed to support two languages used in Malaysia namely English (international language) and Malay (national language). This setting is available at the application’s start page.

1.2.3 Uninteresting Teaching and Learning Approaches Demotivate Learners

A too formal educational application may not attract the interest of young kids to learn, such as the use of storybooks which have many words with no moving pictures and audios. Besides, techno generation is more exposed to computers, internet and mobile devices. Therefore, learning should be made interesting by using proper materials following the trend for the generation. From the article Foundations: Early Learning for Preschoolers (Patricia N. Willoughby) states “classrooms should be rich in materials and experiences that facilitate learning” and “some research shows that it is often possible to learn much more when training media are used effectively and properly” from the article Methods, Media and Technology in Facilitating Learning refer to South African Management Development Institute (SAMDI) (2007).

Significant: This application would be inserted with cartoon picture of characters to ease the learning and imagination of young kids of family member. Suitable audios will also be recorded to make the learning more interesting. Parents are also allowed to import own pictures from the gallery or camera, record own audio and insert personal information of relatives to enhance realistic family titles learning for kids. In addition, this application is mobile, which provide on-the-go learning for the parents and young children, even during a journey in the car.

1.3 Objective and Scope of Study

1.3.1 Objective of Study

The aim of this project is to motivate and nurture family titles learning in young children through mobile technology based learning.

The main objectives of this project are:

1. To develop a mobile application for learning family titles and relationships for young children
2. To create an engaging learning experience about family titles and relationship in English and Malay languages
3. To conduct a user perception study on the developed application

1.3.2 Scope of Study

This project targets to produce a mobile application for only smart phones running in Android operating system. It is meant to fit into any screen size as the size of the screen does not matter in the learning environment. The Java programming has an element <support-screens> that enable the objects in the page to fit into any screen size. User has the option to choose language in the mobile device at the start screen as this app is developed to support two languages: English and Malay.

As this app targets young parents and young children, bright colors of animation and interesting audio are inserted to create an attractive learning environment. Insertion of family member pictures and audio is also supported to generate a real-life relationship for better understanding, especially to the young children.

As mentioned above, this app is meant to be developed in Android OS platform. This is because there is a similar concept iOS app marketed in the Apple Store updated on March 2012. However, this iOS app with name “i Get... My Family Photo Album Books” requires download fee of \$2.99 and only support iOS mobile users. Besides, Android is open source and many resources have been shared online. Therefore, my project is meant to satisfy Android users for an almost similar app with free download.

1.4 Relevancy of Project

The relevancy of my project is that it is suitably developed and targeted for parents to educate their young children with family addressing since young. This application contributes to the public education by helping parents to educate their young children with family titles even before sending them to the preschools.

1.5 Feasibility of Project within the Scope and Time Frame

The feasibility of my project within scope and time frame is gathering data and initial documentation of application within the Final Year Project I and another four months of Final Year Project II to develop and market the mobile application.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

2.1.1 What is family?

Family is a group of related people bonded to each other either by marriage, blood relation (biologically) and (or) with legal documents of adoption. These related people are called as family members. They might be living together under a roof or stay as far as over the sea. Relative can also be called as family member but it is often referred to family member who is not categorized in the nuclear family.

There are a few types of family such as nuclear family and extended family. Nuclear family or immediate family consists of your father, your mother and their children which are your siblings. Extended family includes all the family members of your father's and mother's side of family. When a family is extended by new marriages, the new member's family will be added as in-laws and then followed with new-born babies.

In some cases, some may also have a step family which comprises of step parent and step siblings when the parent re-married. In this report, only nuclear family and extended family would be covered as step family, single-parent family and others are not suitable for this mobile application's target child of age one to three.

2.1.2 What is family title?

Family members are addressed with family titles as a sign of respect to each other. In the old times, the younger would need to address each elder with their title and followed with their name but this tradition is becoming more transparent from time to time. Younger generation might realize of the addressing for elder family members but they seldom apply it in their everyday life.

The common addressing of family members are grandfather, grandmother, father, mother, brother, sister, uncle, aunt and cousin. When a family is extended, new family members would be added such as mother-in-law, father-in-law, brother-in-law, sister-in-law and new-born babies of niece or nephew. Step family would add in stepmother or stepfather, stepbrother and (or) stepsister.

2.1.3 What is family relationship?

Family relationship is also known as kinship. TheFreeDictionary [24] define family relationship as (anthropology) relatedness or connection of a group of people by marriage, blood or adoption. As mentioned above, family is a group of people with relation but family relationship is the relation study or description of this group of related people.

Family relationship is used to describe relationship between two individuals. It can also be seen from the aspect of an individual. For an example, the relationship of a cousin to me is he is the son of my uncle or aunt. We share the same grandparents and might share the same family name (in a Chinese family) if we are related at the father's side of family.

2.1.4 What is family tree?

Family tree is a chart of family generations arranged in a tree diagram from the current generation and traced backwards, in an individual's view. It is usually build by someone who would like to trace back his own family's past. Besides showing existing and

existed members in the chart, relationships between members are shown clearly with lines connecting the members and generations are separated with height levels.

An example of a four-level family tree traced by a male is described here. The highest level of ranking which is the traced great-grandparent is located at the top of the tree, representing the root builder of the family. It is then branches into grandparents at the second level and followed by parents and their siblings (uncles and aunts) at the third level. The fourth level comprises of the individual, his siblings and cousins. If the individual has extended his family by marriage, his sons and daughters will be arranged at the fifth level, with his niece and nephews (sons and daughters of his siblings and cousins).

Besides able to trace the existed and existing members in a family, a family tree also can be extended to trace medical history of a family, this medical-related family tree is called as genogram. From a genogram, some gene-related disease and illness can be easily traced and doctors could also tell the possibility of these gene-related diseases to be passed to the future generations. However, a genogram is a much complex diagram and would not be covered in this report.

2.1.5 Formal and Informal Education of Family Titles

Informal education of family titles starts at home where parents teach their child the addressing of family members and relatives. This teaching usually begins when the child starts to babble (average of 12 months to 24 months), before he or she can talk a proper word. The use of family addressing at home usually are not similar as the one taught in school as each family has their own tradition in addressing family members. Examples of informal addressing taught at home are “mommy” for mother and “daddy” for father in English, “bu” for mother and “abah” for father in Malay. These addressing are more used as they are shorter and brings a closer relationship feel.

In Malaysia, formal education about family titles is taught in pre-schools or kindergarten and is repeated in early primary schools. Children at pre-schools or early primary school

are aged around four to seven. The nine main terms of grandfather, grandmother, father, mother, brother, sister, uncle, aunt and cousin are taught in both English and Malay languages. Some schools that provide Chinese and Tamil languages also teach family titles as one of the syllabus.

The main aim of teaching family titles as a topic in pre-schools and also primary school is to prepare children the basic skills of spelling, pronouncing and writing by referring to concrete examples of people around them, their family members. Children will get a better understanding about family members during this formal learning.

2.2 Family Relationship Learning

2.2.1 Learning Family Relationships Exploiting Multistrategy [2]

In this research paper, a system named INcremental THEory Learner from EXamples (INTHELEX) which is an incremental learning system, carried out tests on a group of participants to observe their understanding on the definition of family titles by abduction, abstraction and deduction. Machine Learning (ML) literature is applied in the system to modify the constantly-changing learning process to fit into a complete and consistent new set of pre-classified examples to help easier understanding for users.

Abduction of the study targets more information of the examples from the partial information completed by participants. Abstraction supports change of language in the theory rules as well as the examples details. Deduction aims participants to complete the observations by filling in their understanding of the examples that are not explicitly noted, but is implicitly stated in the description.

An example of such understanding created by INTHELEX [6] to the definition of a grandfather is known as the father of either the father or mother side. The test is taken by a program set in the machine and takes the understanding of the participant to a specific family title including the gender, marital status, position in a family, ascendants and descendents. The relation of this paper with my study is that each family title has its own description. In order to create a healthy family with least amount of relationship confusion, one should nurture the effort in learning it in the right way since young.

2.2.2 Naming Grandparents [3]

The aim of this research was to identify the different terminologies of grandparents' naming in family. The different terminologies were formed due to different languages used by people around the world. 49 people from 18 different countries (Australia, Bulgaria, Denmark, England, Estonia, Finland (speaking in Finnish and Swedish), France, Germany, Ghana, Greece, Israel (Jewish only), Italy, the Netherlands, Norway, Poland, Portugal, Spain and Sweden) had filled a questionnaire conducted by team leader and researches of the Grandparenthood project.

From the research, it is known that there is difference in terminology according to lineage. Even among the Swedes, the terminologies for grandmother are grouped into type B and type C. Type C address the grandmother of father side with "farmor" and the grandmother of mother side as "mormor" while type B (also happens to England, France, Bulgaria, Greece, Italy, Spain, Portugal, Germany, the Netherlands, Israel and Estonia) call both grandmother as "yiayia" and the grandfather as "pappou".

A sum up of the research's results that has relation to my project is that terminologies used in addressing family members vary in different languages. As Malaysia is a multi-racial country, more than one language is used in the cultures such as English, Malay, Mandarin, Tamil and others. Each family title might be differentiated between the father side and the mother side and might as well differentiate according to position in the family. For an example, the Chinese culture has grandmother of father side to be addressed as "nai nai" while "po po" for the mother side. The differentiated terminology according to family position is practiced by the Malay culture. Malay addressed the first child of the family as "sulung", second as "ngah, third as "lang" and last as "bongsu".

Therefore, the two main languages which comprise of English and Malay are taken into account in the development of this project to increase the flexibility for variety of users and to satisfy demand of the market.

2.3 Technology-based Learning for Children

2.3.1 Learning: Is there an Application for Learning?[1]

Investigations of young children's usage and learning with mobile devices and apps

This study focuses on how smart mobile applications can enhance the learning of young children by discussing the pass-back effect when a mobile phone is passed to a child, effectiveness and feasibility of apps in promoting learning among children, and consequences of this study at the aspect of learning, research and industry.

Usability study is carried out to children among four to seven year-old by using mainly iPhone and iPod touch applications to understand what does young children do with the mobile phones, their knowledge and perspective about the amazing technology. In a learning study, 90 children are given an iPod touch with two apps (Martha Speaks: Dog Party and Super Why) installed to play with over two weeks time. The children's ability in reading skills and content areas covered by the app are assessed before and after the two weeks testing.

Result from the studies observed includes that the pass-back effect is real but children are only given limited access to the device. Most of the children learnt to use the device fast although with some difficulty at the beginning. Other than playing games, children are observed to have access to other applications such as the camera and music. The two apps used have improved the vocabulary learning of the 90 participated young children.

In order to keep the interest of children in learning through mobile phone apps, the consequences of app in industry and research aspects needs to be suitably developed with up-to-date contents, motivating and goal-oriented, amusing activities, requires parent's involvement and short waiting time. In the educational aspect, children's time should be optimized with high-quality educational apps as their supplementary learning tool in daily life.

The challenge of a developer is to carefully create educational apps with essential features stated above, as we cannot deny that the young children in this era is hitting the digital age. It is believed that with careful exposure of parents' and teacher's guidance in

using educational mobile applications, children, as they are in the stage of shaping new habits for learning and social development, receive more advantages than disadvantages.



Figure 1 Martha Speaks: Dog Party iOS application



Figure 2 Super Why iOS application

Age	Number of participants	Average gain in vocabulary score
3	6	14%
4	7	10%
5	13	27%
6	16	22%
7	12	21%

Figure 3 Vocabulary gains after playing with the Martha Speaks app

Age	Number of participants	Average gain in vocabulary score
3	8	17%
4	13	9%
5	23	8%
6	26	9%
7	12	-3%

Figure 4 Literacy gains after playing with the Super Why app

2.3.2 Pockets of Potential: Using Mobile Technologies to Promote Children's Learning [4]

By taking the example of Sesame Street (a popular educational-promoting American children's television series) which had successfully made education conveyed to children from television two generations ago, mobile is seen to have the potential to act as an educational medium that can benefit children in the next decade if it is well deployed. This research has taken iPhone, iPod devices and portable gaming platforms as examples for mobile technologies that contribute to mobile learning.

Five key opportunities of mobile learning in improving education are outlined which include mobile devices support anywhere and anytime learning, accessible and economically-supported, technologically fit, increase social interaction in 21st century and improve learning experience by having personalized instructions. If the points above are achieved, children will have more chance to improve their critical thinking skills, knowledge and perspective.

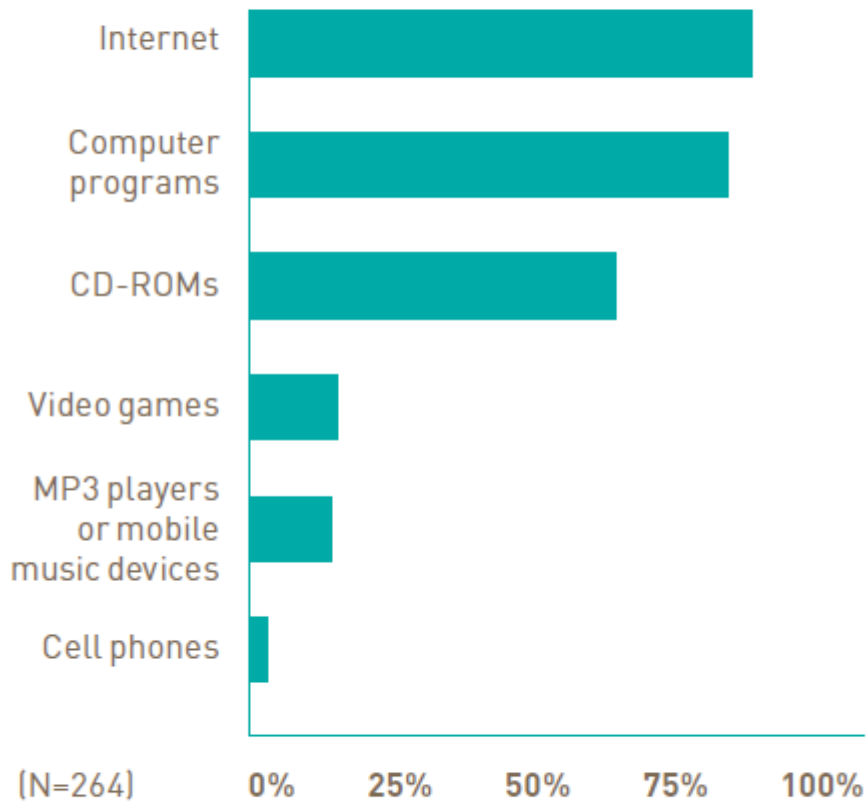
Though mobile learning is suitable to be applied, there are a few challenges that should be focused. Parents and teachers' stereotype view of mobile disadvantages to their children makes them unconvinced with mobile learning. The other challenges include inflexibility of access to technology made teaching difficult to apply equally to all students, small screen size, short battery life and impractical text entry, and negative impacts to children such as they become distracted, start the growth of texting slang and prone to mobile radiation.

A bundle of research projects are taken to children of age 3-11 at America and non-America countries, most of the results show positively to mobile learning (refer to Appendix). The debate of whether mobile learning should be applied to children's education has to be stopped but we should target in the topic of how mobile devices should be optimized in improving children's learning.



Box 5: Digital media's potential as an educational tool

How much potential do you feel the following kinds of digital media have as educational tools?



[Source: Joan Ganz Cooney Center & Common Sense Media, 2008]

Figure 5 Graph above shows Digital media's potential as an educational tool

2.3.3 Technology and Interactive Media as Tools in Early Childhood Programs Serving Children from Birth through Age 8 [18]

Interactive media is defined as digital and analog materials such as applications that developed to help active and creative use by young children and to encourage social engagement with others. In this study, The American Academy of Pediatrics, NAEYC, Fred Rogers Center and the White House Task Force on Childhood Obesity are involved as their concern about child development and health issues due to the advancement in technology and interactive media.

NAEYC and the Fred Rogers Center offer some principles to guide early childhood programs with the use of technology and interactive media. The principles cover the use of technology or media should be age appropriate, individually appropriate, and culturally and linguistically appropriate, depending on the age, developmental level, desires, interests, linguistic background, and abilities of each child.

Young children nowadays have higher and faster ability to accomplish a task by using technological tools and interactive media as their source of exploration and mastery. Takeuchi, 2011 mentioned that “effective technology tools connect on-screen and off-screen activities with an emphasis on co-viewing and co-participation between adults and children and children and their peers. These tools bring adults and children together for a shared experience, thus pulling family relationship closer.

It is also mentioned that children’s social and cognitive abilities could be enhanced when technology and interactive media are used wisely. Parents could provide opportunities to extend learning in early childhood by embedding many materials (blocks, books, art materials, writing materials) in an interactive media and by the technology used; children are exposed to experience the objects, animals, places and activities that might not be experience in person.

As young children learn and develop skills through play, the technology and interactive media used should be developed in a creative, provide exploration and playful ways. From this, children have to follow the rules of games, control the medium and outcome of the experience. Digital resources of different languages no longer hard to be found by

parents for their young children to provide dual language learning, when there are digital technologies.

However, it is strongly pointed that technology and interactive media should not replace the traditional way of children's learning such as outdoor activities, creative plays and social interactions with others. Parents and educators should also limit the contact of children with these tools to a certain hours in a day, depending on the importance of the use, considering impacts on the child's development.

2.4 Mobile Technology Aspects for Children Learning

2.4.1 Designing Intergenerational Mobile Storytelling [21]

Mobile devices offer unique capabilities to support informal educational experiences with grandparents and other adults. This article presents the aid of mobile technologies in conveying children's literature and storytelling with the help of adults such as parents and grandparents.

The interaction of a seventy-three-year-old Myles and a nine-year-old Dana reading a downloaded book is observed. From the observation, it is suggested that a Read Me button should be inserted so that the word being read-out-aloud would be detected, highlighted and appears bigger in size to enable grandparents to read better to their grandchildren. These points are taken into account and are integrated in today's reading applications.

Another observation from the intergenerational design group of eight children and seven grandparents are tested. It shows that cooperation and companionship can be developed through reading activity by using mobile technologies where they would negotiate the share of the device's controls.

Children learn through play and trying out new things. Mobile technology could enable children to convey their message, idea or feeling by creating and editing stories in a device. With mobile technology, it does not only give the reality feeling of sketching,

drawing and writing in a book but also with extra functions of importing media and sharing the story with others.



Figure 6 Today's International Children's Digital Library (ICDL) for iPhone application displays children's books that can be read on an Apple iPhone

2.4.2 Designing Mobile Phone Interface with Children [22]

This study understands the feedbacks, comments and requests made by children in the process of designing and evaluating a mobile phone interface prototype for children. Even though the evaluation was taken on a laptop rather than a real mobile phone, children could point out various feedbacks that dissatisfied them throughout their testing experience.

Most of the complaints made by the group of ten children are experienced by adults too which are the keys are too tiny, icons should be easier to use and understand, and screen should be larger. Uncommon requests are also made by the children such as cartoon-like icons for function and place emergency number at the home screen. These findings help mobile developers to understand better the interface designs of mobile application involving children.

2.4.3 Grocery Hunter: A Fun Mobile Game for Children to Combat Obesity [23]

This paper presents a mobile game that teaches children targeted at age seven to eleven to choose nutritional food items while shopping with their parents at the grocery store. This game works by providing nutritional information about a food, ask the child to find such food and scanned the item chosen by the child to confirm whether the food is correct (should be consumed) or incorrect (should not be consumed).

Parents as well as children can benefit from this game as parents could shop at the grocery store peacefully while their children play with the game; children who play this game could grow to be a health-conscious adult, gain education about nutritional food through game, directly discover food that contribute to obesity, and children only focus on healthy food including negative junk food.

The game prototype is developed based on several factors to be more appealing to the target users, which are children of age seven to eleven. The factors include cartoon-like look and feel, identifiable avatar from one of the popular cartoon show, supports adobe flash animation and pocket PC technology of touch screen.



Figure 7 Grocery Hunter Screenshot

2.4.4 mLearning for kindergarten's mathematics teaching [25]

This study aims to develop a geometry learning game for kindergarten's children by using handheld devices that adapts to the user's behavior. Six year-old pupils with different levels of skill are taken as the learners of this study to obtain a realistic and fair result.

From the tests of learning geometry activities, it is proven that children could learn easily and perform faster by using handheld device with touch screen than PC with a mouse. Besides, handheld devices provides mobility as it can be carried anywhere with wireless connection connected, increasing the engagement of children to the game.

Some obligations are faced during the tests such as the pupil's behavior changes when the six year-old children get tired. Therefore the system should be developed in a way that after a certain time of playing, it can understand the unexpected behavior is due to lack of skill and tiredness. Improvement on the user interface should also be made to remain as a high-level usability system as mistakes on the touch screen device made by children are still unavoidable.



Figure 8 The adaptive geometry game on Compaq iPaq (PDA)

2.4.5 Touch-screen Technology for Children: Giving the Right Instructions and Getting the Right Responses [29]

This paper presents some of the key problems designers need to take into account while designing technologies for children use and lists out suggestions for designers to design touch-screen applications to support children use more effectively.

Children usually face difficulty in understanding the instructions' language to complete a task asked especially if they are not guided with adults. Therefore, audio and simple textual instructions are tested to have big impact on the children's understanding ability. Animations of gesture instruction would be best to enhance their understanding.

It is normal to make mistakes by accident for a child of age six to seven. A doubt in choosing an option might also lead to mistake while handling the application. Hence, minor error recovery should be enabled in applications to prevent children from losing engagement with the application.

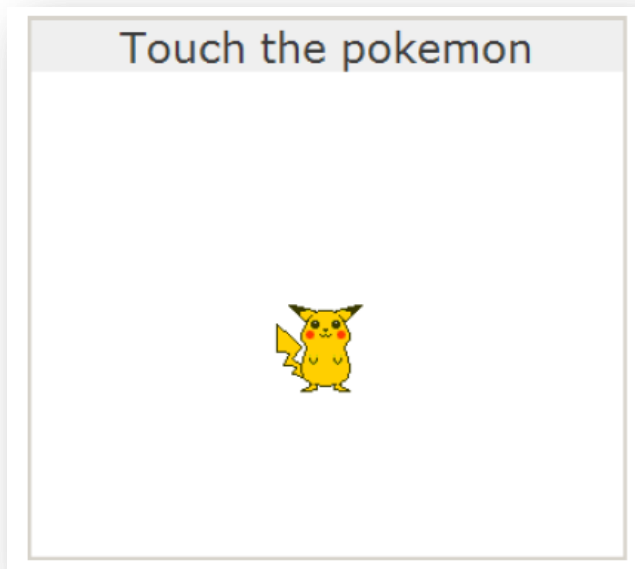


Figure 9 Screenshot of the application screen during a study

2.4.6 Designing and Testing Mobile Interfaces for Children [30]

This study aims to conduct research on the interaction and usability of children by using mobile applications. The applications involved are The Silent E Game, The Sorting Words Game, The Combining Game, The Phonemic Fill Game, and The Silhouette Blends Game developed in the Interactive Reading Environment with Adaptive Delivery (iREAD) system prototype on iPod touch.

Some recommendations for mobile touch application design for children are noted down based on the iREAD prototype formative testing results. Frequent audio prompts should be included in the application's instructions and feedbacks, repetition might also help the children to understand better what should be the next step.

Game structure should be simplified as application in mobile device is smaller than in desktop PC. The number of steps to complete the task can be increased in order to simplify the game structure without cutting the game storyline. Larger and visually-obvious hotspot as well as wider scroll area should be set for an application since the concern of small mobile screen affects performance of children.

Use simple instruction terms to avoid misunderstanding of children in engaging with the application such as "touch and move" instead of "scroll". Animation of the instruction could increase understanding as well as preserving the interest of children in the application. Tutorials and trials should also be provided before the real involvement in the application to ensure children understands the task.



Figure 10 Screenshot of The iREAD Silent E Game

Below is the summary table of Mobile Technology Aspects for Children Learning

No	Article	Features	Advantages	Opinion
2.4.1	Designing Intergenerational Mobile Storytelling [21]	Use of mobile technology in conveying children's literature and storytelling with the help of adults	- develop cooperation and companionship through reading	- need a ReadMe button that highlights and zoom in the words to enable adult read better
2.4.2	Designing Mobile Phone Interface with Children [22]	Understands the feedbacks, comments and requests made by children in the process of designing and evaluating a mobile phone interface prototype for children	- help mobile developers to understand better the interface designs of mobile application involving children	- icons should be easier to use and understand - keys and screen should be larger
2.4.3	Grocery Hunter: A Fun Mobile Game for Children to Combat Obesity [23]	Teaches children (7-11) to choose nutritional food items while shopping with their parents at the grocery store	- parents could shop peacefully - children could grow to be a health-conscious adult, gain education about nutritional food, directly discover food that contribute to obesity, only focus on healthy food	
2.4.4	mLearning for kindergarten's mathematics teaching [25]	A geometry learning game for kindergarten's children by using handheld devices that adapts to the user's behavior	- children could learn easily and perform faster by using handheld device with touch screen than PC with a mouse - increase children engagement as handheld devices provides mobility	- should understand the unexpected behavior of children after a certain time of play is due to tiredness - improve on user interface as mistake on touch-screen is still unavoidable
2.4.5	Touch-screen Technology	An app that provide test cases to study	Presents key problems for children app	- audio and simple textual instructions has a big

	for Children: Giving the Right Instructions and Getting the Right Responses [29]	children responses on touch screen devices	designers and list down suggestions to develop effective touch screen app for children	<p>impact to children's understanding</p> <ul style="list-style-type: none"> - animations of gesture instruction best to enhance children understanding - minor error recovery should be enabled
2.4.6	Designing and Testing Mobile Interfaces for Children [30]	Conduct research on the interaction and usability of children by using mobile applications	Note down some recommendations for mobile touch application design for children based on the iREAD prototype formative testing results	<ul style="list-style-type: none"> - Frequent audio prompts should be included in the application's instructions and feedbacks - repetition might also help the children to understand better what should be the next step - Game structure should be simplified - Use simple instruction terms to avoid misunderstanding - Animation of the instruction could increase understanding as well as preserving the interest - Tutorials and trials should also be provided before the real involvement

Table 1 Summary Table of Mobile Technology Aspects for Children Learning

2.5 Best Age for Children Learning

Relation of best age for children learning with the articles below will focused at the age a child starts to talk a complete word, showing the urge to learn talking.

2.5.1 The First Years Last Forever

This booklet gives parents the idea of what to expect and how to help the child to learn and grow at each age of their child's growth. Averagely, a child starts to babble, say mama and dada at the first year to second year old. He or she might be able to speak a short word and usually is not clear. As the child grows older to two to three years old, this child picks up more words and is able to put a few words in a sentence. He or she starts to understand the happenings around.

Therefore, at this stage, he or she is ready for family relationships learning, starting with the titles of family members and relatives. The understanding of the relationships can be nurtured by time.

2.5.2 Your Child's Development

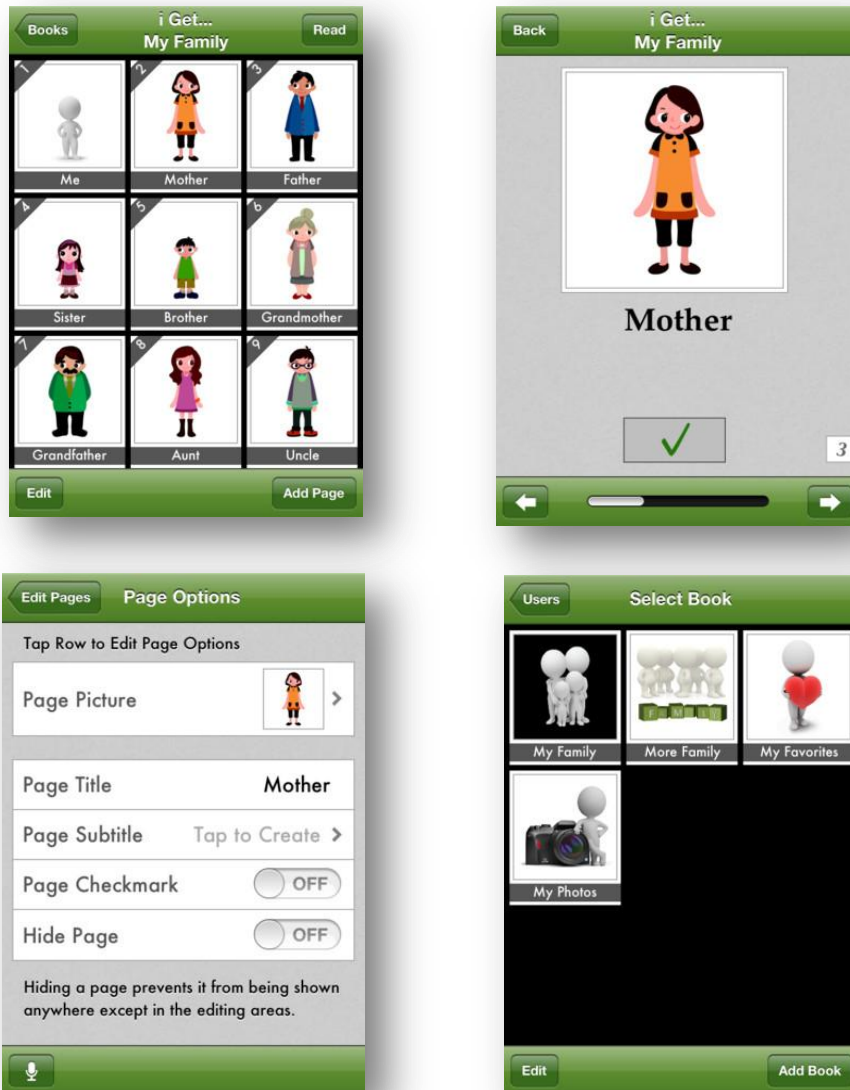
At average of 9-15 months, a baby starts to talk his first word, which is usually a "mama" or "dada". Then, the baby starts to talk two to three words in a sentence at two years age. By the baby's age of three, an adult can understand the sentence for more than 75% and at the age of four, he or she could talk in a complete sentence by using the vocabulary learnt in his or her four years experience.

From this information, a baby's dictionary of words starts to expand at about age one. Understanding of the words starts later at about age three. Therefore, age one is the most crucial age to learn family titles, and continued with family relationships learning at age two to three, when a baby starts to understand.

2.6 Existing Mobile Application

2.6.1 i Get... My Family Photo Album Books for iOS by I Get It, LLC [5]

This application is developed based on Apple iOS platform by I Get It, LLC. It costs \$2.99 for download and is found to have no trial version. Currently, it is updated in version 2.0.2 by March 2012. The limitation of this application is that it only supports English, limiting its target users. Besides, it does not teach relationship between family members such as the relationship of a grandmother and a mother is mother and daughter.



Figures 11-14 Screenshots of i Get... My Family Photo Album Books

2.6.2 Family Relations for iOS by Cody Hatfield [14]

This is an Apple iOS based application developed by Cody Hatfield that enables user to find the kinship relation of a particular person in the user's extended family. User navigates through the application by choosing buttons on the tree structure to find out the desired relationships. With this application, user can find out the difference between a First Cousin and First Cousin Once Removed, and many more relations. However, there is a negative feedback from the user, Anna6846 stating she does not understand how to use the application. From this lesson, it is clearly shown that Help directions should be inserted for users.

Other details of this application include it is free for download, released on 28th June 2012 and is available in English only. It is compatible for iPhone, iPod touch and iPad with iOS version of 4.1 or later.

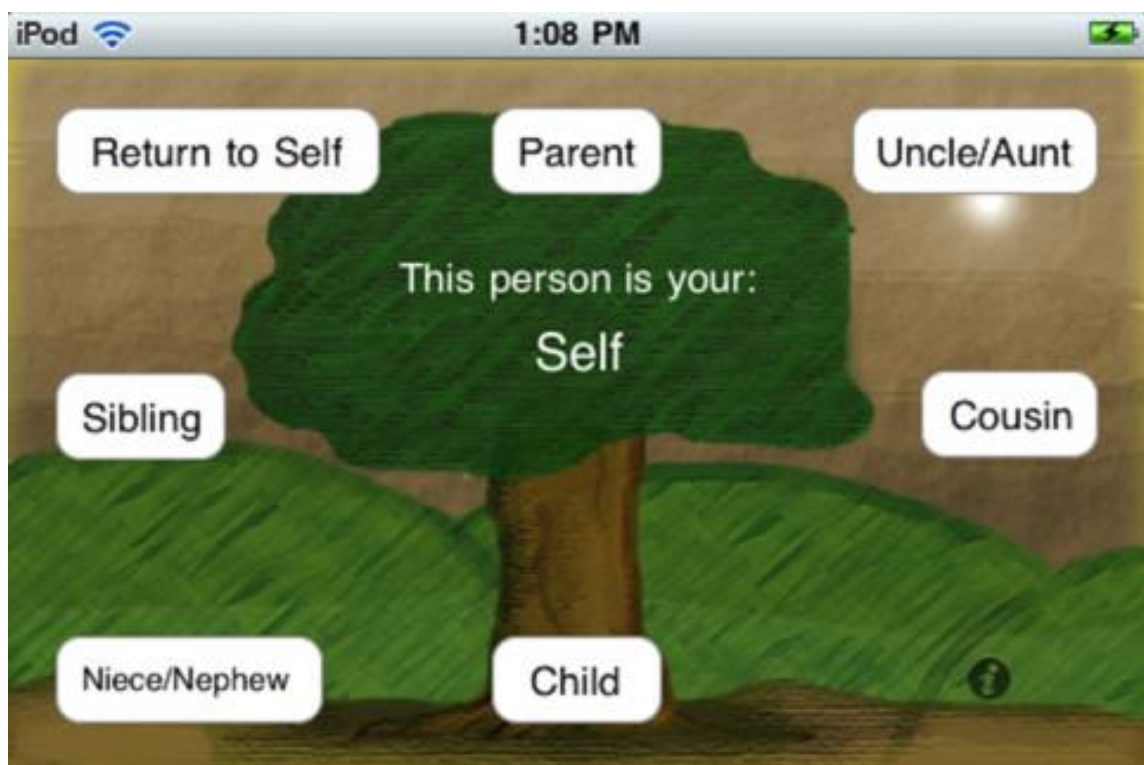


Figure 15 Screenshot of Family Relations for iOS using iPod

2.6.3 Kinship for Android by Teedy Software [12]

This free for download Android based application calculates the relationship between two blood relatives based on their relationship to a common ancestor. It has a straight-to-the-point function as it perform output once the user input by selecting the Person 1 and Person 2 from the drop down menu.

Details of this application include its latest update was on 11th July 2011 and is currently in version 1.0. It supports Android version of 2.2 and above.

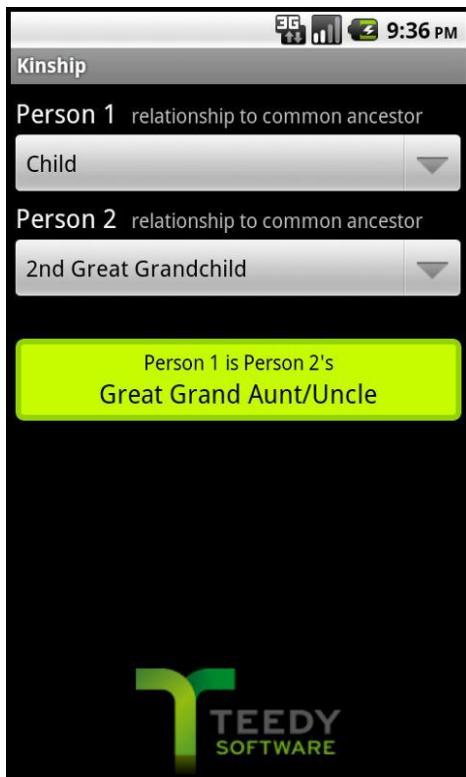


Figure 16 Screenshot of Kinship input selection and output

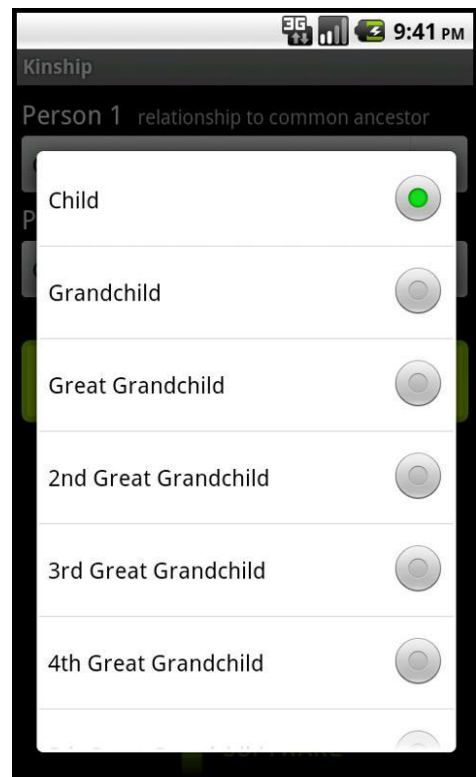


Figure 17 Screenshot of Kinship drop down menu for input

2.6.4 Cousinator for Android by Arnon Hershkovitz [13]

This application defines the exact relationship between two relatives based on a common ancestor or by marriage. It provides complete and easy-to-understand explanation of the relationship chosen by user. Positive feedbacks are received by users stating this application provides answers in bright colours, which should be taken as a role model in my app development. Besides, it is also said as a nice and clean family relationship calculator. This app is updated on 7th February 2012 to version 2.0.2. It is compatible for Android version of 2.1 and above.

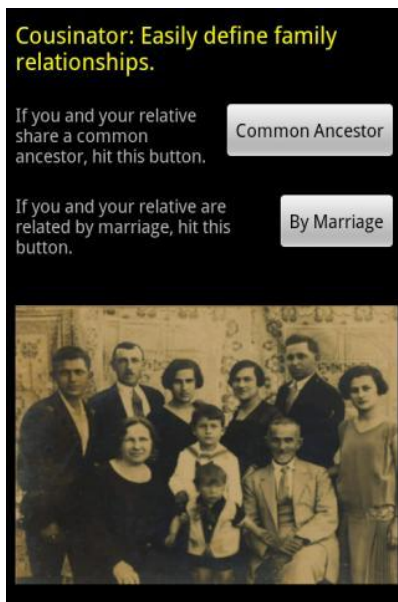


Figure 18 Screenshot 1 of Cousinator

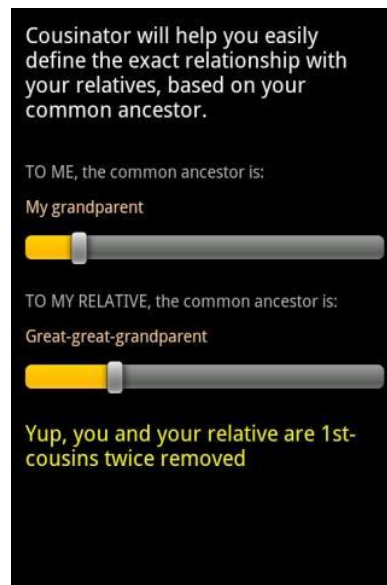


Figure 19 Screenshot 2 of Cousinator

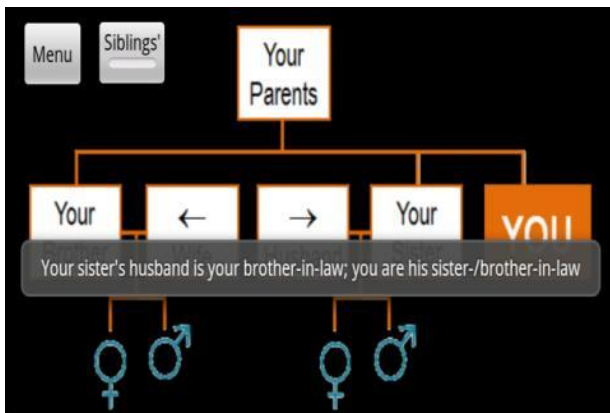


Figure 20 Screenshot 3 of Cousinator

Below is the summary table of Existing Mobile Application

No	Application	OS Platform	Developer	Price	Advantages	Limitations
2.6.1	i Get... My Family Photo Album Books [5]	iOS	I Get It, LLC	\$2.99	<ul style="list-style-type: none"> - Provide information about 8 family members - Support import of pictures into photo album - Enable user to create many book album 	<ul style="list-style-type: none"> - Support only English - Does not provide relationship comparison - Members are not shown in a family tree to resemble relationships and generation levels
2.6.2	Family Relations [14]	iOS	Cody Hatfield	Free	<ul style="list-style-type: none"> - Enables user to find the kinship relation of a particular person in the user's extended family 	<ul style="list-style-type: none"> - Some user might not know how to use the app as Help direction is not provided
2.6.3	Kinship [12]	Android	Teedy Software	Free	<ul style="list-style-type: none"> - Calculates the relationship between two blood relatives based on their relationship to a common ancestor 	<ul style="list-style-type: none"> - User has to know the correct title of both the family members before start to compare their relationship

2.6.4	Cousinator [13]	Android	Arnon HersHKovitz	Free	<ul style="list-style-type: none"> - Defines the exact relationship between two relatives based on a common ancestor or by marriage - Provides complete and easy-to-understand explanation - Provides answers in bright colours 	<ul style="list-style-type: none"> - User has to know the correct title of both the family members before start to compare their relationship
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Table 2 Summary Table of Existing Mobile Application

2.7 Reflection

The cost to raise a child has increased year by year. Therefore, the hard work of parents to earn money to raise their child has also increased. This situation might have made parents spend lesser time to educate their child at home. Besides, some early-married parents might not have enough experience in raising a child's education might have ignored the importance of family titles teaching.

Based on the revised articles, it is shown that there are different types of calling in different languages or side of the family [3]. Therefore, it would be helpful for parents if there is an application developed that helps teaching family titles in different languages, such as English and Malay. This app would be useful for child from age 1 as that is the average age a child starts to talk.

As the modern world is equipped with technologies, children's interest in learning also increases with the use of technology gadgets. Improvement in vocabulary and literacy aspects has shown improvement in the testing of children learning using technology apps such as Martha Speaks app and Super Why app [1]. The only concern of technology-based learning resources for children is the suitability of the developed functions and an attractive design. However, technology-based learning resources should not replace traditional ways of learning such as outdoor activities and social interactions; these have to be taken into serious account for developers [18].

A technology-based learning app for children should be designed appropriately according to the target age, developmental level, linguistic background and abilities of the child [18], in a way that is attractive with colors, cartoons, animations, audio, video, and simple textual instructions. To enhance their understanding of how to use the app, tutorials and trials should also be provided before the real involvement in the learning area. Besides, children's app should be free from unhealthy designs such as pornographics.

From all the information gathered above, this project would like to develop an Android app with the idea to help parents educate their child of age one to three about family titles and relationships teaching. The app is noted to have attractive designs with

colourful graphics, audio supported and developed in two languages, English and Malay. Besides, it also allows parents to import photo of family member to present a realistic family member to their child in the learning process. This app hopes to contribute to the society for parents as well as respects of the children to the elders.

CHAPTER 3 METHODOLOGY

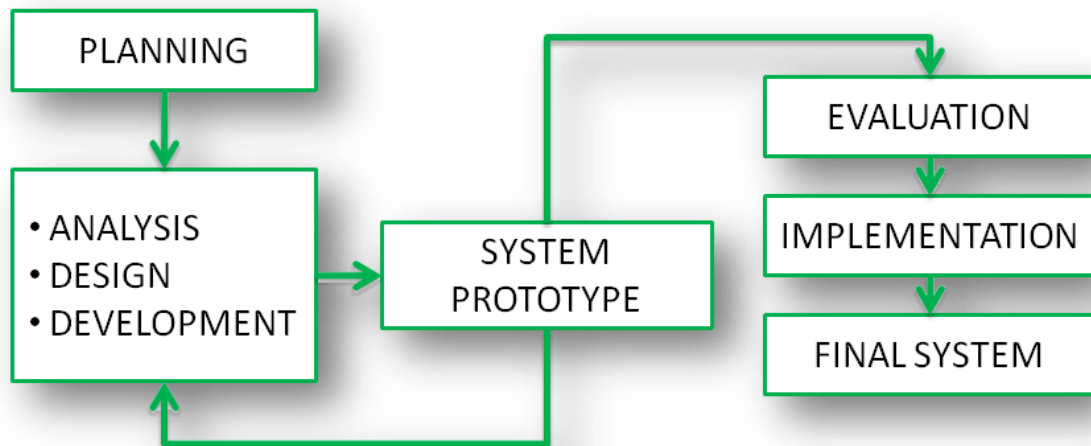


Figure 21 Prototyping Methodology

3.1 Prototyping Methodology

The methodology used to conduct the study of this project is the prototyping model. This methodology is chosen as it is the most suitable for this project's development as it helps the development of the application in a number of ways such as allowing active

participation of the developer and target users. This will allow for early testing and ease of determining what works and what needs to be improved upon during the development of the system. Furthermore, given the limited time allocated for the development of this application, the prototyping methodology allows for faster development of the system. Moreover, by producing a prototype, the development can run more smoothly as early development cycle allows for a grasp on the final product.

3.1.1 Planning Phase

In this phase, planning for what needs to be studied to proceed with development of the application takes place. Research is conducted to determine what criteria needs to be scrutinized in order to establish an understanding on the basic requirements of the application, what functionalities are required, and what data is required to determine these factors. Further researches on existing application that run on other platforms also conducted to determine the benchmark on the basic functionalities of the application. Furthermore, researches on Android platform code development are studied and understood on the function availability.

The related research papers are read, summarized and inserted to the literature review of this report. The chosen research paper is focused on concepts of family, family titles, family relationships and family tree, formal and informal education about family titles in school. Besides researching on the concepts of family titles, technology-based learning for children, mobile technology aspects for children learning as well as best age for children learning are also covered. In the end of this phase, the project has a better view of the methods and resources to start the next phase, which is the analysis phase.

3.1.2 Analysis Phase

The analysis phase is conducted to perform a user need analysis to gather data and statistics that will determine the requirements of the application. This phase will involve conducting surveys and interviews to be conducted on the parent community especially to the young parents to understand what features they foresee in the application. Any incomplete requirement analysis that occurs during this

stage will be addressed during the development phase that will allow for further inspection and testing.

Analysis on the existing mobile application and related mobile application from various platforms are carried out. During the analysis, some well-developed aspects are focused and noted down as role model for the project's design such as the user interface design, easy navigation, main page components, shortcut keys and the graphic design for children. The deliverables of this stage resulted in an app flowchart and initial prototype design.

3.1.3 Design

Creation of design was more focused on interface design and functional design. There are four main buttons for the main menu (Start, Help & About and Settings). Further design of the prototype is discussed at the prototype in Results and Discussion section.

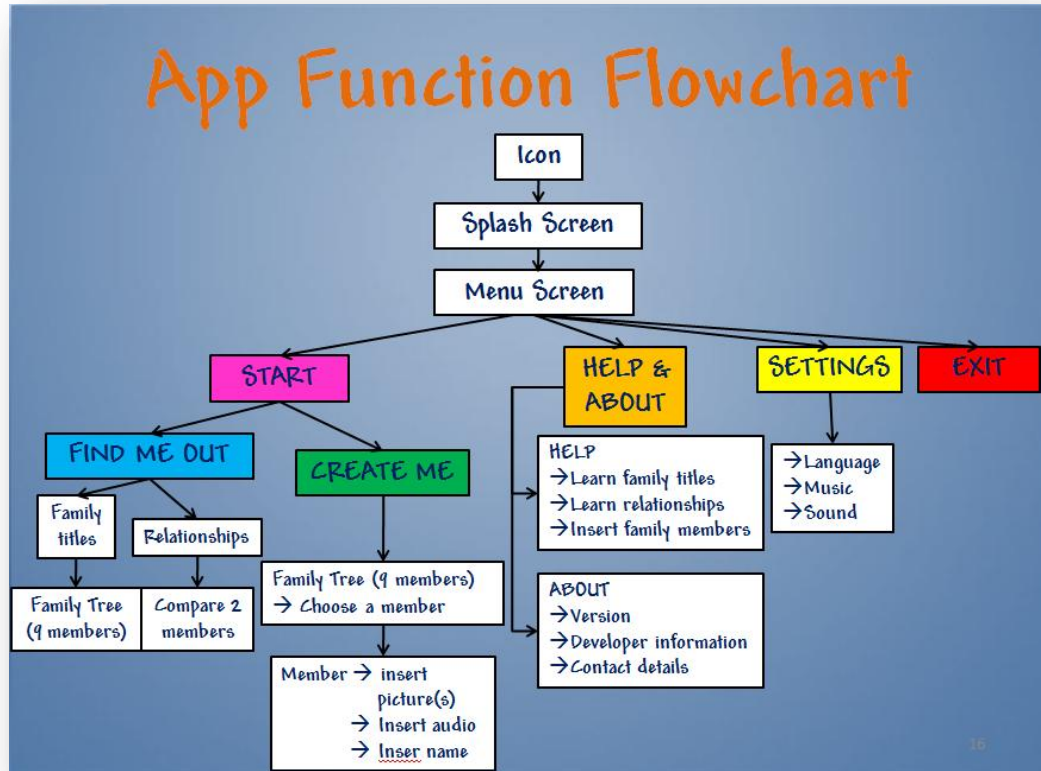


Figure 22 Family Member Learning Mobile Application Flowchart

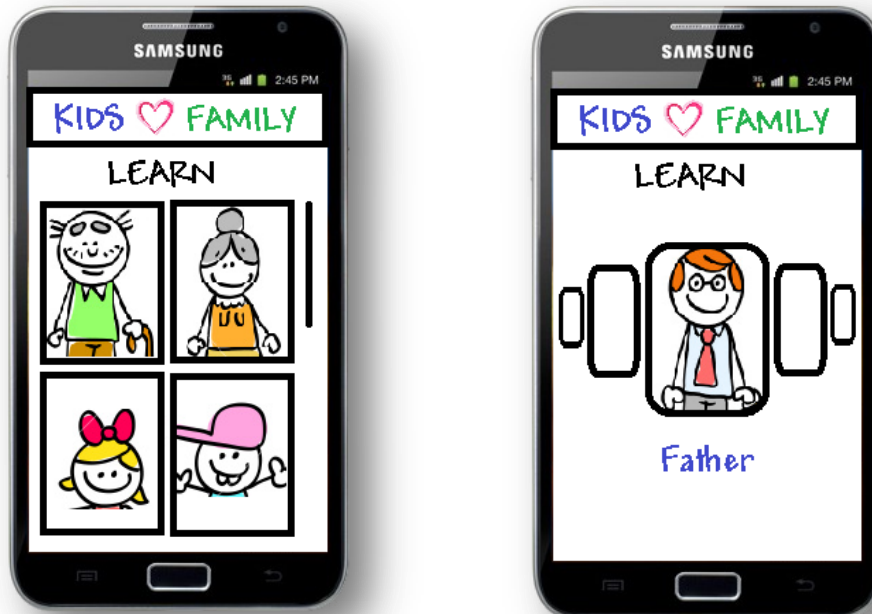


Figure 23 Family Member Learning Mobile Application Initial Wireframe

3.1.4 Development Phase

A prototype of the application is developed in this phase. This will allow for numerous testing of the product during the iteration period for a number of purposes such as validating the application specifications and requirements, addressing any newly discovered requirements, and uncovering any design flaws. This phase will be repeated continuously for improvement purpose.

The prototype is developed in Eclipse Juno version 4.2.1. Android SDK up to version 4.2 with API 17 is used for the development. XML layouts are designed with the help of Adobe Photoshop CS2 and online resources available for free download. Java classes are written for the app functional area and interaction with user besides supporting the appearance of XML pages. Besides, SQLite database is also implemented to store user input images, text and audio files.

Developer testing on the app progress is carried out with Samsung Galaxy Note 1 of 5.3 inch. Some other Android smart phones are also used to run the developer testing such as Samsung Galaxy Ace, HTC Incredible S and Samsung S Plus, which are of different screen sizes. Besides transferring the app to smart phone through a cable connected to the laptop, an .apk file is also produced to test on the installation through Bluetooth transfer.

3.1.5 Evaluation Phase

At this phase, a user perception study and a System Usability Scale (SUS) study is carried out for user testing. A total of ten target users which are parents with their respective child of age one to three are approached from various areas (UTP Staff, Tesco Customer, KL and Teluk Intan Relatives). The target parents from the educated family as well as the less-educated family are approached as this project also serve to help less-educated parents to educate their child with the proper family titles.

The testing required the parent user to use the app together with their child user to learn about family titles by using an Android smart phone. All the pages are asked to be accessed including sound playing of the family titles. Some child even requested to repeat the testing as they are attracted to the appealing graphic designs. The testing time is recorded and some pictures are captured as proof for the evaluation phase.

After the testing, each parent is asked to fill in both the user perception form and SUS form to complete the testing process. Some parent which is less-educated faced problem in filling the form as they are not familiar with English. The results are collected, analyzed and discussed further in the Results and Discussion section.

Family Titles Learning Application (Prototype Testing) Survey

MyFamily is an Android application that provide family titles and relationships learning in English and Malay. Please help fill up this form after you tested the application :)

Are you a parent? *

Yes

If you are a parent, how old is your youngest child?

Are you an Android user? *

Yes



Questions below related to application testing

Do you think a child of age 1 to 3 can use this application without the guidance of parent or adult? *

1 2 3 4 5

Lowest Probability Highest Probability

Is the application attractive and easy to use for you and (or) your child? Rate your choice. *

Please consider the aspects of color, navigation and user-friendliness.

1 2 3 4 5

Poor Excellent

Does the multi-languages helpful in learning family titles? Rate your choice. *

This application supports both English and Malay

1 2 3 4 5

Not At All Helpful Very Helpful

In your opinion, do you think this application would be useful for child's early learning about family titles? Rate your choice. *

Target child of 1-3 years old

1 2 3 4 5

Strongly Disagree Strongly Agree

Does your child learn about family titles better after exploring through this application? Rate your choice. *

Analyse your child's pronunciation and knowledge on family titles.

1 2 3 4 5

Not At All Much More

Would you continue using this application and recommend it to your friends (new parent)? *

1 2 3 4 5

Strongly No Strongly Yes

Do you have any suggestion to improve this application?

eg. put some video or animation, more graphics

Figure 24 User Perception Survey

System Usability Scale

© Digital Equipment Corporation, 1986.

	Strongly disagree					Strongly agree
1. I think that I would like to use this system frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
2. I found the system unnecessarily complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
3. I thought the system was easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
5. I found the various functions in this system were well integrated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
6. I thought there was too much inconsistency in this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
7. I would imagine that most people would learn to use this system very quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
8. I found the system very cumbersome to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
9. I felt very confident using the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
10. I needed to learn a lot of things before I could get going with this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	

Figure 25 System Usability Scale

3.1.6 Implementation Phase

Upon finishing the prototype of the application and reaching a significant level of approval in terms of performance and executability, implementation of the application is planned to market the final prototype to the Android market as a contribute to the society to help parents educate their young child about family titles.

3.2 Key Milestone

In completion to this project, the timeline is separated into two phases, Final Project I (FYP1) and Final Year Project II (FYP2). Progresses of the project are colored in blue as shown in the Gantt Charts below. There are a few key milestones for each of the phase which is, highlighted in orange.

3.3 Gantt Charts

Table 3: Phase 1 Final Year Project I (FYP1)

Week	1	2	3	4	5	6	7	8	9	10	11	12
Title Selection/Proposal												
Submission of Project Proposal												
Literature Review												
Extended Proposal Submission												
Proposal Defense												
Interim Report												

Table 4: Phase 2 Final Year Project II (FYP2)

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Programming Research														
Prototype Development														
Submission of Progress Report 1														
Pre-SEDEX														
Dissertation														
SEDEX														
Viva														
Final Dissertation														

3.4 Tools for project

- a) **Hardware:** Smart phone running on Android OS platform with version Froyo and above (Samsung Galaxy Note with 5.3 inch screen)
- b) **Software:** Eclipse Juno 4.2.1, ANDOIRD SDK 4.2 with API 17



Figure 26 Samsung Galaxy Note (hardware)

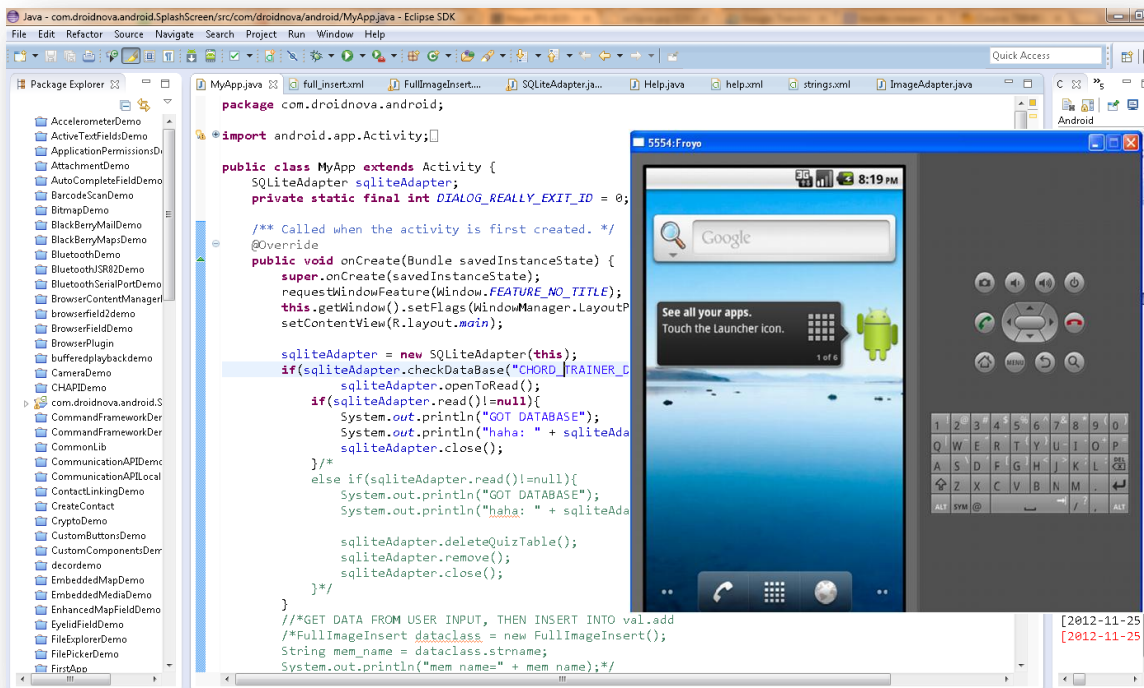


Figure 27 Android SDK Environment by using Eclipse IDE with ADT plugins (software)

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Prototype

A mobile application prototype is a model or an early sample built with design to test functional areas of an idea. Pictures below are screenshots captured from the prototype of version 1.0 using Samsung Galaxy Note 5.3 inch with OS 2.3.6. The latest update of this app is by 24th November 2012).

The prototype section is divided into two:

1. App Information
2. App Function

4.1.1 APP INFORMATION (7 screens)

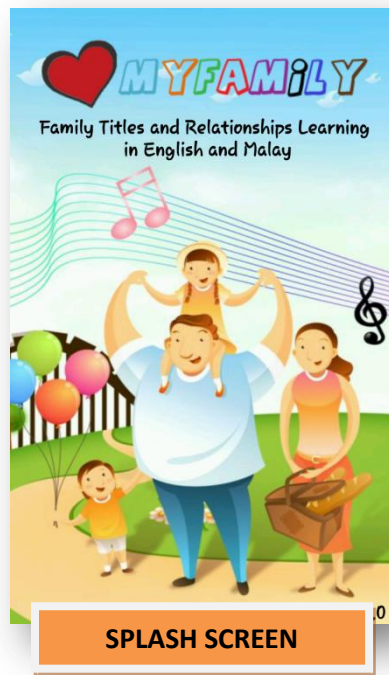


Figure 28 Prototype Splash Screen

Figure 29 Prototype Main Menu

- ❖ The Splash Screen enable user read the app's information for 5 seconds.
- ❖ The Main Menu has 4 main buttons (ABOUT, HELP, SETTINGS and START) and enable user to exit by touching the BACK button.

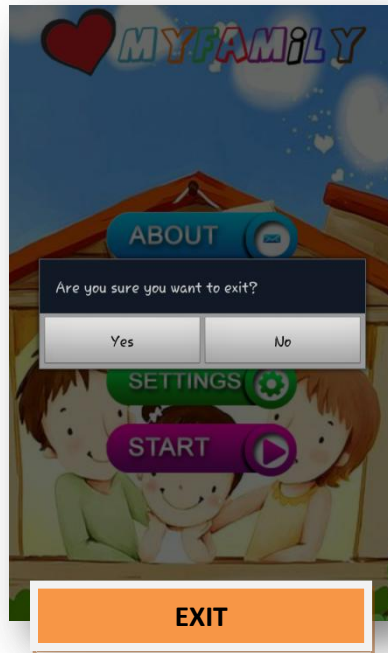


Figure 30 Prototype Exit Screen



Figure 31 Prototype About Screen

- ❖ The Exit Screen appears once user click on the BACK button that has on every Android device. There is no Exit button on the Main Menu to prevent user from exiting the application but instead continue using the app to learn family titles.
- ❖ The About Screen displays information about the app and its developer.

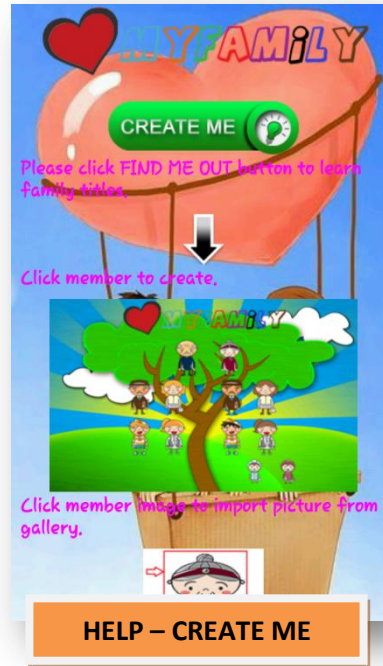


Figure 32 Prototype Help for Find Me Out Function

Figure 33 Prototype Help for Create Me Function

- ❖ The Help Screen shows steps to use the functional area of this app which is built in the START button.
- ❖ The Help information is developed in a scroll view area for easy viewing and is divided into FIND ME OUT and CREATE ME.
- ❖ User can easily determine the help information as the instruction explicitly shows the steps by using the developed buttons, screen images and red box with arrows.



Figure 34 Prototype Settings Screen

❖ The Settings Screen enable user to switch on and off for the application's sound and music.

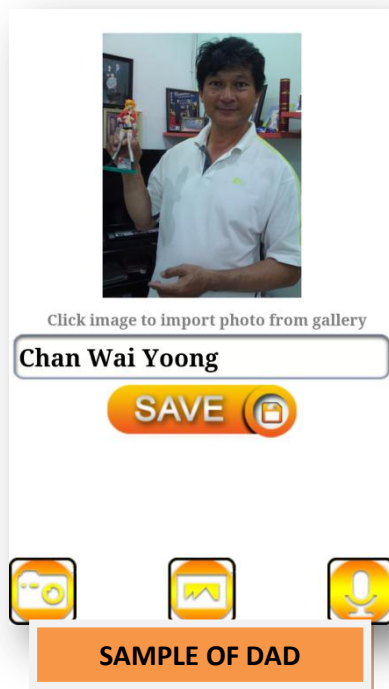


Figure 35 Prototype Sample Screen

❖ This is a sample of CREATE ME function that allows user to import or capture the family member's image and insert the name to save

4.1.2 APP FUNCTION (7 screens)

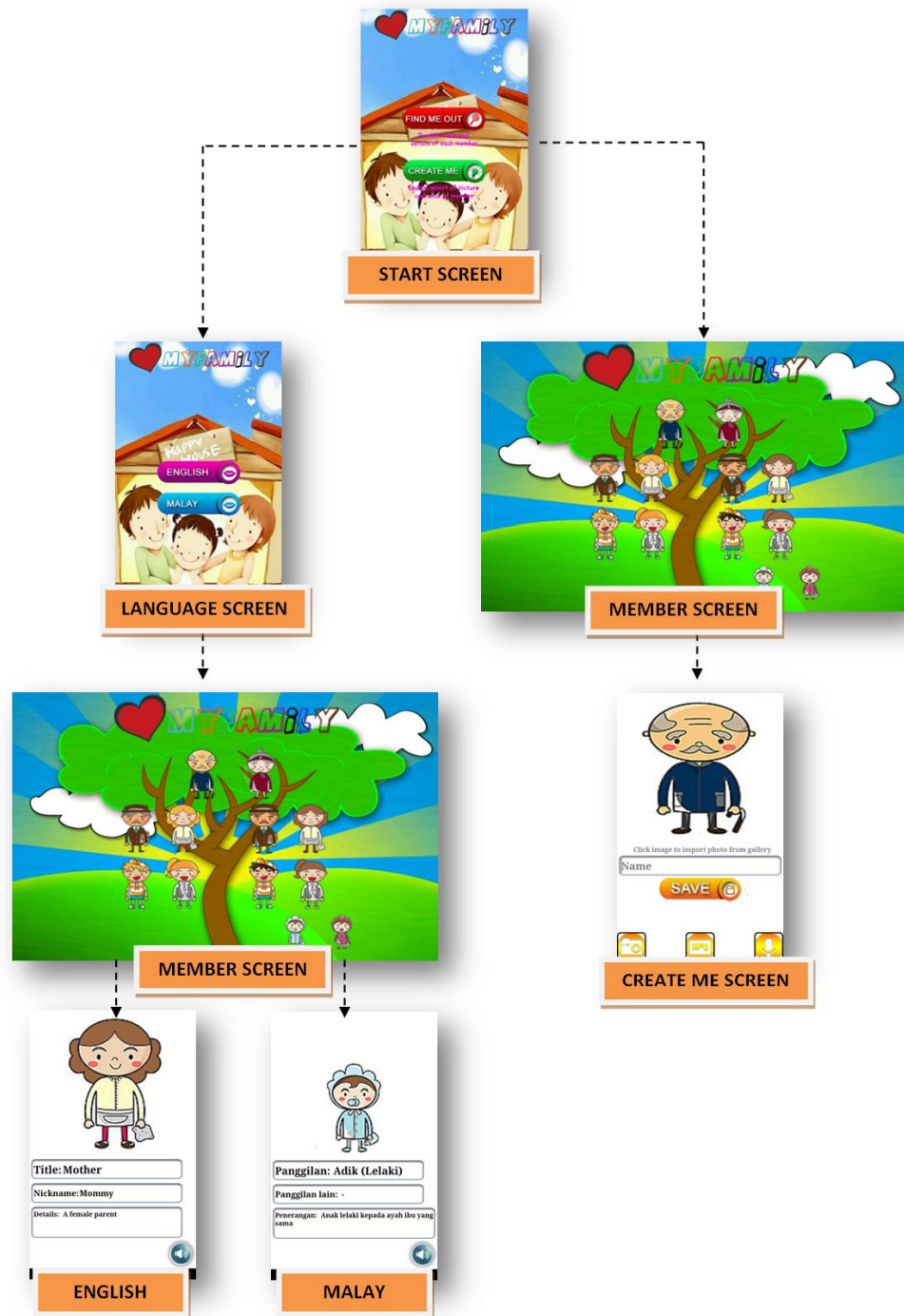


Figure 36 Prototype Functional Screens for Find Me Out and Create Me functions

The flowchart above shows the main function of this application. Once the user click on START button, the image on the first-level (START SCREEN) will appear to enable user choose between two functions.

The first function – FIND ME OUT (please refer to the left side of the flowchart shown above) let user to choose a language between English and Malay to proceed with the learning about family titles.

Then it will pop out a family tree in the MEMBER SCREEN to allow user choose a member arranged in a family structure (grandfather, grandmother, uncle, aunt, father, mother, cousins, brothers and sisters).

Once a member is chosen, it will bring user to the learning page as shown in the lowest-level. The left image displays “mother” in English while the right image displays “adik lelaki” in Malay.

On the other hand, if the user chooses the second function – CREATE ME (please refer to the right side of the flowchart shown above) at the START screen, it will opens up the MEMBER SCREEN and will wait until a family member is chosen.

Once a member is chosen, the CREATE ME SCREEN will be opened allowing user to add in the name and import image or capture image of the actual family member to replace the default cartoon image. Voice of the family member could also be recorded to enhance a more realistic learning environment for the child user. Once the user click on the save button, the objects would be saved in the app’s database.

4.1.3 Application Architecture

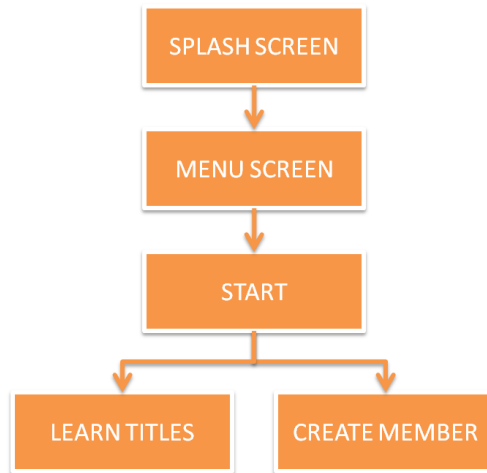


Figure 37 Application Architecture

4.1.4 User Perception Survey

A user perception survey is carried out starting from 19th November 2012 to 21st November 2012. The target respondents are parents with child of age one to three. The survey is carried out mainly through online while some was filled in on-the-spot by some UTP staff and Tesco customers.

A total of ten parents together with their child of age range 1 year-old to 7 year-old responded to the testing survey.

RESPONDENTS	Number
UTP Staff	2
Tesco Customer	3
Relatives from KL and Teluk Intan	5
TOTAL	10

Table 5 Number of respondents found from different areas

Below are the pictures captured during the testing of app prototype.



Figure 38 User testing of a father and his two year-old child



Figure 39 User testing of a mother and her two year-old child



Figure 40 User testing of a mother and her thirteen months child

4.1.5 Discussion – User Perception Survey Results

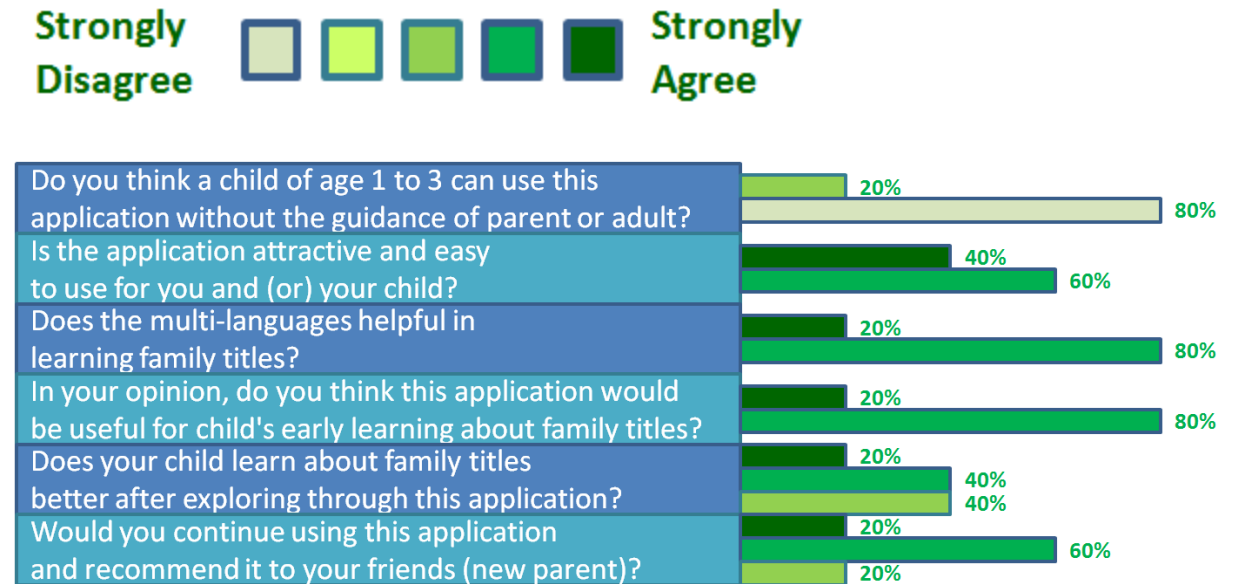


Figure 41 User Perception Survey Results

From the chart above, it is shown that parents strongly disagree that their child could use the application solely by their own, mainly because they can see that their child might not be matured enough to understand the use of a mobile at the age of as young as one year-old and they might have edited or inserted some wrong information which might cause trouble for their parents.

Besides, parents agree that the application appears to be very attractive to their child and it is easy to use. Bright color of images and buttons are implemented to attract the attention of child into the learning environment about family titles.

As the target user responded are all Malaysian, they find that Malay language is very helpful in their child's family titles learning as Malay is

the national language of Malaysia. All Malaysian students are compulsory to educate themselves with Malay language.

Furthermore, most parents agree that this application is useful in their child's learning about family titles, especially at their early age as simple and straightforward descriptions are given for the nine main family members.

After exploring through the application, 20% of parents strongly agree with the improvement of their child's knowledge towards family titles while 40% of parents do agree that their child gain benefit from the learning and the other 40% of parents responded that their child might have improve, or might not.

At the end of the user perception survey, 20% of users strongly agree, 40% agree and the other 40% responded that they might continue to use this application and recommend to other new parents, to promote family titles learning.

As the user testing time is recorded, it is found that the parents and children spent about seven minutes (in average) exploring the app prototype and repeating the family member's title sound.

4.1.6 Discussion – System Usability Scale (SUS)

SUS was developed by Brooke (1996) as the “quick and dirty” assessment tool. In this project, the approached parent respondents are also asked to assess the app’s usability aspect by filling in the SUS form. From the survey, it is calculated that the overall score of system usability is rated **64.25%**. Below are the chart results for some question picked from the survey form.

Question 1: I think that I would like to use this system frequently

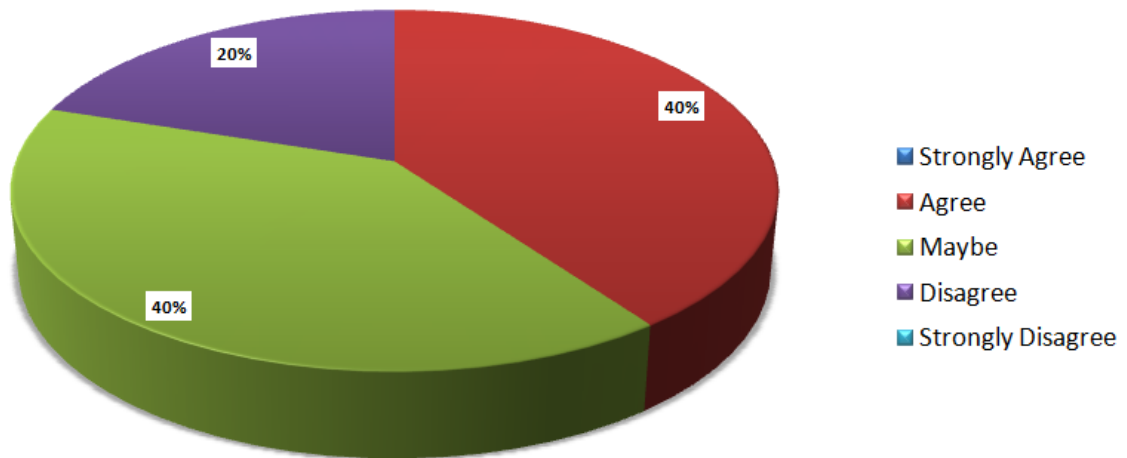


Figure 42 Question 1 – I think I would like to use this system frequently

From the chart above, there are 40% of respondents who would like to use the app frequently as guidance to educate their child while there are 20% of respondents who disagree to use the app frequently probably because their child has captured the family titles well enough.

Question 6: I thought there was too much inconsistency in this system

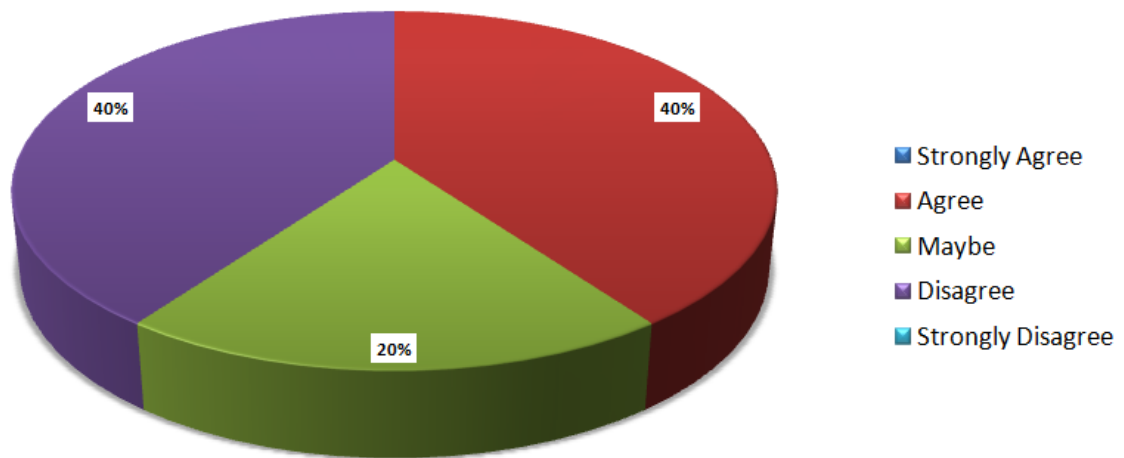


Figure 43 Question 6 – I thought there was too much inconsistency in this system

40% of the respondents disagree that there is too much inconsistency in the app. This means that they find the app quite consistent in the usability function area. However, another 40% responded agree on the inconsistency of this app usability area. This might be caused by some of the unfinished part of the functional area as the prototype is only developed for about one month time.

Question 7: I would imagine that most people would learn to use this system very quickly

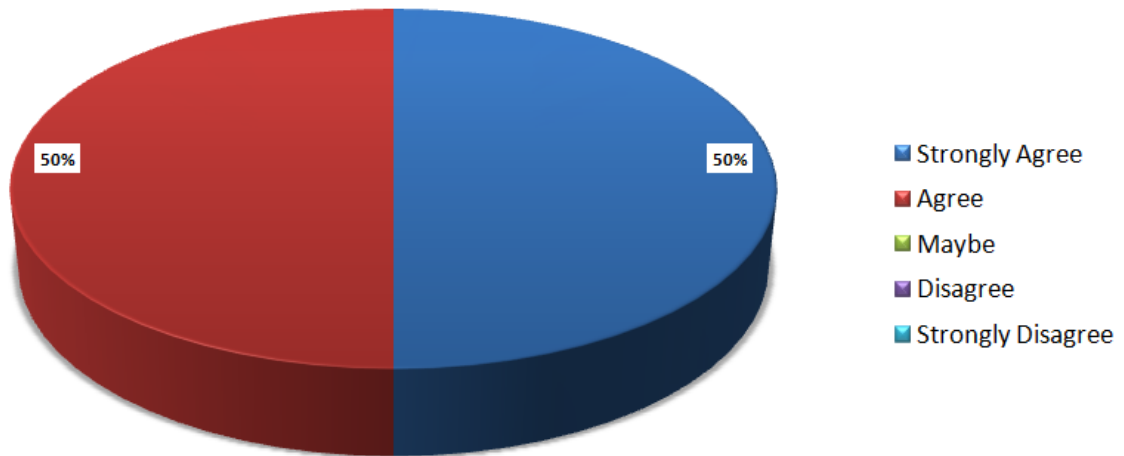


Figure 44 Question 7 – I would imagine that most people would learn to use this system very quickly

50% of the respondents strongly agree that the app is easy to learn while another 50% responded agree. Overall, all the parents agree that a novice user would learn to use this app in a short time. This is probably because of the language used is simple, description is available for the buttons and most importantly, a help page of screenshots and steps are available in the app's menu page.

Question 10: I needed to learn a lot of things before I could get going with this system

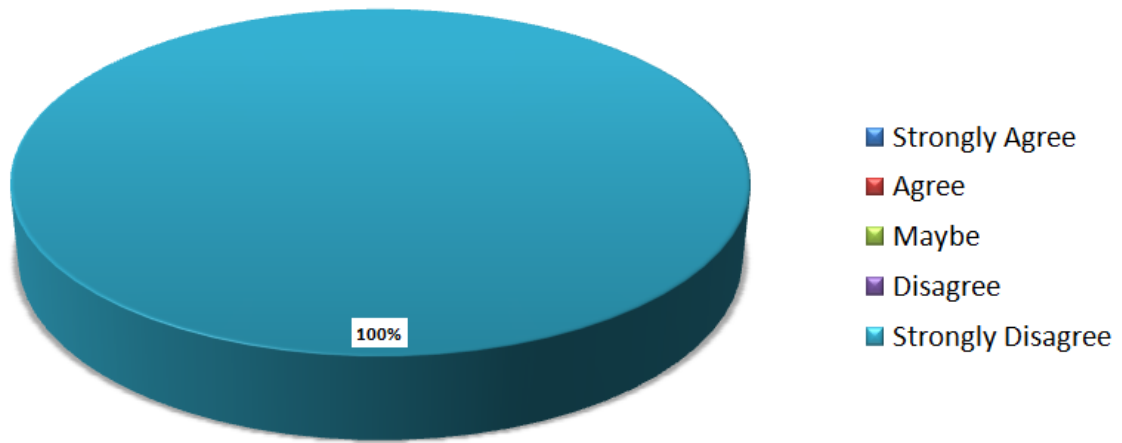


Figure 45 Question 10 – I needed to learn a lot of things before I could get going with this system

It is clearly shown that all the parent respondents strongly agree that they do not need to learn a lot of things before they could use this app. This is because this app meant to help parents to teach their kid about family titles but not meant to test or quiz them.

CHAPTER 5

CONCLUSION

5.1 Relevancy to the objectives

From the results of user perception study, the targeted parents and children shows positive response that the app is helpful in learning family titles and relationships. However, more language options and family members' titles are requested by the parents to improve the app.

Results from the System Usability Scale (SUS) which is 64.25% also indicates that parents are quite satisfied with the prototype app and would like to continue using it in the future as well as recommend it to other parents.

Besides, the children could engage in the app prototype learning for about seven minutes (in average), and hopefully the children could engage themselves into learning the finish product for a longer period, thus improving their knowledge in family titles as well as family relationships, for a better society respects.

5.2 Suggested future work for Expansion and Continuation

This project is developed to support Android smart phones only. In the future, it is planned to be extended to also support Android tablets, which runs on higher version of Android such as the Samsung Galaxy Note 10.1 inch. Therefore, higher resolution of images would be used for the tablet size. Besides, the language options are planned to be expanded to cover Chinese language to satisfy the Chinese market demand.

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APPENDIX I

MOBILE LEARNING EXAMPLES AND RESEARCH PROJECTS (U.S.)

Project	Description
PBS KIDS Ready to Learn Cell Phone Study: Learning Letters with Elmo	<p>The goal of this study was to develop a mobile-phone-based intervention that would encourage parents to engage their children in daily literacy-learning activities. The intervention content included text messages for parents, audio messages for parents and children, and <i>Sesame Street</i> letter videos for children. Messaging to parents suggested real-world activities that they could use to engage their children in learning letters. Pre- and post-interviews indicated a significant increase in the frequency with which parents reported engaging their children in literacy activities after participating in this study. In addition, 75% of lower-income participants and 50% of middle-income participants reported that they believed watching the <i>Sesame Street</i> letter videos helped their children learn letters. More than 75% of participants reported believing that a mobile phone used in this way can be an effective learning tool, since mobile-phone delivery made it extremely easy to incorporate literacy activities into their daily routines.</p> <p>Collaborators Funded by U.S. Department of Education, through PBS Ready to Learn supplemental funds.</p> <p>(pbskids.org/read/research/cellphone.html)</p>
Game Based Learning Scotland	<p>This randomized study involves 600 students and 32 schools using Dr. Kawashima's Brain Training (aka BrainAge), a Nintendo DS game meant to boost math ability. In a small-scale pilot study with three classes of 11- and 12-year-olds, children who used the game showed positive results compared to a control.</p> <p>Collaborators Learning and Teaching Scotland, led by Derek Robertson.</p> <p>(http://www.ltscotland.org.uk)</p>
Making Playful Learning Visible U.K.	<p>The Making Playful Learning Visible project aims to help parents in Britain see the many ways in which their children learn. The purpose of the project was to develop a robust methodology to inform and guide parents and caregivers in observing their children's learning and to create a searchable database of video observations to be used as the basis of research worldwide. Both of these aims were successfully met during the project. While video cameras and video-enabled mobile phones were used by parents to record observations, the focus was not on using one type of technology for documentation, but on determining what forms of technology enabled parents to make observations.</p> <p>Collaborators The Next Generation Foundation. Led by Siobhan Thomas and James Bradburne.</p> <p>(www.ngf.org.uk)</p>

APPENDIX II

MOBILE LEARNING EXAMPLES AND RESEARCH PROJECTS (NON-U.S)

Project	Description
<p>The Mobile-Based Interactive Learning Environment (MOBILE) Project Taiwan</p>	<p>The MOBILE project examined how the use of mobile devices could aid elementary school children in learning English. Consisting of a mobile learning server and mobile learning tools, the MOBILE environment supported in- or outdoor learning activities, such as field trips and library visits. Experimental results obtained from post-tests and questionnaires indicate that the MOBILE project may significantly increase students' interest in learning English.</p> <p>Collaborators National Taipei University of Technology, Computer Science Department. Led by Tan-Hsu Tan and Tsung-Yu Liu.</p>
<p>Three Rs Singapore</p>	<p>This project is investigating the use of handheld computers to facilitate students' inquiry-based learning of environmental issues. Using handheld computers during field trips, 480 primary students examined how wastes are produced and what impact the "Three Rs" (Reduce, Reuse, and Recycle) can have on protecting the environment. The handheld computers were used to support, guide, and extend the student thinking process within and out of classroom. Research data were collected from two classes of students (n=79). Pre- and post-tests measured awareness and knowledge of the Three Rs; pre- and post-surveys explored attitudes and perceptions of the role of the handheld computers in learning. The resulting data indicated that the use of handhelds improved students' understanding of the Three Rs.</p> <p>Collaborators Learning Sciences Laboratory, National Institute of Education, Singapore; Led by Chee-Kit Looi.</p>
<p>Escondido Union School District's Project iRead (I Record Educational Audio Digitally)</p>	<p>A group of pilot teachers in Escondido Union School District are exploring the use of iPod devices, GarageBand, and iTunes to improve student reading. Using the iPod's voice memo and a Belkin recorder, students can record and then hear themselves reading, which improves motivation and helps them work on fluency and comprehension. Teachers can also import student recordings into their iTunes library and create time-stamped digital portfolios (via playlists) that they can use to track progress over time. Data collected from a small group of fourth-graders has found that using iPod devices to practice fluency resulted in more rapid improvement rates compared with a control classroom.</p> <p>Collaborators Apple Distinguished Educator Kathy Shirley, in conjunction with teachers in the Escondido Union School District.</p> <p>(www.eusd4kids.org/edtech/iRead.html)</p>