Mobile Game for Teaching Bilingual

by

Shafitra Bt Afrizal

Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information Systems)

SEPTEMBER 2011

Universiti Teknologi PETRONAS
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CERTIFICATION OF APPROVAL

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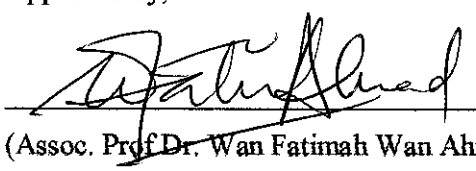
Approved by,



(Assoc. Prof Dr. Wan Fatimah Wan Ahmad)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK

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.

SHAFITRA BT AFRIZAL

ABSTRACT

Nowadays, English has become important language worldwide. On this globalization era, people over the world communicate with each other using English as primary language. English has become a compulsory subject for schools in Malaysia. Most of Malaysian children face difficulties in learning foreign language especially English. In addition, current method of teaching English provide less mobility and boring. Thus, the involvement of games in teaching bilingual believes can gives positive impacts on children learning. To design and develop suitable mobile-based education game for preschool and primary school children in their bilingual learning, studies on learning theories and investigate the suitable learning theories for children that can support their learning process is made. To make the teaching of bilingual more attractive and easy to learn, the game is used. In addition, to equip the demand of children's today, this game is created in Android platform. To enhance children's bilingual learning through this technology, it is important to understand how to design the mobile game to teach bilingual. This study explores the exposure of mobile application by five to seven year olds children with the observation of teachers or parents. Through a close examination of the young children's learning process and their attitudes toward mobile games as well as their teachers' comments, this study showed that mobile technology could engage children at a longer period of time in learning environment. Besides it attractiveness of using current technology, the impacts also seen through the improvement of marks obtained from the game. The findings show that most of the teachers and parents believe that the usage of Mobile Game for Teaching Bilingual is attractive and helpful in teaching foreign language. Most of the respondents agree to the implementation of SPELL IT! Game as a learning tool. The method used throughout the development of the application are throwaway prototyping which will produced more reliable and interactive application as it requires deeper analysis and design process. The creation of this courseware is by using Eclipse Indigo as a programming tool.

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Alhamdulillah I bid for granting me the strength and perseverance necessary to complete this project. The past 12 months have indeed been an amazing experience and journey to embark on. I have learnt so many things from scratch until the completion of my own proposed system which has been fruitful to my learning curve thus far.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Games have always been a popular pastime, but with the arrival of computer games they have become even more pervasive. Everyone either they are kids or adults like to play games. Games can give positive and negative effect to brain development. It depends on the types of game itself.

In order to produce desired product, the research cover the views of parents, kindergarten teachers and the kids itself to really understand their situation. Besides putting our self into their shoes, the attitude and behavior of these kids need to be study. It is because different people have different learning capability.

Thus, in this project there are four main keywords highlighted and connected to each other. It is depicted by diagram below:

Figure 1.1: Connection between kids, bilingual, game and mobile

Nowadays, English have primarily become an international language. People around the globe are using English to interact with each other regardless in reality or in cyber world. Thus, the Ministry of Education in Malaysia have make English as a compulsory subject to school syllabus as stated in Kurikulum Standard Prasekolah Kebangsaan (KSPK), Kurikulum Standard Sekolah Rendah (KSSR) and Kurikulum Standard Sekolah Menengah (KSSM). This project will focus on preschool and early

primary school children in teaching English because at this time, the strong foundation to master foreign language is build.

To make the learning of foreign language more interesting, the game approach is used. There are many recent studies showing that a gaming approach to language instruction is more intrinsically motivating than non-gaming approaches. It is because learning language is unexciting and it requires a long period to master the language especially in foreign language. So, the game approach is believed can make the teaching of foreign language more attractive.

In addition, world technologies are changing rapidly. Mobile application is highly demanding nowadays because it offers high portability as compared to computer. Thus, the educational method also should be change in order to cope with these new technologies. Mobile application for education is believed can to be a new learning tools to improve the old method of teaching language. With the implementation of game in this mobile application, it is believe that teaching and learning process of foreign language is more delightful and interesting. There are several benefits of using mobile devices for learning. Benefits of mobile device include portable, low costs as compared to PC's, energy efficient because it require less power to run than PCs, cool and delightful as the user can touch the screen.

Furthermore, according to MarketWatch research, by 2013 there will be more than 1 billion Android™ and iOS device users, millions of whom will be kids. As the market for kids' applications rapidly grows, so do its challenges. Parents face difficulty staying engaged in their kids' play experience and finding appropriate content that can facilitate their kids' learning in crowded app stores. Thus, this project is developed to fulfill the demand of Malaysian parents who would like to improve the learning methods of English language of their children.

1.2 Problem Statement

1.2.1 Problem Identification

Nowadays everyone are required to learn global language that accepted by people worldwide. Not just their mother-tongue language. Besides that, immigrants also need to know the local language in order to survive. So, there comes the term bilingual education. It is essential for everyone as it can develop multiple understandings about languages and cultures, and foster appreciation for human diversity. To focus the problem of bilingual education in Malaysia, Malay-English will be the most preferred type of bilingual education as English play a major role in daily life of Malaysian especially in working world. So, to master the English language the early exposure was made by Ministry of Education for Malaysia citizen. It is implemented through Kurikulum Standard Prasekolah Kebangsaan (KSPK) that makes English language as a compulsory subject for the students. So, it is beneficial for children to get early exposure on this world wide language for better future.

Learning foreign language in not that easy especially for non-native speaker. Most of the kids in Malaysia especially in rural area face difficulty in learning English. They not only need to know the meaning of English words, but they also need to master the pronunciation and spelling in English. So, this project will be focusing on the spelling as it is a strong foundation to a correct pronunciation thus it can facilitate the learning of English in advance level.

Currently, the tools such as children's picture dictionary, interactive learning CD/DVD and online courseware are used in teaching English to Malaysian kids. All of them have advantages and disadvantages. Table 1.1 depicts the advantages and disadvantages of current method.

Table 1.1 Advantages and disadvantages of current tools in teaching English to Malaysian preschool children

Tools	Forms	Advantages	Disadvantages
Children's Picture Dictionary	Books	▪ Children can relate the item and its location ▪ Can be in more than two languages ▪ Light and easy to carry	▪ One way interaction ▪ Mostly does not have student evaluation or assessment ▪ Does not provide multimedia element
Interactive Multimedia CD/DVD	CD/DVD that plays on television or computer	▪ Children can relate the item and its location ▪ Usually in two languages ▪ Contain multimedia element	▪ One way interaction ▪ Mostly does not have student evaluation or assessment ▪ Less portable
Courseware	CD or online application	▪ Contain multimedia element ▪ Mostly provide student evaluation or assessment ▪ Two way interaction	▪ Less portable

In summary, the old method to teach English does not provide mobile features. As per discussed in Backgound of Study section, Mobile Game for Teaching Bilingual is believed can solve the problem of current methods. The old methods are not attractive because it only provide one way interaction between the students and the tools (Picture Dictionary or Interactive Multimedia CD/DVD), does not offer student evaluation such as quiz (Picture Dictionary or Interactive Multimedia CD/DVD) and lack of mobility.

1.2.1 Project Significance

Based on Table 1.1, the Mobile Game for Teaching Bilingual is introduced to cater the problem of current method. Mobile Game for Teaching Bilingual provides two way interactions between the student and the tools itself because it provides evaluation or assessment using gaming method. At the end of the game, the children able to know the score that they obtained for each level.

Many recent studies shows that gaming approach for teaching language is intrinsically motivating than non-gaming approach. It is because learning language is boring and require longer period to master those language. Thus, by developing Mobile Game for Teaching Bilingual, it is proven from the observation of the respondents during testing session where the children are eager to achieve better score than their friends and they are willing to figure out the correct answer in order to proceed to the next level.

Another significant is current methods of teaching foreign language to children provide less mobility. So, with the development of Mobile Game for Teaching Bilingual, it offers high portability because it can be installed on mobile phone and can be used anytime and anywhere as it is light and easy to carry.

Besides that, excited feeling in learning process can be a main factor to make learning more interesting. It also satisfies the needs of advance technology in order to attract student in their learning process because of the criteria of the phone itself which are cool and delightful as the user can touch the screen. Based on interview with preschool teachers, they accept the implementation of mobile learning as educational tools in teaching new language if there is no security issue of the mobile phone. However, most of them do not deny that the usage of modern technology makes student more interested in learning.

Based on the problems foreseen in the above situations, it is a good foundation to introduce such application to facilitate the learning of new language. In this project, it is significant for Malaysian children to learn English language as it has been made compulsory under Kurikulum Standard Prasekolah Kebangsaan (KSPK).

1.3 Objectives

- To research on suitable learning theories for children and type of game for teaching language.
- To design and develop suitable mobile-based education game for preschool and primary school children in their bilingual learning.
- To conduct usability testing for the mobile-based education game to the target group.

1.4 Scope of Study

The target audience for this project is preschool children and primary school children in the range of five to seven years old with the support of teachers and parents. The main subject focus on the development of this application is based on the theme core module based on Kurikulum Standard Prasekolah Kebangsaan (KSPK). Though there are five main modules in KSPK, but this project will only be focusing on Alam Hidupan (Life Kingdom) which includes animals and plants. The main purpose of this application is to teach children in spelling. The combination of games, current technology and children's interest can probably give positive impact in teaching new language process.

Besides that, the study also covers the learning theories that suitable for the target group. This includes Behaviorism Theory, Cognitivism Theory and

Constructivism Theory. The suitable learning theories for kids are identified and applied on the development of the application. The suitable types of game also been studied in this project to support the development of SPELL IT! Game application. At the end of the project, the usability testing is conducted to the target group. The feedbacks are obtained for the improvement of the application.

1.4.1 Project Feasibility

1) Technical Feasibility

The system will be developed by using:

- Eclipse Indigo for Android 2.1 platform

2) Schedule Feasibility

The development of the system is to be completed within the allowed time frame, which is 3 semesters, where the first semester dedicated for planning, research, data collecting, documenting and presenting. The following semester are focusing on the development, testing and implementation of the application.

3) Operational Feasibility

After the application has been fully developed and undergo usability testing, it will proceed to the research which involves the study on the effects of this application on children learning process. If the study gives positive outcome, it will be distributed around Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Learning Theories and Language Learning

There are various types of theories on how people learn. As different people learn and process information differently, it is important to understand individual learning style which allows the prediction of the way learners react and feel in different situations (Rapeepisarn et al., 2008). It is essential for the teachers to identify which theories are applicable to different age of students. This can make teaching and learning process more effective. What follows is variety of them, and it is useful to consider their application to how your students learn and also how you teach in educational programmes (Dunn, 2002). Learning theories can be categorized into Behaviorism Theory, Cognitivism Theory and Constructivism Theory.

According to Mergel (1998), these three learning theories are related to each other. She states that behaviorism is based on observable changes in behavior. It focuses on a new behavioral pattern being repeated until it becomes automatic. Druin & Solomon (1996) states children love repetition. They love to do things such as drawing, watching videos and play games over and over again. This theory can be applied to children in teaching process. Thus, SPELL IT! Game applies the behaviorism theory where it allows children to play the games over and over again until they succeed to continue to the next level. In addition, Mergel claims that behaviorist learning theory is observable; it does not consider there was anything occurring inside the mind. It means the process of learning cannot be seen but it can be measure though the behavior of the learner. So, the teaching process can be said effective when it produces desired behavior. The relationship of behaviorism learning theory and language learning can be seen through stimulus-response pattern (VanPatten & William, 2007). It means when children are exposed to new words,

they are more likely to speak those words unintentionally. This stimulus-response pattern can be applied in SPELL IT! Game. This game helps strengthen the pronunciation in native language and improve spelling words in foreign language - English.

Cognitivism based on the thought process behind the behavior. The changes in behavior are observed and used as indicators to what is happening inside the learner's mind (Mergel, 1998). It is developed by Jean Piaget in the beginning of 1920. There are four stages of cognitive development which starts from sensory motor, pre-operational, concrete operational and ends with formal operational (Riley, 2005).

Table 2.1: Stages of cognitive development
Source: http://www.slideshare.net/niena17/learning-theory-by-jean-piaget

Segment of Cognitive Development	**Range of ages**	**Characteristics**
Stage 1: Sensorimotor	Birth – 2 years old	Understands world through senses and actions
Stage 2: Preoperational	2 – 7 years old	Understand world through language and mental images
Stage 3: Concrete operational	7 – 12 years old	Understands world through logical thinking and categories
Stage 4: Formal operational	12 years onward	Understand world through hypothetical thinking and scientific reasoning

According to Piaget, learning will be more successful when adapted to the stage of cognitive development of students (Riley, 2005). So, the use of images in SPELL IT! Game supports preoperational development of children in the age of 5 to 7 years old

as it can support the development of their mental images. Thus, it can be advantage to teach language subject to children with the application of images.

Constructivism based on the premise that we all construct our own perspective of the world, through individual experiences and schema (Mergel, 1998). Koohang et al. (2009) define constructivism learning theory as active construction of new knowledge based on a learner's prior experience. Druin & Solomon (1996) states, constructivists and constructionists acknowledge that children know a lot before they get to school and need help in building on what they already know. Generally, children know how to speak their mother-tongue language and the name of things like table, chair and book. But, they do not know how to spell it and sometimes they are not pronouncing it correctly. Iordanidou and Tzevelekou (n.d.) claims that pronunciation does not correspond to spelling. So, special effort needs to make in order to learn correct spelling whether for the users of native or foreign language. In addition, the big job for education is to help bridge the gap between informal learning and formal learning. Constructivism learning theory emphasize on identifying relevant material and employing good teaching strategies to encourage children to learn (Druin & Solomon, 1996). So, through games it can help children to create their own experience in spelling words correctly. With the usage of mobile technology it also can reduce the gap between formal and informal learning and at the same time making learning process more interesting rather than using traditional method.

2.2 Game and Language Learning

According to Salen & Zimmerman (2004) in their book Rules of Play: Game Design Fundamentals, they define game as a system in which players engage in an artificial conflict, defined by rules, that result in a quantifiable outcome.

- System – A set of interconnected elements within the game. A score in a game will relate to the behaviors and activities in the game. So, each part of a game give impacts as it is integrated with each other.

- Players – Person who interact with the content of the game.
- Artificial – Games represent the abstraction of reality. It means that games and reality are not mixed.
- Conflict – Conflict restrict the player to achieve goals and outcomes in straight forward manner.
- Rules – The rules of game define the sequence of play and the winning state of the games.
- Quantifiable Outcome – Clear outcome such as win or lost should be inform to player in order to measure whether the players have achieved their goals or not.

To develop an effective educational game, different game genres, learning activities and techniques, and learning styles are important issues for consideration (Rapeepisarn et al., 2008). Kirriemuir & McFarlane (2005) believe that most children learn best through play. According to Rapeepisarn et al. (2006), most studies show that 'learnt to play' has proven to be a successful learning experience. Recently, most studies focus on several variables when selecting game genres. This includes age level, gender, racial diversity, number of players, and the role of teacher (Rapeepisarn et al., 2008). He tried to reduce the gap between Prensky (2005) and Chong et al. (2005). Prensky's study presented a theory based on computer games and learning, whereas Chong's study focuses on the impact of learning styles using digital games.

Digital Game-Based Learning (DGBL) is a term used by Marc Prensky (2001) to indicate the use of computer games in delivering educational content. For nearly a decade, Prensky have been arguing for a greater focus on DGBL in various educational contexts, primarily on the computer games are better to support intrinsic motivation in learners than non-gaming teaching materials and techniques. Intrinsic motivation is considered a key factor to engage learners for extended periods in challenging activities, such as learning a foreign language. Prensky (2001) refers to DGBL as a revolution but, it does not seem to be a revolution in learning theory so much. For example, DGBL and Task-Based Language Learning (TBLT) still use the main approach for teaching foreign languages which are influenced by

constructivism. But, DGBL are more advance as it offer a fresh perspective and powerful tools for dealing with an important aspect of foreign language education which is intrinsic motivation.

Prensky (2007) claims that games are the new Worksheet for nowadays. Prensky (2001) categorizes the types of learning and possible game styles.

Table 2.2: Types of learning and possible game styles
Source: http://www.marcprensky.com/writing

"Content"	Examples	Learning Activities	Possible Game Styles
Facts	Laws, policies, product specification	Questions, memorization, association, drill	✓ Game show competitions ✓ Flash card type games ✓ Mnemonics ✓ Action, sports game
Skills	Interviewing, teaching, running a machine, project management	Imitation, feedback, coaching, continuous practice, increasing challenge	✓ Persistent state games ✓ Role-play games ✓ Adventure games ✓ Detective games
Judgment	Management decisions	Review cases, asking questions, making choices (practice), feedback, coaching	✓ Role-play games ✓ Detective games ✓ Multiplayer interaction ✓ Adventure games ✓ Strategy games
Behaviors	Supervision, self-control, setting examples	Imitation, feedback, coaching, practice	✓ Role-play games

Theories	Marketing rationales, how people learn	Logic, experimentation, questioning	✓ Open-ended simulation games ✓ Building games ✓ Constructing games ✓ Reality testing games
Reasoning	Strategic and technical thinking, quality analysis	Problems, examples	✓ Puzzles
Process	Auditing, strategy creation	System analysis and deconstruction, practice	✓ Strategy games ✓ Adventure games
Procedures	Assembly, bank teller, legal	Imitation, practice	✓ Timed games ✓ Reflex games
Creativity	Invention, product design	Play	✓ Puzzles ✓ Invention games
Language	Acronyms, foreign languages, business or professional jargon	Imitation, continuous practice, immersion	✓ Role-play games ✓ Reflex games ✓ Flashcard games
Systems	Healthcare, markets, refineries	Understanding principles, graduated tasks, playing in micro worlds	✓ Simulation games
Observation	Moods, morale, inefficiencies, problems	Observing, feedback	✓ Concentration games ✓ Adventure games
Communication	Appropriate language, timing, involvement	Imitation, practice	✓ Role-play games ✓ Reflex games

Table 2.3: Experimental finding summary based on Chong et al.

	Role-playing games (Counter Strike)	**Strategy games (Championship Manager)**	**Puzzles (Bookworm)**
Activists	Enjoy playing this game	Discard the instructions given before the start of the game	Use their brainstorming to solve the problem
Reflectors	Prefer not to lead the game	Observed to follow the instructions given to them earlier	Not able to draw strong conclusion
Theories	Not able to draw strong conclusion	Reacted very similar to the reflectors	Did not learn and play well
Pragmatists	Dislike this game	Copied the strategy given *during the briefing*	Great interest in *this* game

Table 2.3 discusses the summary between type of learning styles and the impact to digital games. Rapeepisarn et al. make a connection between learning techniques, learning activities and possible game styles from Table 2.2 and Table 2.3 and make a conclusion as depicted by Table 2.4 based on Prensky's and Chong's study.

Table 2.4: The relationship between learning techniques, learning activities and possible game styles

Learning techniques	**Leaning activities**	**Possible game genres**
Practice & feedback	Questions, memorization, association, drill, imitation	Game show competition, flashcard type game, mnemonics, action, sports game
Learning by doing	Interact, practice, drill, imitation	Strategy game, action game, role playing game
Learning from mistake	Feedback, problem	Role-play game, puzzle game
Discovery learning & guided discovery	Feedback, problem, creativity play	Adventure game, puzzle game
Task-based learning	Understand principle, graduated tasks	Simulation game, puzzle game
Question-led learning	Question/ questioning, problem	Quiz or trivia game, game show competition, construction game
Situated learning	Immersion	Immersive style game such as role-playing game, flashcard game

Role playing	Imitation, practice, coaching	Role-playing game, strategy game, reflex game, adventure game
Constructivist learning	Experimentation, questioning	Building game, constructing game
Multisensory learning	Imitation, continuous practice, immersion	Game in which introduce new technologies such as locatable sound or force feedback, reflex game
Learning object	Logic, questioning	Games which are becoming object-oriented
Coaching	Coaching, feedback, questioning	Strategy game, adventure game, reality testing game
Intelligent tutors	Feedback, problem, continuous practice	Strategy game, adventure game, puzzle game, reflex game

Thus, based on research above the possible game styles for learning foreign language is role playing games, reflex games and flashcard games. It requires the players to do the activities such as imitation, continuous practice and immersion. The Table 4.4 supports those suitable types of game for those activities. So, the development of SPELL IT! Game is using flashcard type games as it provides pictures and descriptions and it can measure children ability in mastering English language specifically in their spelling. Another reason of choosing flashcard type games is because the lower age of the target group as this project will be focusing on kids between 5 to 7 years old.

2.3 Kids and Mobile Learning

" The kids these days are not digital kids. The digital kids were in the '90s. The kids today are mobile, and there's a difference. Digital is the old way of thinking, mobile is the new way."

- Elliot Soloway

Prensky (2001) state that the world is "birthing" a new type of person who requires digital tools to live and work. He coined the term "H. Sapiens digital". He also claims that within the next few years we'll all be switching to 1) small individual

devices, 1 per student; always on, always connected; 2) ubiquitous free broadband and 3) software that teaches and adapts. His statement supports the usage of new technology in teaching and learning process which has high mobility. He also states that every day we have to wait to use these tools. So, we'd better get started, because "Phones are the new Textbook" (Prensky, 2001). In addition, he suggests that teachers need to start evaluating students with their tools. So, the development of SPELL IT! Game as mobile application gives significant advantage to students as it offer high mobility and can be use to access students' ability in mastering foreign language subjects.

According to Fougere (2010), she states that students also commented that they really enjoy coming to school to use the new technology. She also claims that it makes learning fun because they can really relate to the technology. Teachers were impressed with how quickly students learned to use new software, how much they enjoyed it and the level to which some students excelled (Fougere, 2010).

Shuler (2009) highlights five opportunities to seize mobile learning's unique attributes to improve education. One of them is it encourage "anywhere, anytime" learning. She claims that mobile devices allow students to gather, access, and process information outside the classroom. Besides that, they can encourage learning in a real-world context and help bridge school, afterschool and home environments.

In addition, Shuler (2009) also explains about the 21st-century button. She states that users have traditionally interacted with mobile devices via buttons and keypads, which prevent children from achieving full control of pocket-size devices. But, it is believed that developments in touch screen may significantly improve the way children interact with mobile devices (Shuler, 2009). It supports the development of this project which using Android™ as a platform for mobile game as a tool for teaching English to kindergartens.

Furthermore, Shuler (2009) claims that mobile devices are integral part of children's lives. It is because they will be a generation who are going to lead this world in future and we cannot deny the importance of technology nowadays. Shuler (2009) suggests that national debate on *whether* to use mobile device to support learning must be shift to *how* and *when* it might best be used. For example like Sesame Street. It had proved the potential of television as educational medium for two generations ago. The similar things can be applied for mobile technology as educational tools for today's children. Technology is evolving and children deserve to expose to them.

She also claims that perhaps the most flexible technology in children's lives today are mobile devices — tools such as cell phones, iPod devices, and portable gaming platforms that traverse home, school, and play via the hands and pockets of children worldwide. Although this device is a source of fun and entertainment, it is believed that this device have significant potential to support learning experiences.

Based on research done by Mariam & Woollard (n.d.), they concludes that there are strong positive arguments for employing mobile technology in Malaysian schools but the implementation is not without critics and challenges. The main motivation behind the deployment of mobile phones in education is mobility (Mariam & Woollard, n.d.). It is because of the features of mobile phone itself that are compact and can be transported with ease. In addition, they also claim that mobile phones are perceived as affordable devices to many people. Mobile phones are relatively low cost and accessible in low income communities which will bring positive impact in developing countries, including Malaysia (Mariam & Woollard, n.d.). Thus, it is believe can be supportive tool in mobile learning.

2.4 Usability Testing with Kids

According to Koyani et at. (2004), there are two major considerations when conducting usability testing. The first is to ensure that the best possible method for testing is used. Generally, the best method is to conduct a test where representative

participants interact with representative scenarios. The tester collects data on the participant's success, speed of performance, and satisfaction. The findings, including both quantitative data and qualitative observations information, are provided to designers in a test report.

The second major consideration is to ensure that an iterative approach is used. After the first test results are provided to designers, they should make changes and then have the application tested again. Generally, the more the iteration, the better the application.

According to Hanna et al. (1997), there are three common target age ranges in order to conduct the usability testing. There are preschool-aged children (2-5 years), elementary-school-aged children (6-10 years) and middle-school-aged children (11-14 years).

Preschooler require the most extensive adaptations of usability testing because their attention span, their motivation to please adults, and their ability to adjust to strange surroundings and new people may change from one moment to the next (Hanna et al., 1997). In general, children at this age should be allowed to explore the application by themselves according to their interest rather than giving a series of directed tasks. The tester should make an observation based on children behavior such as sighing, smiling, or sliding under the table. This is because children at this age often have difficulty expressing their likes and dislikes in words.

Meanwhile, usability testing is easier when conducted to elementary school children. This may due to their experience in school makes them ready to sit at a task and follow directions from an adult, and they generally not self-conscious about being observed (Hanna et al., 1997). They claim that six- and seven-year-old children will be more hands-on – ready to work on the computer but a little shy or inarticulate when talking about the computer as compared to ten years old children.

2.5 Conventional Method of Teaching Foreign Language

In Malaysia, most of the teachers and parents use picture dictionary to teach their student/children foreign language. There are also online coursewares that provide dictionary-like application. There are so many examples to list. Some of the existing children's bilingual dictionaries are introduced by Oxford. The languages offered are Arabic, Chinese, French, German, Italian, Polish, Russian and Spanish. This can be illustrated in Figure 2.1 that represents Oxford Children's Bilingual Multimedia Dictionary (Chinese-English).

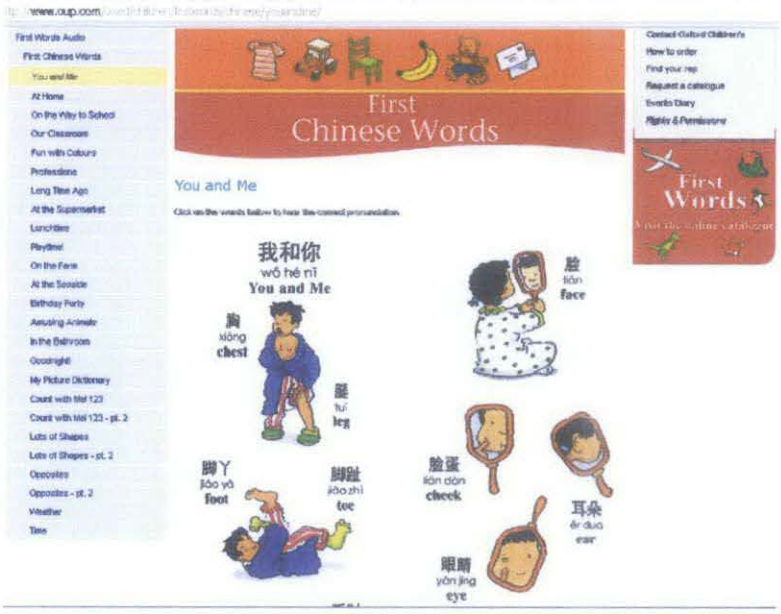

Figure 2.1: Oxford Children's Bilingual Multimedia Dictionary (Chinese-English)

But, nowadays technology of using mobile application to teach foreign language is developing. It is believed this method can create more interesting learning environment for children in learning bilingual.

2.6 Existing Mobile Games for Children

FINGERPRINT is one of the examples of mobile game application for kids. It is the first mobile learning and play network for kids and their grown-ups. Currently, there are fives application offers by FINGERPRINT.

1. Big Kid Life™ Fire Fighter

   This application is focusing on Mathematic subjects. The mission of the game is to save animals and put out fire monster. The logic of the math are implemented using fire hose. This application is suitable for kids from 4 to 7 years old.

Figure 2.2: Big Kid Life™ Fire Fighter snapshoot

2. Big Kid Life™ Veterinarian

   This application is suitable for kids from 3 to 6 years old as it offer logical fun with letters, numbers, colors and shapes. It also provide X-Ray features to make it more attractive.

Figure 2.3: Big Kid Life™ Veterinarian snapshoot

3. Big Kid Life™ Fairy Princess

This application helps in building reading comprehension skills for kids from 4 to 7 years old. The kids are able to create their own Fairy Princess story through 15 magical adventures.

Figure 2.4: Big Kid Life™ Fairy Princess snapshoot

4. Play Maker

This application are focusing on the progressive math and spelling for kids from 4 to 8 years old. The kids are able to create their own character, choose animations and sound effects to make a learning app.

Figure 2.5: Play Maker snapshoot

5. Do-Re-Mi 1-2-3

This application is suitable to introduce kids to musical instruments. It is suitable for kids from 3 to 8 years old.

Figure 2.6: Do-Re-Mi 1-2-3 snapshoot

The problem of existing kid's mobile game is all of the application from FINGERPRINT only compatible with Apple's platform. It makes the scope of target user limited to Apple's customer. On the other hand, the Mobile Game for Teaching Bilingul is build using Android™ platform where it is compatible in any Android™ phones. In addition, FINGERPRINT application does not offer bilingual game especially in Malay-English. SPELL IT! Game that developed from this project is useful for Malaysian kids in learning bilingual especially in Malay-English. However, the usage of all multimedia elements in FINGERPRINT application creates interactive learning environment to the kids. It can give substantial effects to SPELL IT! Game if all multimedia elements are implemented.

CHAPTER 3

METHODOLOGY

This project adopts throwaway prototyping as its system development methodologies. The reason of using this type of methodology is thorough analysis is required to gather info and develop ideas for the system concept. This method is applicable in creating mobile game for teaching bilingual because detail analysis need to be made in gathering required information and functionality and at the same time to design an appropriate interface, layout and interaction styles that suitable with the children's interest. Other than that, this methodology can be produced more reliable and stable system as it requires deeper analysis and design process. The Figure 3.1 illustrates the structure of throwaway prototyping methodology.

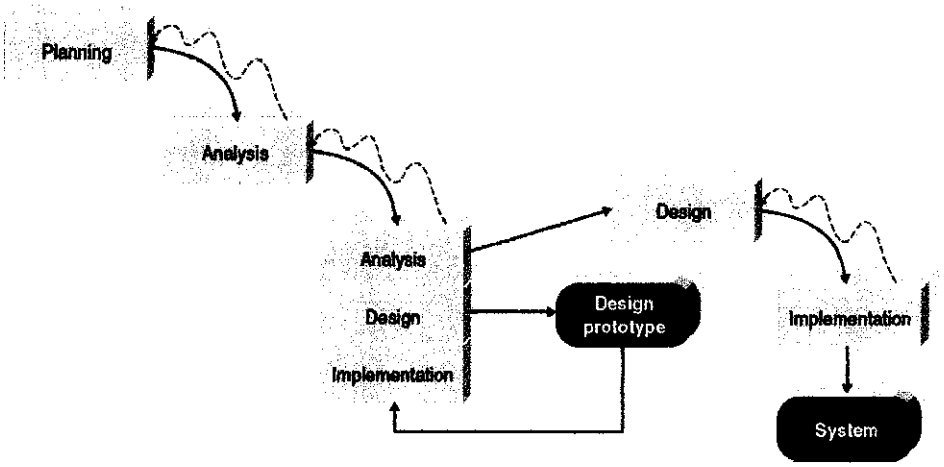

Figure 3.1: Structure of throwaway prototyping methodology

Source: http://mazirwan.blogspot.com

3.1 Planning

On the planning phase, the business value of the project is identified. Then, it being proceeded to analyze the feasibility analysis after the project have been approved by Final Year Project (FYP) committee. On this stage, the project plan is produced. See Appendix 1.1 to view the Gantt chart of the project. So, the deliverable on planning phase is feasibility analysis and project plan. Appendix 1.1 shows the Project Plan – Gantt chart and Appendix 1.2 shows the Project Activities.

3.2 Analysis

Currently, the project is in analysis phase. Research is conducted to investigate the function and limitation of current courseware. In addition, detail research will be made on the target group to gather the requirement of this courseware. After perform the data collecting and requirement gathering, the deliverable expected from this phase is system proposal. Besides that, higher level of initial design of the system is made before proceed to the next phase.

3.3 Design

On the design phase, the user interface (layout and images), system input (content and level of question) and output (how many question should correct in order to proceed to the next level) are identified and refined. After designing the user interface, usability testing is conducted. The suitability of the questions asked is obtained from teachers to make it match with the KPSK syllabus. Besides that, during simple interview session with the kids, the feedback of images used and the easiness of questions asked are obtained and recorded.

For this project, usability testing is conducted for 5-7 years children who include both preschool and elementary-school-aged children. Different methods are

used in approaching those children. Among 40 respondents of survey and interview sessions, 15 of them are children. Among these 15 children, 5 of them are 5 years old and 10 of them are in the age of 6-10 years old. These 5 years old children are picked up randomly from nursery at Seri Iskandar and the other 10 children are picked up from MyKids Soccer event that occur at Universiti Teknologi PETRONAS (UTP).

The interview session with preschool children is conducted using learning while playing approach. The tester gives a reward such as candy for every correct question in the game application. The purpose is to make the testing process more exciting and interesting. During the testing, the children behavior also been recorded. No iteration for the testing process because of time restriction.

For elementary-school-aged children, the different approach is used. At this time, the iteration method is used if the respondents fail to go to the next level in the game. At this stage, the open-ended oral interview question being asked to the children to obtain their feedback. In addition, the children behavior also been recorded.

The design of the application is using Android Eclipse and the platform for application is Android 2.1. The reason of choosing lower version of Android platform is due to limited resources.

3.4 Implementation

On this implementation stage, the complete system is constructed and undergoes testing stage to ensure the system run properly and produce desired result. Then, user acceptance test is done to the target group. Interview session with kids is done. Besides that, in order to get measurable result for the application, survey and simple interview session is done to the teachers and parents. The details and result of the survey are discussed on the next section. If the system is accepted, it will be deliver to the end user through teachers and parents.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Learning Theories

All three learning theories are implemented in the development of this application. In behaviorism perspectives, the application allows children to play the games over and over again until they succeed to continue to the next level. The measurement of learning process can be seen through the behavior of the children itself where there have desire to play again to get a better score than their friends. This is proven based on observation of user behavior after conducting user acceptance testing. In addition, stimulus-response pattern is used to measure behaviorism theory and language learning. The usage of this application allows children to spell things correctly in their second attempt. For cognitivism learning theory, the development of the application is using the right segment of cognitive development. Children understand world through language and mental images which support their preoperational development. The application is mainly about learning global language and equip with interesting images. Meanwhile, constructivism learning theories are applied by creating the environment for the children to experience the spelling process using gaming approach.

4.2 Advanced Flash Card Game Type

Based on the research, the suitable type of game for teaching language especially foreign languages are role-play, reflex and flashcard games. The flashcard game is a type that implemented in the development of this application. Flashcards are the effective and easiest way to learn and remember new information. Furthermore, they simplify and condense information so that users only learn the important facts and

ideas. In flashcards, the content of books has been stripped down to its essence and placed into a format that is easy to read and understand. The advantages of flash card games are can be used anytime and anywhere, help students memorizing and can be used for self or group study if the application is run on Tablet like Samsung Galaxy Tab. By making flash card type of games as foundation of this application, it also offer more advanced features. Besides providing mobile flash card, the application also allow user to translate items into global language (English) from native language (Malay). The users are allowed to spell those words in English. In addition, the application also offers description for each object. The significance of the 'description part' is to provide a dictionary-like game so that while playing, the children also can learn some factual data about that particular animals or plants.

4.3 Deliverable's Interface

The planned project deliverable flash card type of Android game had been successfully developed and delivered to the target group. The main interfaces of the overall game are as follow:

4.3.1 Start Screen

Figure 4.1: SPELL IT! Start Screen

Figure 4.1 is the start screen of SPELL IT! Game. After the game is successfully install in the Android™ phone or any Android™ platform, this screen will be prompted to the user. This start screen contain only one button which is 'Start Quiz' that will direct the users to the Menu Page as depicted in Figure 4.2.

4.3.2 Menu Screen

Figure 4.2: Menu Screen

Figure 4.2 shows the menu which consists of 'High Score', 'How to Play?' And 'Start' button. 'High Score' button direct to the screen where the list of all users with their score is stored. The score is sorted from the highest to the lowest. Meanwhile, 'How to Play?' button will direct to the screen for the game's instruction. Figure 4.3 shows the instruction of the game. The 'Start' button will redirect the users to all five kingdoms. It is depicted by Figure 4.4. The users are allowed to choose any kingdom they prefer if they do self study meanwhile; the students need to follow their teacher's instruction if the teacher wants to use this application as students' assessment.

Figure 4.3: Instruction's Screen

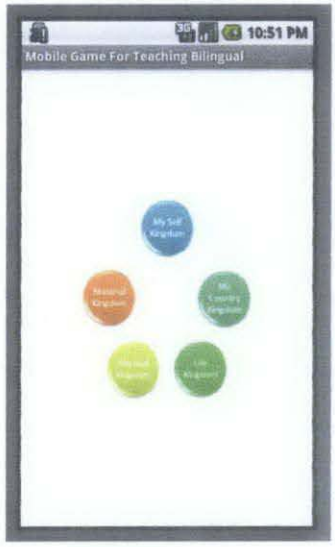

Figure 4.4: Directory Screen

There are five kingdoms in the Directory Screen as stated in Figure 4.4. These kingdoms are based on the theme-core module of Kurikulum Standard Prasekolah Kebangsaan (KSPK). But, the development of this application is only focusing on the Life Kingdom (Alam Hidupan). The significance of focusing on life kingdom is there are consists of animals and plants which are very common subject for teaching children especially for the introduction of foreign language. In addition, based on requirement gathering during analysis

stage, children show positive interests on animals. The significance of selecting plants topic under the Life Kingdom is to allow the children to relate it to their daily life consuming because it will be focusing on fruits and vegetables.

4.3.3 'Choose Topic' Screen

After choosing 'Life Kingdom', the user will be directed to the new screen which allows the user to select either 'Animals' or 'Plants' as shown in Figure 4.5.

Figure 4.5: The user can choose either 'Animals' or 'Plants'

4.3.4 Detailed Instruction Screen

After make a decision, the user will be prompted by the screen that stating a detailed instruction of the game. The instruction is depicted in Figure 4.6.

Figure 4.6: Detailed instruction of the game

Basically, there are two levels for 'Animals' and 'Plants' topic. Each level consists of 10 questions. Each question contains 10 marks. Users have only three lives. It means, they can only be wrong at most 2 questions in order to proceed to the next level. It is the same as explained by the instruction in Figure 4.6: *To go to the next level, you must get 80 over 100 marks or get correct at least 8 questions.* The user also cannot go back to change their answer as this game have not limit the time for children to think for the correct spellings. Before starting any level, the screen in Figure 4.7 will be prompted.

Figure 4.7: Starting Level Screen

Starting level screen consists of two button; 'Start' and 'Cancel'. Start button will redirect the users to the first question while 'Cancel' button will bring the users to the five kingdoms.

4.3.5 Question Screen

Figure 4.8: Question 2, Level 2 in 'Animals' topic

The questions provided are arranged from the easiest to hardest in respective levels. For 'Plants' topic, Level 1 is mainly about fruits while Level 2 are focusing on vegetables. As shown in Figure 4.8, the top of the screen is the instruction of the game. There are also 'Hint' buttons in each question.

4.3.6 Message Box for 'Hint' button

The purpose of this hint button is to give a clue regarding how many characters to spell those animals or plants. In addition, it also gives a clue of possible character for the answer. For example, if the user click the hint button for Question 2 in 'Animals' topic the hint will show in Figure 4.9.

Figure 4.9: Message box showing the hint

4.3.7 Message Box for Wrong Answer

If the user enters the wrong answer, the total life will be deducted once for each wrong answer and the message box will prompt the user that they entered the wrong answer.

Figure 4.10: Message box prompting the user for the wrong answer

4.3.8 Congratulation Screen

Figure 4.11: Fill name screen

At the end of each level, the users are allowed to fill in their name to be stored in the High Score section in Main Menu. The user can know their score for each level and can proceed to the next level.

4.3.9 Game Over Screen

If they children not able to get at least 8 questions correct, the Game Over screen will be prompted.

Figure 4.12: Game over screen

When screen in Figure 4.12 appear, it mean the user need to start the game again. The significance is to allow the students find the correct answer in order to proceed to the next level. It not only make the children learn from their mistakes but also allow them to make an initiatives to find the correct spelling.

4.4 Survey and Interview Result

To meet the objectives of the project, the survey and interview is done to measure the suitability and effectiveness of the application to the target group. **Survey** is done to the teachers and parents who have children in the range of 5 – 7 years old. Meanwhile, **simple interview** is made to the target end users who are 5 – 7 years old children. The respondent is taking randomly that stay around Tronoh and Seri Iskandar and Kuala Lumpur. The total number of respondents is 40; 15 children, 15 parents and 10 teachers. There is no time limit for the survey as the session is conducted informally. It means the tester and respondents enjoy the testing process with two-way communications. The survey question is attached at Appendices. Data is gathered from survey and interview session and analyzed as below.

4.4.1 Usability Testing

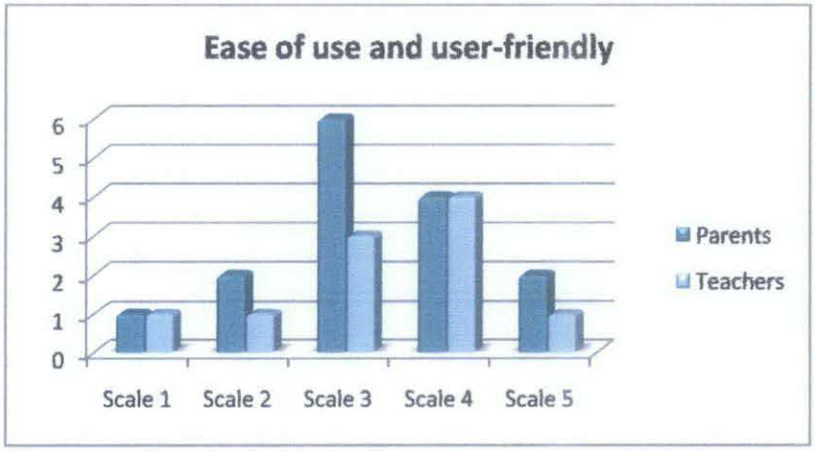

Figure 4.13: Ease of use and user-friendly

Figure 4.13 shows the ease of use and user-friendly rating for the application. Most of the respondent put the scale of 3 and 4 as a rating. It means, the application is in medium level in it easiness and user-friendliness.

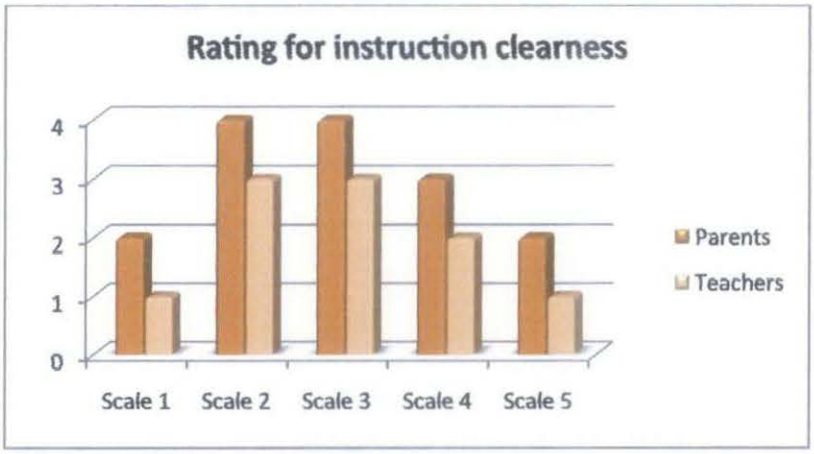

Figure 4.14: Rating for the clearness of the instruction

In Figure 4.14, the 56% of the parents and teaches rank the instruction at Scale 2 and 3. This may due to so many screen and confusing between 'How to Play' screen and 'Detailed Instruction' screen. In future, this two screen maybe to be combined to one screen only.

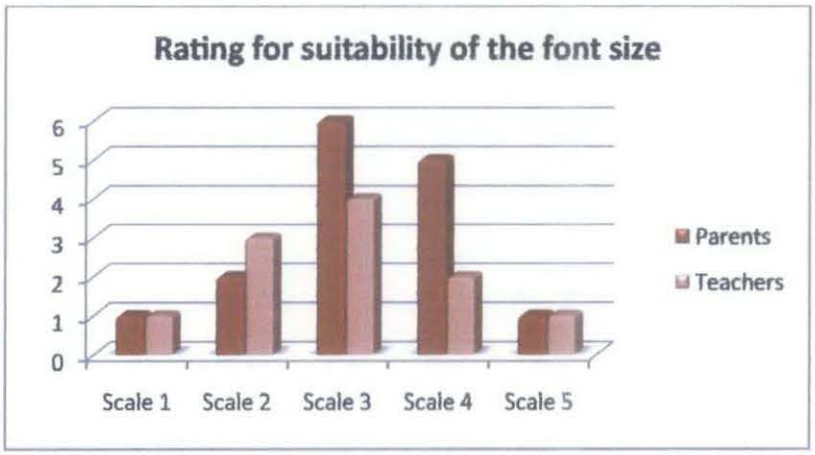

Figure 4.15: Rating for suitability of the font size

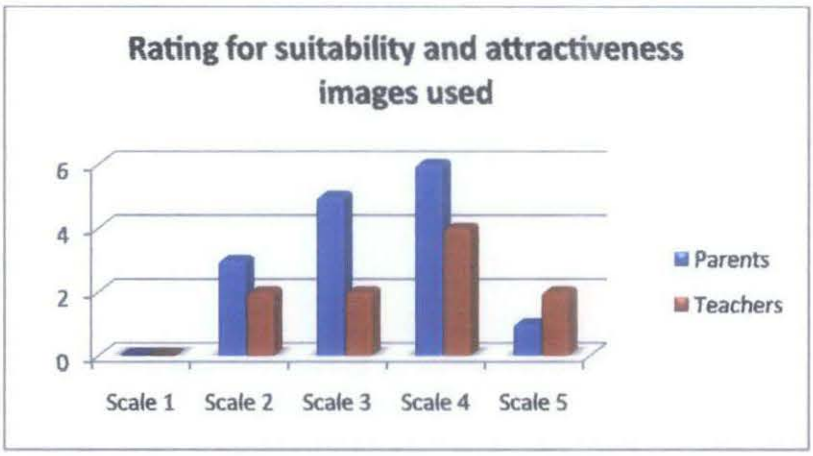

Figure 4.16: Rating for suitability and attractiveness of the images used

Figure 4.15 and 4.16 depicts the rating for font size and the images used. Both font sizes are rated at medium scale. Based on comment at the survey sheet the respondents suggest using animated images to make the application more attractive. In addition, they also propose to provide another 'Hint' button that speaks the animals and plants name.

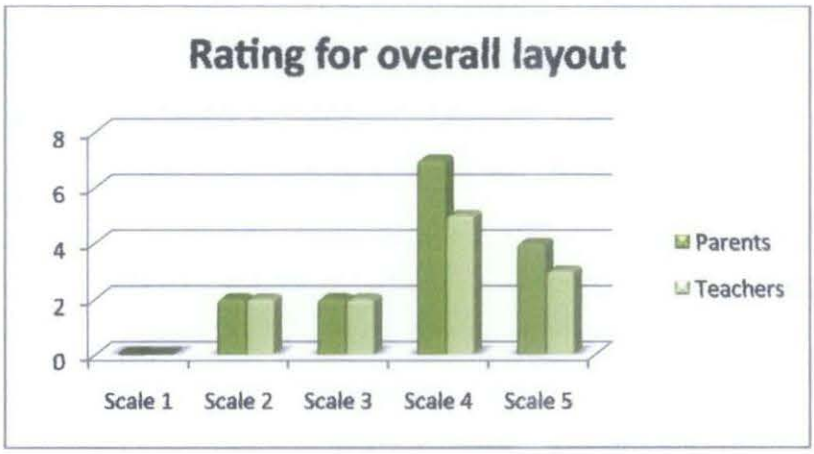

Figure 4.17: Rating for overall layout

Figure 4.17 shows the rate for overall layout. Most of the respondents claim that the layout is in suitable position. However, most of them comment that they did not realize the 'Hint' button. This may due to its dark color. In future, the color of 'Hint' button should be change into more light color.

As a conclusion, the percentage distribution for usability can be concluded into three parts. It is Learnability and Effectivenes. Figure 4.18 shows the percentage of the distribution.

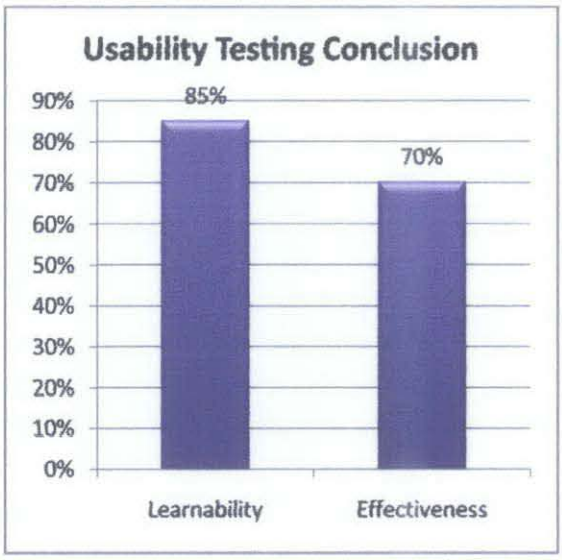

Figure 4.18: Usability testing conclusion

Figure 4.18 explains the percentage of elements of Learnability, Effectiveness and Usefulness of the application. About 85% of the respondents agree that the usage of mobile game in teaching bilingual give positive impacts on children learning. For the Effectiveness, 70% of the respondents agree with this kind of game type as it makes the learning for foreign language easy and at the same time practice children spelling ability.

4.4.2 User Acceptance Testing

According to the survey that has been conducted during analysis stage, some children have problem in the spelling during their early stages of learning. To solve this problem, this application is developed.

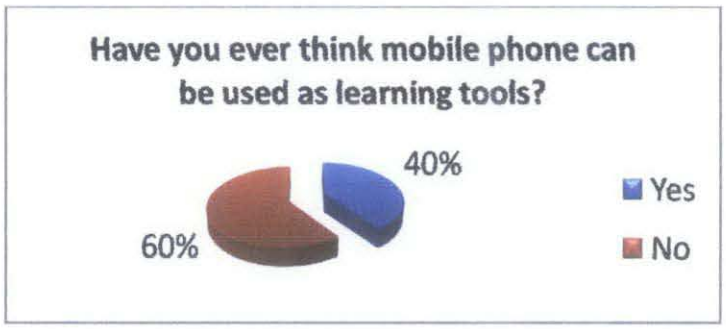

Figure 4.19: Mobile phone as learning tool

As stated in Figure 4.19, 60% of parents and teachers never think that mobile phone can be used as learning tool for their children. 40% of them ever think about that. This might be due to the location and occupation of the respondent itself where most of the respondent stay in sub-urban and rural area.

From the observation of interview session, children feel excited with the application because of it is cool and delightful characteristics. The application is using brand new technology – touch screen – that allows the children experience by themselves. In addition, the result shows 70% of the teachers and parents' population rate the scale 4 and 5 out of 5 when asked about the attractiveness of using mobile phone or Android™ application in teaching bilingual as compared to children picture dictionary, courseware and online application. It is shown by Figure 4.20.

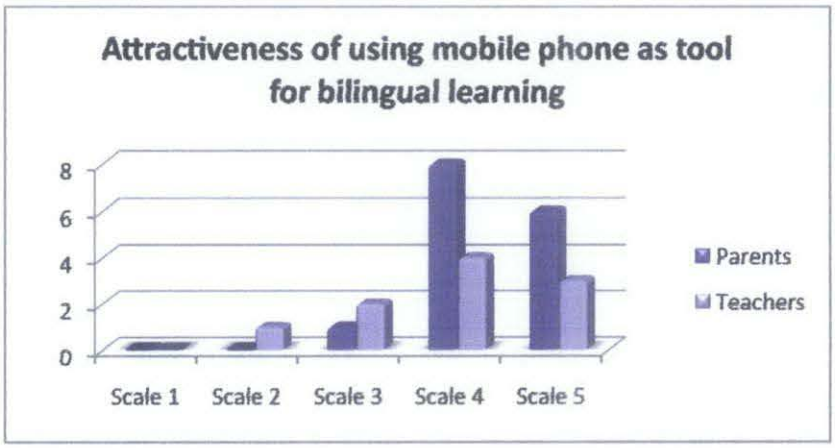

Figure 4.20: Attractiveness of using mobile phone as tool for bilingual learning

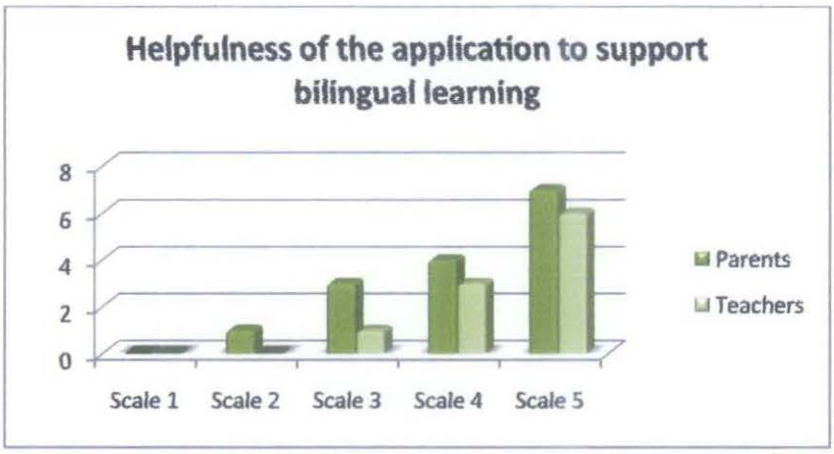

Figure 4.21: Helpfulness of the application to support bilingual learning

Figure 4.21 states about the helpfulness of the application in helping students/children in their bilingual learning. Most of the teachers and parents agree that the application can support bilingual learning. Based on simple interview session with them, they agreed the mobility is important in today's environment to support learning as it can be done at anytime and anywhere. In addition, they also agree the method of delivering the content is appropriate in teaching bilingual. Furthermore, some of the parents respond that their children are eager to play again in order to compete with their peers to obtain better scores.

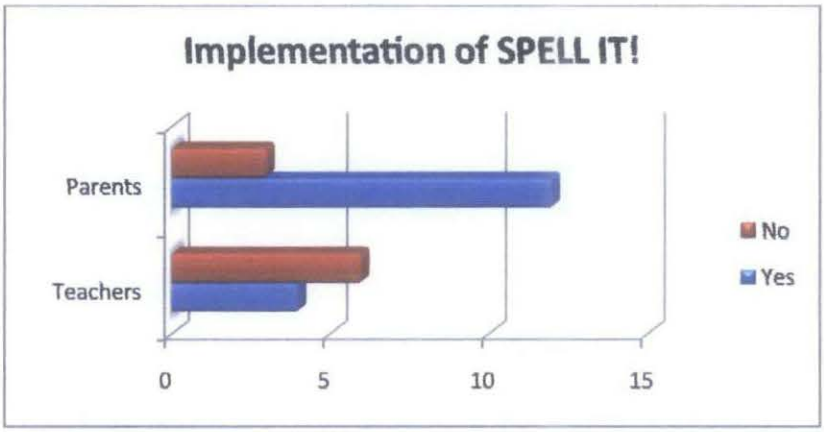

Figure 4.22: Implementation of SPELL IT! Game for children/students

From Figure 4.22, the parents outnumbered the teacher who are agree to implement SPELL IT! Game as teaching tools for bilingual learning. After interviewing several respondents, they agree to install SPELL IT! Game in their

Android™ platform because they believe it will produce positive impact to their children in bilingual learning. Some of them suggest doing it for primary school children to increase their vocabulary in English. Most of the teachers disagree to use SPELL IT! Game as they concern on the security of the belongings of their students.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Mobile game for teaching bilingual helps children in the early stage of their learning process. With the utilization of mobile technology will create interesting learning environment and at the same time to create an exciting feeling in learning new things. This application will act as an essential tool in learning process especially in learning foreign language. Besides that, the game approach in believe can increase effectiveness in delivering the information.

On the first semester of the project duration, the activities will be focusing on analyzing and designing. Thorough research will be made in order to gather all required data and make necessary analysis. Then, the designing process is performing to create effective learning tools for children. All the objectives of this final year project are met. On the following semester, the project is continued into development, testing and implementation before deliver the system to the user.

The utilization of mobile technology creates interesting learning environment for children especially in their bilingual learning. So, the suitable learning theories and suitable type of game for teaching language are identified and applied in the development of this project. The application is successfully developed using Eclipse Indigo as programming software. At the end of the project, usability testing is conducted and the results are discussed for future recommendation and enhancement.

5.2 Recommendation

Some recommendations are obtained from the respondents who do the testing of this application. First, is to use animated picture to make the application more attractive. Second, using multimedia element such as sound of the animals or provide a hint in a form of sound. It means by pressing 'Hint' button, there is a human sound stating the animals name in English. Next, is to produce this type of application according to primary school syllabus in order to increase their English vocabulary. Thus, in future the application will cover higher syllabus context for example, verbs vocabulary which suitable for Primary School children in learning English language.

For continuation of the project, the database should be created in order to store the player names and scores. In future, these elements may be important in assessing and evaluating students' performance if the application is implemented in school.

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APPENDICES

1.1 Project plan – Gantt chart

No	Activities	Months											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	**Planning**												
	Choose topic												
	Preliminary research on topic												
	Specify scope												
	Feasibility analysis												
2	**Analysis**												
	Requirement gathering												
	System analysis												
	System proposal												
	High level of initial design												
3	**Design**												
4	**Development**												
5	**Testing**												
6	**Implementation**												
7	**System delivery**												

1.2 Project Activities

No	Activities	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Title selection/proposal														
2	Announcement on approved topic														
3	Research class														
4	Submission of extended proposal														
5	Viva: Proposal defense and progress evaluation														
6	Interview session with kindergarten teachers														
7	Submission of interim report														
8	Design the interface of prototype														
9	Submission of technical report														

1.3 Project Activities

TANDAKAN (X) DI DALAM KOTAK YG DISEDIAKAN

A. HANYA PILIH SALAH SATU PILIHAN

UMUR

25-27 tahun	
28-30 tahun	
31-45 tahun	

JANTINA

LELAKI	
PEREMPUAN	

GURU/IBU BAPA (Sila bulatkan)

1 SANGAT TIDAK SETUJU

2 TIDAK SETUJU

3 NORMAL

4SETUJU

5 SANGAT SETUJU

1. Adakah mudah mengendalikan perisian ini?

1	2	3	4	5

2. Adakah arahan dalam perisian ini mudah difahami?

1	2	3	4	5

3. Adakah saiz tulisan bersesuaian?

1	2	3	4	5

4. Adakah gambar atau grafik dalam perisian ini menarik?

1	2	3	4	5

5. Adakah anda percaya telefon bimbit boleh digunakan sebagai alat bantu mengajar?

1	2	3	4	5

6. Adakah penggunaan telefon bimbit dapat menarik perhatian kanak-kanak dalam pembelajaran Bahasa Inggeris?

1	2	3	4	5

7. Adakah penggunaan telefon bimbit dapat membantu kanak-kanak dalam pembelajaran Bahasa Inggeris?

1	2	3	4	5

8. Anda akan menggunakan perisian sekiranya dipasarkan?

1	2	3	4	5

B. JAWAPAN TERBUKA (PENDAPAT)

9. Apakah pendapat anda untuk perisian ini?

_____

_____

_____

_____