AN APPLICATION FOR LEARNING CHINESE LANGUAGE AS A SECOND LANGUAGE: A PROPOSED DESIGN

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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.

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ABSTRACT

With the booming of mobile technologies and Internet connection nowadays, this paper presents a framework for learning Chinese language as a second language for primary school children aged 7 years old through a mobile application. In Malaysia, mobile learning technology still not widely used in the education system but in developing countries such as US had emerged into mobile learning technology in school. Plus, the non-Chinese students who take Chinese language as their second language in school have lower performance compared to the others. Hence, the main objective of this project is to encourage and support the process of learning Chinese language among young children who use Chinese as their second language at their own pace anytime anywhere by develop mobile learning application. It is designed in such a way of additional learning tool that young children can use and explore the modules in the application. From the user testing survey, most of the students would like to use mobile learning application in learning Chinese language as additional learning tool because the children find out it is interesting to learn new language via mobile. The application will include learning with exercise, test and also performance evaluation of the learners. There are five learning modules in the application which are numeracy, my body, my family, my school, and animals. Plus, the application also includes three tests based on random modules question. Then, the teacher can monitor the score of the students that had registered in the application. With this additional mobile learning tool, the students will expose to mobile technology learning at the early age with interesting learn application that will give excitement in learning the language. Indirectly, this mobile learning application also helps to develop and maintain the interest of the learners in learning a new language.

ACKNOWLEDGEMENT

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ABBREVIATIONS

1. CIS   Computer Information Sciences
2. FYP   Final Year Project
3. BCK   Bahasa Cina Kebangsaan
4. UTP   Universiti Teknologi PETRONAS
5. UML   Unified Modeling Language
6. 1M   1 Malaysia
7. SAT   Scholastic Aptitude Test
8. SR   Speech Recognition
9. MOE   Ministry of Education
10. RAD   Rapid Application Develoment
11. SLDC   System Development Life Cycle
12. KSSR   Primary School Standard Curriculum
13. USA   United State of America
14. UK   United Kingdom

CHAPTER 1
INTRODUCTION

1.1   BACKGROUND OF STUDY

In the era of globalization, technology replaced many traditional aspects of our lives. It changed the methods of communication, altered the phenomenon of mobility and had a great impact on improving our lives in this emerging world. The advancement of mobile technologies emerge the dimensions of e-learning to m-learning. In principle, m-learning is a subset of e-learning which deals with learning through a mobile phone. There have been some researchers showed that using mobile devices in the course can improve learners' performance and arouse their motivation. The major advantages associated with mobile phones are the affordability, portability and interactivity.

This paper details one such application that deals with m-learning in learning a second language. Language is very important for a nation and every nation have their own formal language. Generally, a Malaysian is able to speak in at least two languages which are Malay and English. In learning a language, there are two main aspects which is memorizing and practicing in order for the learners to understand a vocabulary and its usage in the right context. According to some research, the best age to learn a new language is young children because they are so much skilled at picking up a second language than adults. It also does not hinder any abilities in the child's native language and they understand that language is something to explore, to play around with and to enjoy. Thus, starting early offers the widest possible set of benefits and opportunities.

To know another language is to give the opportunity to see another world of understanding. Currently, Mandarin Chinese is spoken by over 1 billion people around the world, about one fifth of the global population. Each year more and more students around the world whose mother tongue is not Chinese are studying it with enthusiasm and success. Thus, Mandarin Chinese become number one most popular spoken languages in the world up till now. Learning Chinese language as a second language at early child education is an advantage for them because the Chinese language was an important asset as China was expected to play an important part globally. The early learning environment for Chinese language may maintain their interest in learning Chinese language when they proceed to the secondary school and also in higher education.

In Malaysia, Minister of Education had introduced elective subjects such as *Bahasa Tamil Kebangsaan, Bahasa Cina Kebangsaan, Bahasa Arab, Bahasa Iban* and *Bahasa Kadazandusun* for primary school students. The objective for introduction of elective subjects in primary school is to attract the interest of students with different races to learn different language in early ages. Thus, the concept of 1Malaysia (1M) can be practiced and implemented in schools. For this paper, *Bahasa Cina Kebangsaan* (BCK) is chosen as a resource to develop the application for learning a second language. Based on *Pelan Induk Pembangunan Pendidikan 2006-2010*, *Bahasa Cina Kebangsaan* (BCK) is introduced in primary schools since 2005 which occupied approximately 14,000 students in 153 primary schools.

Therefore, this paper proposes an interactive design of mobile application that could help the non-Chinese students in primary school of age 7 years old to learn Chinese language as a second language according to the current syllabus of primary school education. The aim is to encourage young children to learn on daily usage of the language which are corresponded to the curriculum such as recognizing Chinese alphabets, numbers and objects. With the provided modules, learners will be able to measure their performance in mastering the language. However, this additional learning tool is not meant to replace the traditional way of teaching and learning in class but to create an excitement among the learners that promising more fun learning.

1.2   PROBLEM STATEMENT

1.2.1   Problem Identification

Today, some of selected primary school in Malaysia includes learning Chinese language in their syllabus of teaching at non-school hour as an elective subject. This is an advantage for the parents to send their kids to the school that teaching Chinese language in their extra class. However, some of young children find difficulties in learning new language which is not their mother tongue or daily language. Moreover, it is quite hard to maintain and develop the interest of young children to learn a second language. The traditional way of teaching may lose the attention of the children when they feel bored of the learning process. Plus, Chinese is usually considered difficult to learn because of its complicated shape, different pronunciations and multiple meanings.

The challenges not only arise in children but also the teachers who may face the difficulty in interacting with and understanding the children. Many teachers tend to spend more time by assisting particular group of children which is non-Chinese students in order to learn and speak Chinese. The traditional way of learning will need more time in teaching student to memorize the vocabularies where the student will be a passive learner due to the medium used is usually a one way communication. Furthermore, the attention among the children may lose after a while due to the failure of the teacher to interact with all of them at once. This surely will distract the teaching and learning process in class. Therefore, the root cause found to this problem is the minimum used of technology for teaching and learning to be done in more effective and interesting ways which can maintain the interest of school children to learn a new language.

1.2.2 Significant of the Project

Based on these problems, the usage of mobile learning application is needed to make significant impact on student's interest in learning a second language and assisting teachers to teach and make the students understand Chinese language faster than usual. Therefore, the role of assistive learning tool may increase the effectiveness of teaching and learning among students and teachers.

1.3 OBJECTIVE

The objective of the project is:

    i)   To design and develop mobile application as additional learning tool for non-Chinese students in the primary school to learn a second language (Chinese Language) which is corresponded to the integrated curriculum.

1.4   SCOPE OF STUDY

Based on the objective in the previous section, scope of study is only focused to cater the non-Chinese students in the primary school aged 7 years old in learning Chinese language as a second language. Furthermore, the main task of the project is to develop a mobile application focusing on creating alternative tool in learning Chinese language where excitement and fun learning process among students may be created. The application will include three functions which are learning with exercise, test and performance evaluation. The application will focus more on learning vocabularies of Chinese language word instead of learning Chinese character.

1.5   RELEVENCY OF THE PROJECT

The proposed system is indeed relevant to the unit in particular and will benefit the non-Chinese students and teachers in teaching and learning Chinese language. By using additional mobile learning tool, the students will be able to perform well in *Bahasa Cina Kebangsaan* (BCK) subject and increase the effectiveness of teaching Chinese language in class. The students can learn Chinese language with interactive way of mobility where they can access to mobile learning outside class hours. Plus, the teacher also can keep track to their students' performance anytime and anywhere outside class hours. It is also relevant due to the existence of *Bahasa Cina Kebangsaan* subject introduced by Ministry of Education in primary school. With this application, it may be benefit the school in effective way of learning new language for young children.

1.6 FEASIBILITY OF THE PROJECT WITHIN THE SCOPE AND TIME FRAME

In terms of time frame, a complete and thorough study of the subject matter especially in the developing the mobile application of learning Chinese language as a second language based on several modules requires a high time commitment. Since the research period is very short, it is limiting the extensive research outcomes and transforming ideas and solutions into a working system will be quite challenging. With all the constraints that may be encountered throughout the development phase, the risk on the project size is medium.

The time frame of the project development will be two semesters of study, whereby the first semester the project will be more focused on the planning, analysis, research and design phase. Meanwhile, the second semester will be mainly on developing the prototype and usability testing.

In terms of technical, mobile application focuses on three different features which are learning with exercise, test and score performance. The function and process of the mobile application are feasible to program within time frame as it includes a few modules.

1.7 LIMITATION

The limitation of the system will be the content of the application of learning Chinese language where it will concentrate more on Chinese vocabularies in terms of understanding the meaning of the Chinese words with pronunciation. Basically, learners need to start with understand Chinese vocabularies before learning to write Chinese characters in the early stage of learning. This is because learning to write Chinese character correctly with correct stroke order is difficult for beginning learners. Thus, the learning modules will only include learning Chinese vocabularies with meanings and audio pronunciation.

CHAPTER 2
LITERATURE REVIEW

2.1   THE BENEFITS OF LEARNING A SECOND LANGUAGE AT EARLY AGE

The age factor in second language learning has long been, and continues to be a subject of much debate and controversy. Some researchers said that for those who learn a second language early in life will get higher levels of proficiency than those who begin as adults. The ability of learning second language at early age is possible and would be a great advantage for a child even though children are thought using their native language since toddler. According to Curtain and Dahlberg (2004), the learning experiences of a child determine which neural connections are developed and which no longer function. That means what is easy and natural for a child in learning a language.

According to Johnstone (2002), an earlier start of learning a second language for young children enables productive links to be made between first and additional languages, which bring benefits for a child's language awareness and literacy. Plus, they are likely to find it easier to acquire a good command of the sound system of the language, not only the pronunciation of individual sounds but also patterns of intonation. For children, they are always discovering new things and with a second language may encourage them on to a deeper and broader passion for learning in general.

Furthermore, numerous reports have proven that students who have studied a second language perform much better than monolingual peers on many assessments and standardized test in school. Results from the Scholastic Aptitude Test (SAT) show that students who had studied a foreign language for 4 or more

years outscored other students on the verbal and math portions of the test (College Board, 2003). Hence, it is an advantage for parents to send their kids to learn Chinese language as a second language to boost their kids' performance in other subjects. Learning at earlier stage also can maintain the interest of the children and they may easily catch up the learning with proper approach of teaching medium.

2.2 COMPUTER-BASED TECHNOLOGY USED FOR CHINESE LANGUAGE TEACHING AND LEARNING

Technology advancement has opened new space and possibilities for computer-based edutainment learning approach in which students can achieve their learning goals in different ways. Below are several approaches that have been done in learning Chinese language:

(a)   Chinese Word-processors

Word-processor is a common and useful tool in learning foreign languages. Chinese word-processors can help students learn Chinese characters by composing and editing. There are two most popular ways in input Chinese characters into computer which is *Pinyin* which is the standard system of transcribing Chinese into Latin Script and also by encoding the radicals that constitute characters. Thus, by using computer to input Chinese texts can enhance the students' capability in reading, memorizing and recognizing characters and in learning words (Liu, 2002). However, some scholars worry that using computer in teaching Chinese characters will de-motivate students in character writing and influence the recognition of characters in the long term (Liu, 2002).

(b)   Computer Game Based Learning

Game-based learning is an attractive option particularly for a generation who has grown up digital. Children have different ways to communicate and learn something new. Game is one of the alternatives to express themselves and behave socially. Azan and Wong (2008) suggested that young learner mostly attracted to an interactive technology such as digital games which could foster learning process effectively and interestingly. Playing is an important stage in child's development, where it is one way for them living their life. By playing, children can use their minds to encourage the imagination and develop physical and mental abilities. Thus, the game approach may help to boost up the teaching and learning Chinese language among young learners in class. However, Dwiana and Singh (2011) stated that the success of game-based learning experiences on two key attributes which are an effective educational background and a sound entertaining support.

(c)   Speech Recognition Software

According to Liu, Moore, Graham and Lee (2000),

Speech Recognition (SR) software requires a user to produce meaningful linguistic units that are than translated by a speech recognition program. The implication for second language classroom is that a student's oral abilities can be grammatically analyzed in order to access oral proficiency levels and to provide students with feedback. Derwing, Munro, and Carbonaro (2000) stated that the usefulness of speech recognition software for language students hinges on its ability to recognize nonnative utterances and identify problem areas of student production in order to provide corrective feedback. Furthermore, Derwing and his colleagues reported that SR software was only able to recognize 90% of the words uttered by native speakers; it was

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only able to understand 24% and 26% of the nonnative speakers' utterances. Thus, enhancement of SR software need to be improved so that teaching and learning in class through it may be effective for young learners today.

2.3 THE BENEFITS OF MOBILE LEARNING IN TEACHING AND LEARNING

Based on the research survey conducted by Attewell, Savill-Smith, and Douch (2009) in mobile learning, of over 900 learners who responded to an SMS survey, 91% agreed that mobile learning did help or may help them to learn; 93% believed that it did or sometimes did make learning more interesting; and 84% wanted to do more mobile learning in future. From the survey, it can conclude that people are ready to accept mobile technologies due to the benefits could gain from it in teaching and learning. Below are some of the opportunities gained from mobile learning founded by several scholars:

(a) **Mobility**

The main motivation behind the deployment of mobile phones in education is mobility. With mobile phones, students can access their lesson almost anywhere and at any time (Quinn, 2000; Mellow, 2005). It will allow students to gather access and process information outside the classroom. Thus, they can encourage learning in real-world context, and help bridge school, afterschool and home environments (Shuler, 2009).

(b) **Enable a personalized learning experience**

In a report by Shuler (2009), it stresses the importance of mobile phones enabling personalized learning experience. Because not all learners are alike, lessons should be customized according to students' level of performance. This is one of the features that mobile phones can support,

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which Shuler referred to as "supporting differentiated, autonomous, and individualized learning through mobile devices".

(c) **Fit with learning environments**

According to Attewell, Savill-Smith, and Douch (2009), mobile technologies can make learning more interesting, more enjoyable and therefore more attractive to learners. It also can help overcome many of the challenges associated with larger technologies where it provides learners with bite size lessons which are breaking down large and more complex teaching materials into smaller chunks (Mellow, 2005). For instance, on the way back home by bus, a student may be able to study access notes through his or her mobile phone. They do not have to depend on access to desktop computers to conduct e-learning activities.

Therefore, this paper introduced mobile learning technologies as a medium for new approach in learning Chinese language as a second language in class. With the opportunities stated, the aim to boost up children's performance in learning language may be accomplished.

2.4 PEDAGOGICAL APPROACHES IN MOBILE LEARNING

There are four types of pedagogical approaches that can be implemented to develop effective mobile application which are constructivism, blended learning, collaborative learning and active learning (Ozdamli, 2011).

(a) **Constructivism**

Constructivist learning constructs knowledge by interpreting new knowledge based on their prior knowledge (Kuiper & Volman, 2008). According to the constructivist theory, learning should be student-centered (Mathewi, Felvegi & Callaway, 2009). Wheeler (2008) also

state that students should be in social interaction with their peers taking part in constructing information actively for the fulfillment of the learning and the instructor need to guide students in the construction of the information.

(b) Blended Learning

It is the combination of classroom instruction and mobile learning which can maximize the benefits of both face-to-face and online methods (Bonk & Graham, 2006). Dziuban, Hartman and Moskal (2004) described the blended learning characteristics: (1) a shift from teacher-centered to student-centered instruction in which students become active and interactive learner; (2) increases student-instructor, student-student, student-content and student-outside resource interactions; and (3) integrated formative and summative assessment mechanisms for students and instructors.

(c) Collaborative Learning

Collaborative learning defined as the well management of individuals engaged in a common assignment using technologies such as mobile tools. This type of learning environments are usually the environments that provide information and opinion sharing between the group members and experts via the technology supported collaborative learning tools (Lipponen, 2003; Peck, 2010, Rastegarpour, 2011).

(d) Active Learning

According to Ozdamli (2011),

Research on teaching and learning center described as active learning in a process whereby students engage in higher-order thinking tasks such as analysis, synthesis, and evaluation. Mobile learning devices can have to enrich the learning process for learners.

These pedagogical approaches should be taken seriously by any developer who plans to embark on mobile learning development. The approaches determined the mobile learning environment that the developer wants to adapt in the classroom.

2.5 SELECTION STRATEGIES USED WITH TOUCH SCREENS FOR MOBILE APPLICATION

With the introduction of touch screen phones, good user interface design and simplified input methods for applications running on such devices are important factors that contribute to its popularity and success. Usability still plays a big role in its acceptance in the mobile market. It may be difficult to change the design of the actual hardware itself, but a well-designed application can be a big help in order to overcome such limitations (Fernandez, Forrai & Hussmann, 2007).

There are several types of selection strategies used with touch screens such as land-on, first-contact, lift-off, land-on lift-off and sequential-touch stated by Sears, Plaisant and Shneriderman (2006). Below is the description for some of the types of selection strategies used with touch screens:

(a) **Land-on**

Users touch the screen and the location of the touch is compared to the location of the targets on the screen. The target is selected when the touch is on a target. Otherwise, users must remove their fingers from the screen and make another selection attempt. It can be used when targets are large enough to assure that users will not unintentionally touch an incorrect target. This strategy is suitable for applications that require selections with minimal attention as long as targets are sufficiently large.

(b) Lift-off

Lift-off also uses continuous feedback about the touch location where the selection is made when users' fingers are removed from the screen. Users touch the screen; they can then drag their fingers to a new location if desired, and lift their fingers to make a selection. This strategy allows densely packed targets to be selected with minimal errors. Thus, it provides additional accuracy and user control at the cost of additional perceptual and cognitive effort.

(c) Sequential-touch

This strategy requires a sequence of touches, possibly simply selecting the desired target followed by a confirmation button, before an action is taken. The confirmation button may be a special button or the same button the user has just selected. It is useful for applications when accuracy is critical but speed is not.

There are other different gestures and type of finger presses can be used to interact with touch screens. Swiping, pinching, tapping, double-tapping and sliding are all different gestures and means of interacting with touch screens. For this paper, mobile learning language application need to determine the suitable system learning approach that suit to the children preferred input method over the touch screen.

2.6   MANDARIN LEARNING LANGUAGE

Mandarin learning through various type of computer-based technology had been discussed earlier in this chapter. Learning second language in more exciting and fun activities will help in improving children's skills on communication. In Malaysia, it is difficult to obtain mobile learning application that can attract children to learn foreign languages, especially Mandarin. Mandarin is the language that will be selected to be learned by majority of society.

The number one reason is that Mandarin Chinese is the most widely-spoken language in the world which research stated that Mandarin Chinese is the mother tongue of over 873 million people. Mandarin Chinese is also spoken in important and influential Chinese communities of Indonesia, Thailand, Malaysia, Singapore, Brunei and Philippines. Therefore, learning Mandarin language gives several advantages to the learners which mentioned by Qiu Gui Su (2010):

- **Business**
  Since China is the second largest economy in the world, it is obvious that Chinese communities are success in the world of business. Thus, business people who speak Mandarin have a great benefit in tapping and penetrate into the Chinese market. It is much easier to develop trade business relationship if the person can speak and understand Mandarin well. Datuk Seri Ong Ka Ting (2005) stated that, "Chinese language has emerged as one of the important international languages after China started to play a prominent role in the global area."

- **Travel**
  It is also an advantage for a traveler to travel in Chinese countries where most of the people there will speak in their native language and it is quite difficult to find people that can speak English. With learning of Mandarin language, the traveler may easily get around and communicate with the local people while traveling.

- **Culture**

  From the facts about China, it is the one of the world's oldest and richest continuous culture, over 5000 years old. With thousands of years of history, Chinese culture is endlessly fascinating. Knowledge of Mandarin will enrich understanding of Chinese culture despites the interests in history, architecture, music or cuisine.

Therefore, learning Mandarin language in early education will bring benefits to the children itself in developing it careers in the future and also learning second language will differentiate them from the mono-lingual learner. Thus, in order to develop learning Mandarin language in early age, Ministry of Education (MOE) in Malaysia had introduced teaching and learning of Mandarin Language or also known as *Bahasa Cina Kebangsaan* (BCK) as elective subject in primary school and also secondary school.

2.7 COMPARATIVE STUDY

These days there are a lot of mobile application for learning Chinese language for early children available. In order to develop one another, it is important for the developer to study the existing those mobile application. This section aimed to study the existing mobile application for similar target group which is the young children.

Based on the research had been done, there are three mobile learning Chinese language application available on Google Play and AppStore which could be almost the same with Mari Belajar BCK application. The applications are Chinese 字宝宝 for Primary Students, Kids Chinese Learning Vol 1 and Little Pim Chinese. Although these applications might have some similarities with Mari Belajar BCK application, but they do not provide Chinese syllabuses based on Malaysia Ministry of Education. Table 2.1 below shows the comparison had been made between several mobile applications

TABLE 2.1: Comparison of Other Mobile Learning Chinese Language Application with Mari Belajar BCK Application

Elements/ Application	Chinese 字宝宝 for Primary Students	Kids Chinese Learning Vol 1	Little Pim Chinese	Mari Belajar BCK Application
User Interface	Good. Flash card with auto play and stroke order animation.	Good. Have variety of interesting photos.	Good and interesting with interactive games.	Good and interesting with variety of learning modules and exercise.
Ease of Use	Easy to use. Have English translation and use Pinyin Romanization system	Not easy to use because no English translation	Easy to use. Have English translation and use Pinyin Romanization system	Easy to use. Have Malay translation and use Pinyin Romanization system
Human Computer Interaction	A clear textbook view of Chinese characters and words listed in read-only, read-write	Game interaction with multimedia presentation of pictures, photos,	-Demonstrate the vocabulary word or phrase both visually and aurally, then to	-A clear main menu after successfully login to choose the function. - User can choose

	order with search functionality.	videos, voice storytelling, folk songs and games surrounding the characters to be taught.	help the player acquire the vocabulary and lastly to validate and reinforce newly acquired knowledge. -Animation and interactivity help provide context in this immersive language learning experience.	different types of learning modules and at the end of each module will be an exercise to be completed.
Information Content	- Based on Singapore Ministry of Education latest 1 to 6 Chinese syllabuses. - Full coverage of 12 Normal Chinese books and 12 High Chinese books from Primary level 1 to 6.	- Offers demonstration of how to write the Chinese characters (Traditional Chinese) and provides writing exercise on the touch screen - Only provide 6 modules in volume 1. - Need to install other volume to get different modules	- Includes three interactive games: (a) Eating and drinking (b) Playtime (c) Wake Up Smiling - Each games covered basic nouns (level 1), verbs (level 2) and short phrases (level 3) - Introduces a total of 60 Mandarin Chinese words and phrases.	-Include three main functions which are learning with exercise, test and also performance score sheet. - Learning with exercise will include five modules based on Malaysia Ministry of Education.
Main Feature/ Functionality	Assists kids to learn and read and write Chinese characters and words in a fun and intuitive anytime, anywhere.	Assists kids to learn how to write and pronounce simple words in Mandarin and Cantonese.	Assists young children develop basic vocabulary about eating and drinking, playing and sharing, and sleeping and waking in Chinese.	Assists young children to learn and read Chinese characters and words in a fun way anytime anywhere with given exercises and test to evaluate performance.

Price	Free for Lesson 1 of all books and stroke animation for first lesson of Primary 1-3	Free	$2.99	Free
Working Offline/Online	Offline	Offline	Online/Offline	Online/Offline
Target User	Suitable for children age 6 to 13 years old learning Chinese language	Suitable for young children learning Chinese language	Suitable for native English speakers who are interested in Chinese	Suitable for children age 7 years old learning Chinese language
Link	From AppStore, https://itunes.apple.com/sg/app/chinese-zi-bao-bao-for-primary/id427535856?mt=8	From Android Play, http://www.androidpit.com/en/android/market/apps/app/air.IFC.Landscape.Androidv1/Kids-Chinese-Learning-Vol-1	From AppStore, https://itunes.apple.com/us/app/little-pim-chinese/id493957128?mt=8	-

CHAPTER 3
METHODOLOGY

3.1 RESEARCH METHODOLOGY

Because there are many methodologies, the first challenge faced by analysts is to select which methodology to use. Each methodology has its own pros and cons and choosing a methodology is not simple because it depends on the standards and policies of the project. The criteria of methodology that have to be considered before being implemented include clarity of user requirements, familiarity with technology, system complexity, system reliability and also short time schedules. After analyze all the methodologies, Rapid Application Development (RAD) based methodology (*refer Figure 3.1 below*) have been chosen as the best methodology for this project.

Rapid Application Development (RAD) is defined as a methodology that enables organization to develop strategically important systems faster while reducing development costs and maintaining quality. This methodology had been chosen because it relies on rapid prototyping and allows developer to test the prototype rapidly. It performs the analysis, design and implementation phases concurrently, and all three phases are performed repeatedly in a cycle until the system is completed. In the beginning, there will be first prototype that provides a minimal amount of features and the users will provide comments. These comments are used to reanalyze, redesign and re-implement a second prototype, which provides a few more features. Users normally need to interact with technology to really understand what a new system can do and how to best apply it to their needs.

Therefore, prototyping-based RAD methodology is appropriate when user requirements are unclear because they provide prototypes for users to interact with early in the SLDC. Besides, it is also the excellent choice because this project need to be delivered within a shorter time scale which is four months to develop the mobile application where the final output targeting on create interactive and fun way of learning approach to learn a second language.
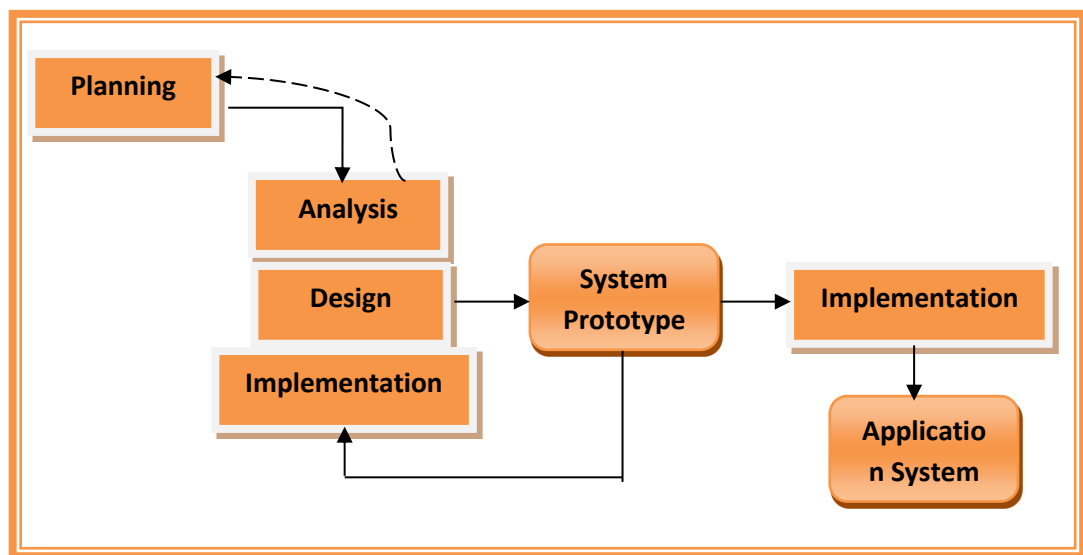
FIGURE 3.1: A Prototyping-based Methodology (Dennis, Wixom & Roth, 2006)

3.2 PROJECT PHASES

Phase 1: Planning

The planning phase is the fundamental process of understanding why an application should be built and determining the research problem. For this project, the problem had been identified where the need to improvise the teaching and learning education among students and teachers and also to design and develop an assistive technology for new additional learning tools in order for the young children to understand a second language with interactive way.

This project will be done in two phases, the first phases is for data gathering and research which consists of 11 weeks period. The second phase will be the application development which consists of 14 weeks period. Hence the total number of weeks required for the project to be completed is 25 weeks. Refer to *Appendix A* for the Gantt chart and mile stone of the project.

Phase 2: Analysis

During this phase, critical analysis on the literature is conducted to have a better understanding on a current problem faced by young children in learning a new language which is not their mother tongue and also challenges for teachers in teaching a new language with traditional way of education. Besides, it is also to review the existing theory and guidelines on mobile learning towards young children by other researcher.

After done with the analysis strategy, the next step is requirement gathering. Data and information such as user requirements are gathered via various data collection methods such as interview, observation, user testing.

Phase 3: Design

During this period, models and prototypes that represent all system processes, inputs, and outputs are designed. It is a continuous interactive process that allows users to understand, modify and eventually approve a working model of the system that meet their needs. Unified Modeling Language (UML) such as Use Case Diagram, Class Diagram and Activity Diagram will be designed during this phase to model the application and fulfill the user requirements. The proposed system architecture will also be designed to determine the communication activity between server and client. System architecture and UML Diagram will be discussed in next subtopic.

Phase 4: Implementation

This phase focuses on coding and testing of the project. It actually involves the actual development of the application where the system specification is converted into an executable system. Then, the project needs to be tested for conformance with the system requirements. If there are any comments during the testing phase, the comments are used to reanalyze, redesign and re-implement a second prototype which provides different features. Lastly, making it available to the end user of the mobile learning application and then the development cycle is finished.

3.3 SYSTEM ARCHITECTURE

The design of the system architecture for mobile learning application is shown in Figure 4.1. From the figure, the users i.e. the teachers or students start the communication with the system by logging in and accessing the mobile learning application through mobile devices. The model also illustrates several levels of user authentications which have different role of permission in accessing the contents and functionalities. Each of the users has to go through an authentication function before proceeding to the individual function such as learning, test and progress tracking.
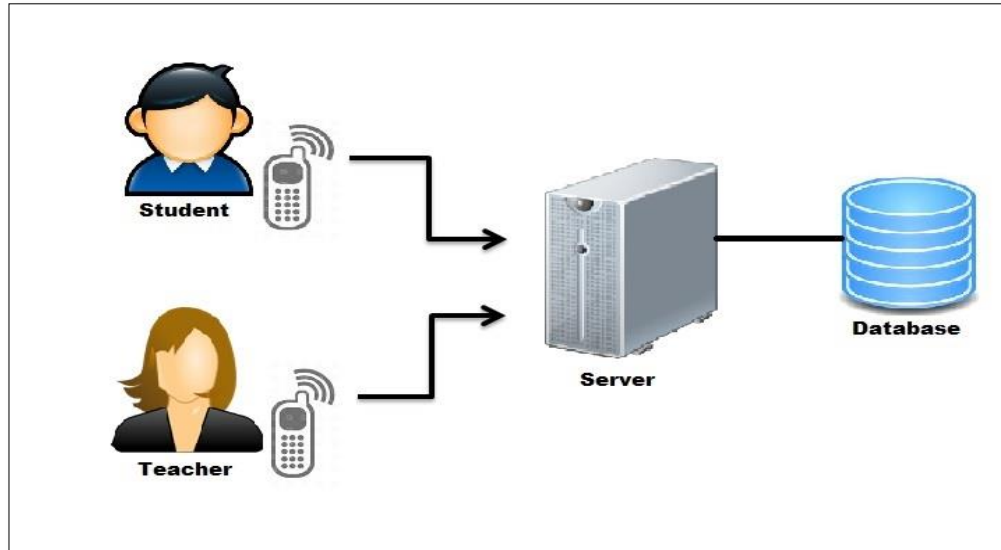
FIGURE 3.2: Mobile Learning Application Architecture

3.4   UML DIAGRAM

By reviewing the common syllabus approved by the Ministry of Education under Curriculum Standard for Primary Schools (USSR) and discussion with teacher, there are five chosen modules for the development of the mobile learning application shown as below.

- **Numeracy**

    This module will teach student on recognize numeracy character in Chinese with pinyin and teach them to pronounce the words by using audio.

- **My Body**

    This module will teach student about the part of human body such as eye, mouth, nose, hand and other parts in Chinese character with Pinyin and audio.

26

- **My Family**

  This module will provide the students about the members of family in Chinese character and pinyin with audio.

- **My School**

  In this module, the learning application will provide the students on learning about school and things in class in Chinese character with Pinyin and audio.

- **Animals**

  In this module, it will teach students on recognizing different type of animals in Chinese character with Pinyin and audio.

The result from the system requirement and literature review were then translated into the system models by using the Unified Modeling Language (UML) in the form of activity diagram as shown in Figure 3.3 and Figure 3.4. Plus, use case diagram as shown in Figure 3.4.

Activity Diagram
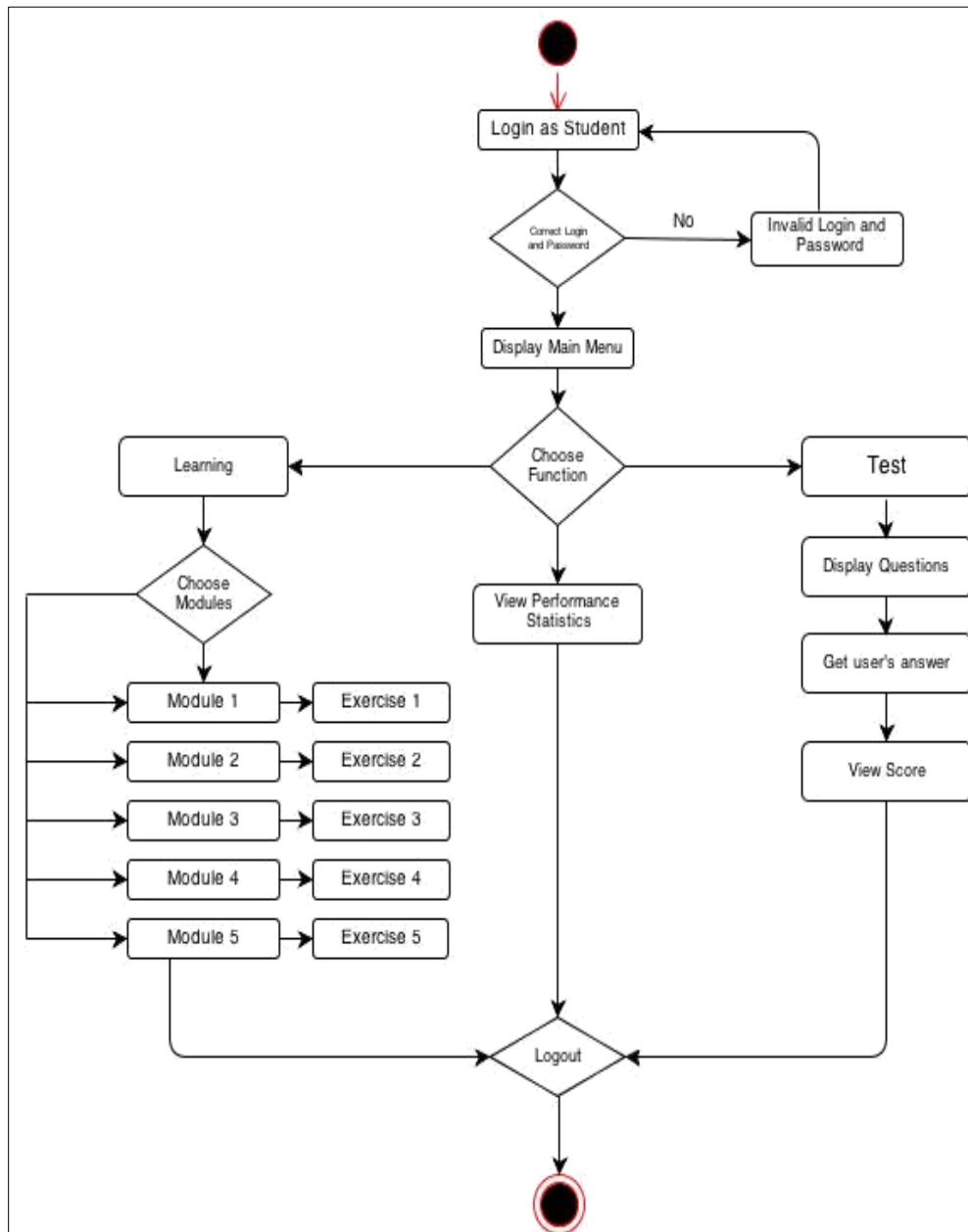
FIGURE 3.3: Activity Diagram for Student
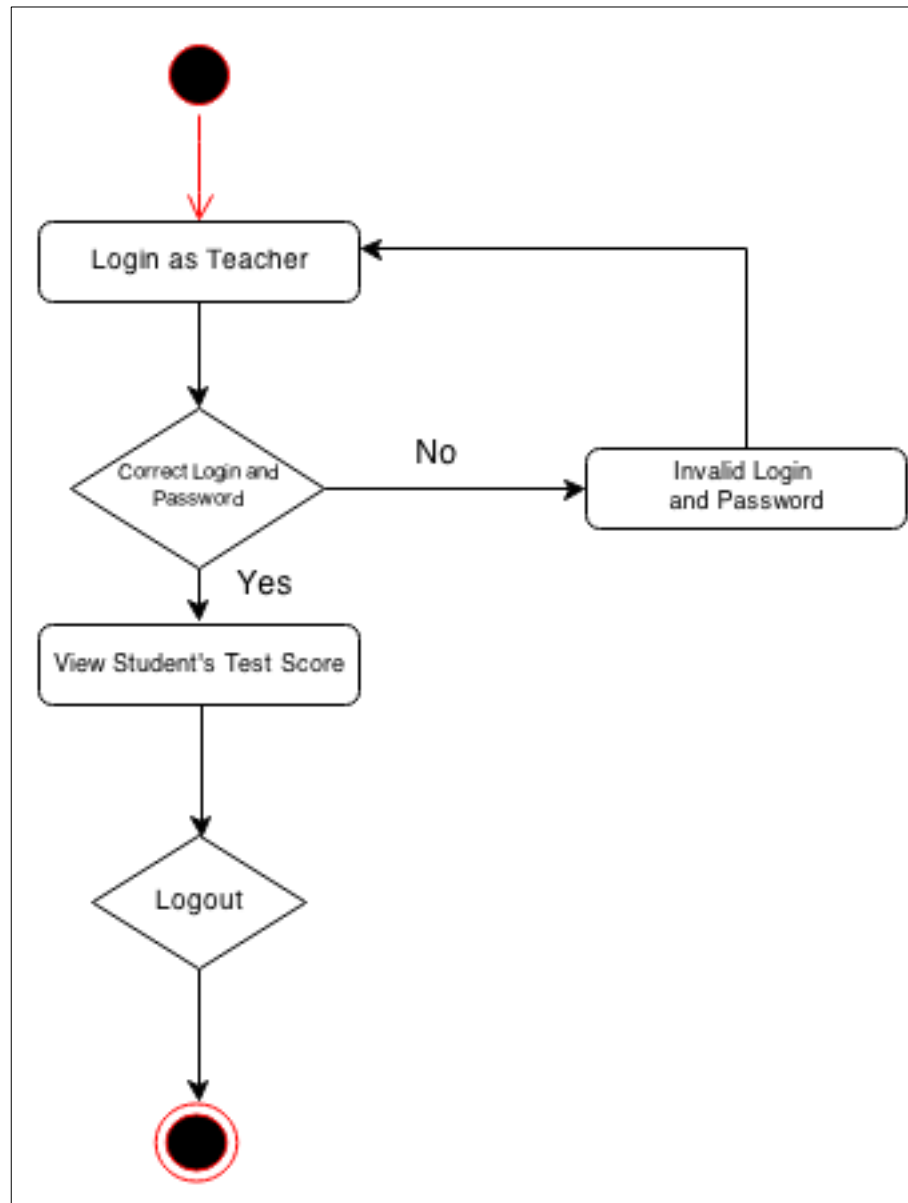
FIGURE 3.4: Activity Diagram for Teacher

Use Case Diagram

Figure 3.5 shows the use case diagram for Learning Chinese Application System. Three different actors engage in this system which is the student, teacher and system administrator. It illustrates two main use cases which are login and choose function for the student. From Choose Function use case, the student can select learning, test or view performance from the system. There are several modules that can be chosen under learning function. Then, the student also can view his/her score after done with test from random modules. Meanwhile, teacher also has two main use cases which are login and also view students' performance for test. Lastly, the system administrator is the one that will manage the application in terms of improve the performance and update the mobile learning application.
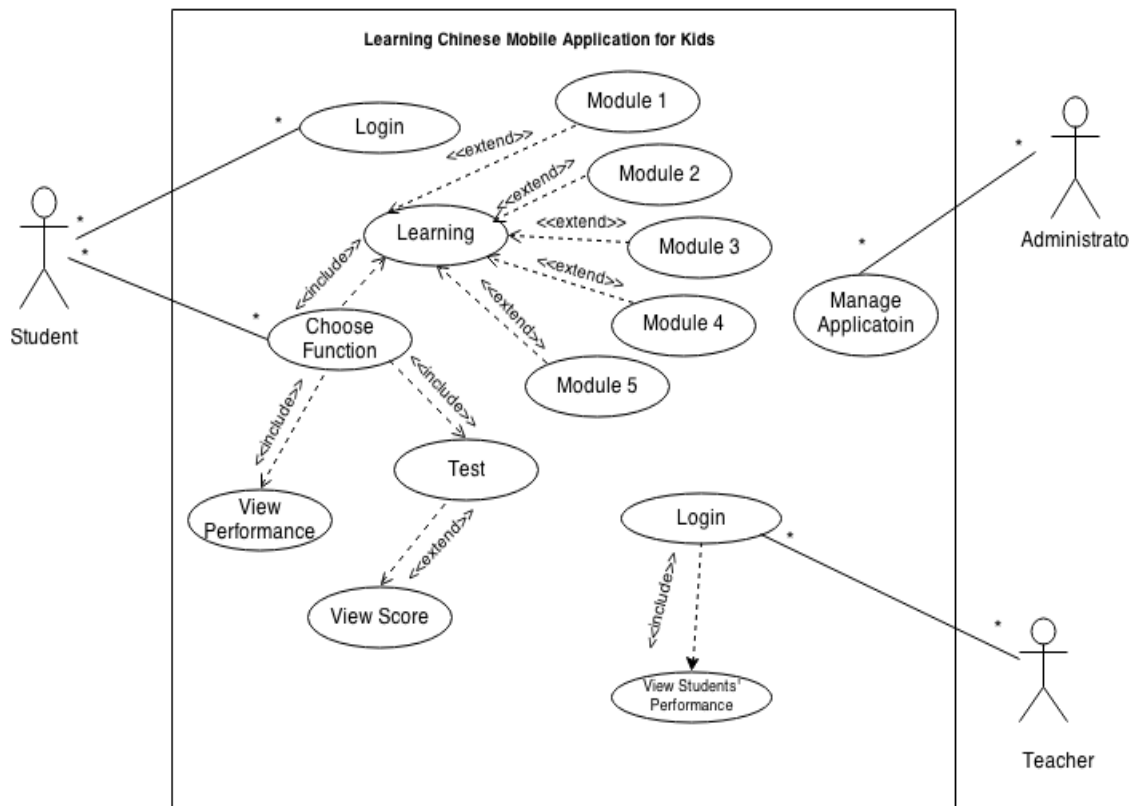
FIGURE 3.5: Use Case Diagram

3.5   METHODS OF DATA COLLECTION

For this project, data is collected using the following data collection methods:

i) Interview and observation

The interview and observation is involving teachers from primary school that teaching Chinese language as an elective subject. Sekolah Rendah Kebangsaan St Bernadette's Convent, Batu Gajah, Perak will be the targeted school for this study and user acceptance testing. The purpose of this interview is actually to know about the current practice or traditional way of teaching Chinese language in class. Besides that, it is also to determine the acceptance of teachers regarding using mobile application as one of the additional tool in teaching Chinese language. Despite from the teacher, the informal interview session will also involve the primary user of the application which is student. By having this interview, a solid result of user acceptance regarding mobile application can be gathered and ready to used and implemented in the application development. (*Refer to Appendix B, page ii*)

ii) Pre-Acceptance Survey

A set of close ended questions are forwarded to the related respondents which are the students that taking *Bahasa Cina Kebangsaan* as their elective subject. The survey had been distributed to 10 respondents from standard 1 at SK St. Bernadette's Convent and the result will be discussed in next chapter. The survey intended to study the users' acceptance of the mobile application of learning Chinese Language.

iii) **Acceptance of User Testing**

Review and comments based on testing of the prototype of the project will be collected from the students and teachers to verify whether requirements are met or not. The system prototype was tested at SK St. Bernadette's Convent, with 10 students and 1 teacher. The students paid their attention and actively participated toward the lessons during the testing. The result of the user testing survey will be discussed in next chapter.

iv) **Literature Review**

Theoretical information will be gathered through review of related literature of current technology and theory used to overcome the problem or challenges faced by young children and teacher in learning and teaching a second language.

3.6 SAMPLE DESIGN

3.6.1 Defining the Population

An acceptance survey will be conducted among the teacher and students in Sekolah Rendah Kebangsaan St. Bernadette's Convent, Batu Gajah, Perak. These people are the targeted respondents for the survey and will be the main users of the mobile learning application.

3.6.2 Sample Size

Due to time constraint, the targeted sample size to be carried out interview will be only one teacher in the school and for the testing of the prototype estimation of 10-15 students will be involved.

3.6.3 Sampling Method

In conducting the survey, a probability sampling method is used. It is a method that requires a sample population to be chosen in order to conduct a survey. It is one of the best methods for data collection as according to Doherty (1994), if the sampling is properly conducted, there will be no bias in the result. Therefore, it is possible to apply this method to conduct survey on teachers and students to test the acceptance of this project.

3.7 GANTT CHART (FYP1 & FYP2)

Refer to Appendix A (page i)

3.8 KEY MILESTONES

Below are the key milestone that needs to be achieved throughout both of semester of Final Year Project 1 (FYP1) and Final Year Project 2 (FYP2).

Semester 1:

TABLE 3.1: Key Milestone for FYP1

Milestones	Week
Project Proposal	3
Extended Proposal	6
Proposal Defense	12
Interim Report	14

Semester 2:

TABLE 3.2: Key Milestone for FYP2

Milestones	Week
Progress Report Submission	4
Pre-SEDEX (Poster Presentation)	10
Dissertation Submission	11
VIVA Presentation	13

3.9 TOOLS

Tools required is divided into two aspects which are the tools for research and tools for application development.

3.9.1 Research

  i.   Internet
 ii.   Laptop
iii.   Printer
 iv.   Books
  v.   Journal
 vi.   Google Play
vii.   SmartsSheet.com

3.9.2 Application Development

   i.   Eclipse IDE
  ii.   Java Development Kit
 iii.   Android SDK
  iv.   Android Device Manager
   v.   DroidDraw
  vi.   Adobe Photoshop CS3
 vii.   Audacity (Sound Editor)
viii.   Android Devices (tablet/mobile phone)

CHAPTER 4
RESULTS AND DISCUSSION

4.1 PRELIMINARY STUDY

4.1.1 Interview and Observation

Background of Interview

Interview and observation had been conducted on 22nd July 2013 at Sekolah Kebangsaan St. Bernadette's Convent. The interviewee is a Chinese teacher who teaches *Bahasa Cina Kebangsaan* (BCK) named Wong Sook Fun. She has six years of experience in teaching BCK in primary school for standard 1 until standard 6.

Purpose of Interview

- To uncover further the problems regarding teaching and gaining participation from children who have difficulty in understanding Chinese language.
- To understand the concept and approach being used by the teachers in handling these problems.
- To gain relevant information and knowledge that may be applicable for developing a project prototype.
- To identify the main features or functionalities to be integrated into project prototype.

Summary of Interview Results

- Total number of students taking BCK is 72 students out of 98 students of level 1. Most of the students are from different background which includes Malays, Indians and also Chinese.

- Miss Wong teaches BCK based on traditional method by translating the Chinese character with pinyin to Malay language to ensure the learners understand the meaning of the Chinese words. The syllabuses are based on text book prepared by Primary School Standard Curriculum (KSSR).

- Miss Wong faces difficulties in teaching the children on how to speak in Chinese especially for the Malays and Indians. However, some of the learners are good in writing Chinese characters and understand the Pinyin words.

- Miss Wong use games or competitions among groups to attract children interest and attention to learn BCK in class. She divides the whole class into 3 or 4 groups by their seats and divides the blackboards into parts for every group. The rules were that every group came to the blackboard at the same time and wrote any words they knew, one by one. Then, she checked the group whom had written the most and the highest correct after a period of time would be the winner. It is one of the examples of games that she used in class to gain participation of the students.

- Based on KSSR, Band had been introduced and replaced the grade ABC system to indicate the performance of the students in their assessments. Below is the description of Band 1 to Band 6 based on KSSR.

BAND	STANDARD
6	Know, understand and excellent in performance
5	Know, understand and very good in performance
4	Know, understand and good in performance
3	Know, understand and can do
2	Know and understand
1	Know

Most of the Chinese learners get average of Band 4 & Band 5. Meanwhile, the Malays and Indian learners get average of Band 2. This shows that the Malay and Indian shows low performance in learning a second language compared to Chinese who have a higher performance because they learn their own mother tongue.

- Regarding the use of computer-based learning in teaching, the teacher said that she only use it sometimes for playing the VCD for some Chinese songs with lyrics.

- Suggested modules to be included in the mobile learning application listed as below:
  - Numeracy
  - My Body
  - My Family
  - My School
  - Animals

- Miss Wong likes the idea of using mobile learning application in teaching BCK in class and she was looking forward for the working prototype development.

FIGURE 4.1: After Interview Session

4.1.2 Pre-Acceptance Survey

Pre-Acceptance survey (*Refer to Appendix C, page iii*) had been conducted with 10 respondents from students of standard 1. The purpose of the survey is to study the user's acceptance of using mobile application of learning Chinese Language as additional learning tool. From the survey, it can be concluded that most of the students love to learn BCK and like the way of current teaching and learning BCK in class. However, for the Malays and Indians, some of them felt learning BCK is difficult.

Figure 4.2 shows a pie chart of percentage for the usage of smart phone among young children. Most of the respondents ever used and know how to use smart phone especially in playing game. It is about 40% of the students strongly agrees and also 40% of them agree in knowing on how to use smart phone. However, they did not own any smart phone but they are using their parents' smart phone to play games.
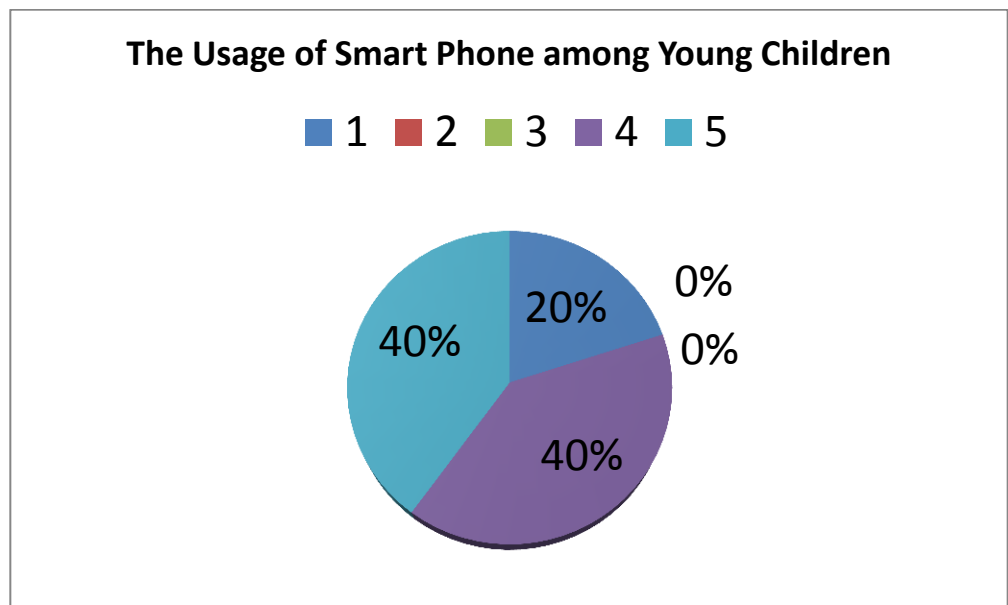
FIGURE 4.2: The Usage of Smart Phone among Young Children

Figure 4.3 shows a pie chart of users' acceptance of learning BCK using mobile learning application as additional learning tool. It shows that most of the students agree to use smart phone in learning BCK as additional learning tool which comprises of 40% of the students. However, there are some students not agree with the additional learning tool which comprises of 20% of the students. This is because the students are never been exposed to the smart phone in any activities.

Users' Acceptance of Learning BCK using Mobile Learning Application

■ 1 ■ 2 ■ 3 ■ 4 ■ 5

10%
20%
0%
40%
30%
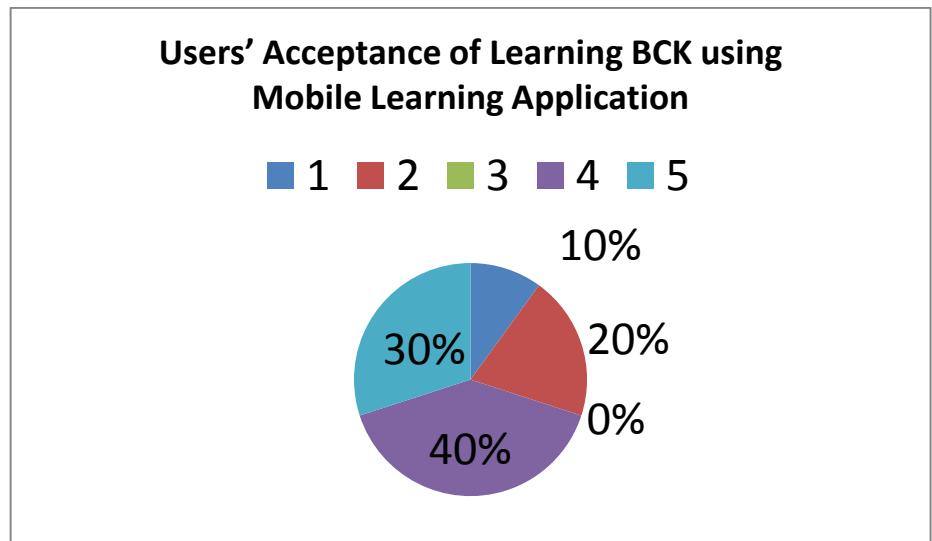
FIGURE 4.3: Users' Acceptance of Learning BCK using Mobile Learning

4.2 SYSTEM INTERFACE SCREENSHOTS

The system interface was developed using Eclipse IDE and the contents in the application were collected from reliable source in the Internet and text book based on Primary School Standard Curriculum. The following figures show the interface's screen shots of the application developed.

4.2.1 Login and Registration Page for Student

Figure below shows log in and registration page for student where new user need to register first by clicking register (*Daftar*) button and it will be redirected to registration page. In the registration page, the student need to fill in name, password, confirm password and also full name. These details will be kept in the database to be retrieved for future usage of the application. After done with registration part, the user can submit the application by clicking on submit (*Hantar*) button and then will directly go to main menu of the application. For existing user, he just needs to fill in name and password in log in page.
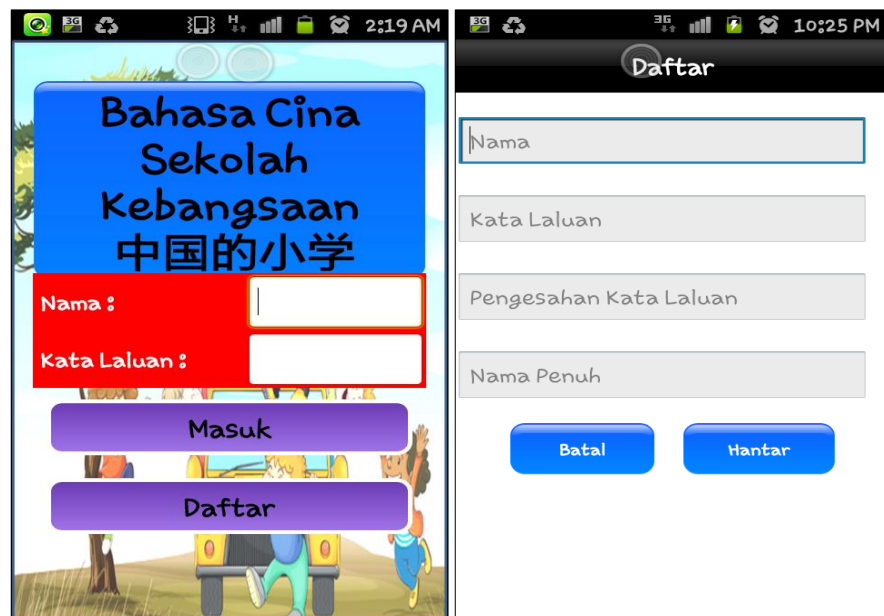
FIGURE 4.4: Student Login and Registration Page

4.2.2 Main Menu and Module Selection Page

This page allows students to select three functions which are learning, tests and performance score. For the learning function, the user can select five different learning modules with exercises at the end of each module. Below are the modules in the module selection page:

- Numeracy   号码   Hàomǎ
- My Body   身体   Shēntǐ
- My Family   家庭   Jiātíng
- My School   学校   Xuéxiào
- Animals   动物   Dòngwù

FIGURE 4.5: Main Menu and Modules Selection Page

4.2.3   Module 1 – Numeracy

Numeracy module lesson introduces the student to read from one to ten with audio in pronouncing the pinyin words when click on audio button. The student also can learn to count from one to ten which is the basic level that they should know for the first year of primary level. There will be three exercises where the student needs to count the objects in the picture and there will be three options to answer each of the questions. Notification of correct or wrong answer will be pop up once the student click on the answer.

FIGURE 4.6: Module 1 – Numeracy Page

4.2.4 Module 2 – My Body

In My Body lesson, the student will learn different part of human body which the module exactly taken from the text book. The student will learn on how to pronounce the pinyin word based on each part of the body. There will also three exercises at the end of module where the student needs to identify part of the body and answer the question with given three options. Notification of correct or wrong answer will be pop up once the student click on the answer.

FIGURE 4.7: Module 2 – My Body Page

4.2.5   Module 3 – My Family

My Family is another important lesson. The lesson will teach student on how to call each family member in Chinese based on Pinyin words provided. Then, the student will need to answer the exercises at the end of module. There will be three pictures and three options that need to be matched correctly. The student needs to click on the picture first then followed by the correct answer. Notification of correct or wrong answer will be pop up once the student click on the answer.

FIGURE 4.8: Module 3 – My Family Page

4.2.6   Module 4 – My School

My School module includes school surrounding such as canteen, field and classroom with audio based on pinyin word. It also includes objects used in classroom with audio based on pinyin word too. Like My Family module, there will be match exercise where the student needs to click on the picture first then match with the correct answer. Notification of correct or wrong answer will be pop up once the student click on the answer.
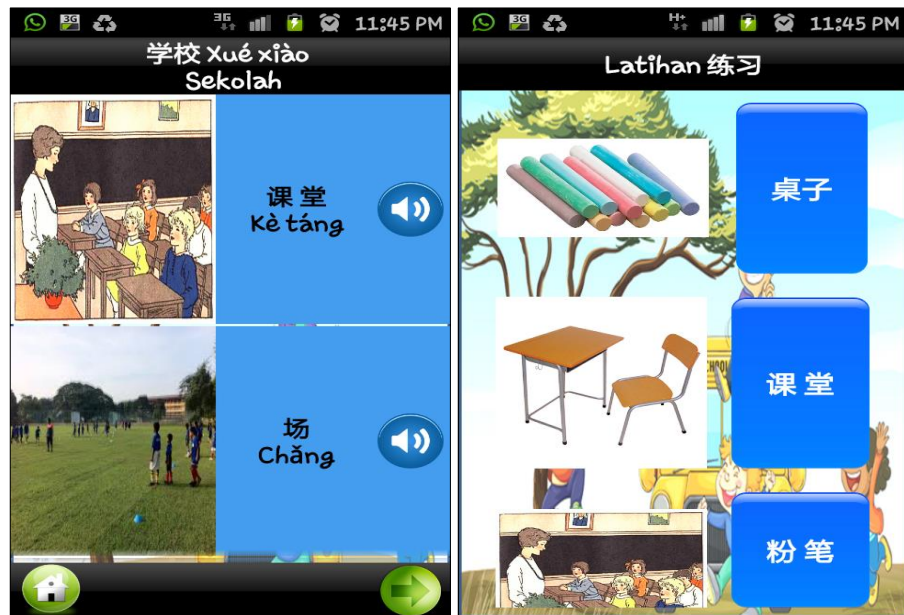
FIGURE 4.9: Module 4 – My School Page

4.2.7   Module 5 – Animals

Animal's module is the last module where the student can learn different types of animal which basically represent the Chinese Year of the Animals. There will be 12 types of animals with picture and pinyin word for the student to pronounce based on the audio played. At the end of the lesson, the student needs to answer three questions. The student need to identify the correct animal based on Chinese character and Pinyin word given. Audio for pronounce Pinyin word also provided at the bottom of the page. Notification of correct or wrong answer will be pop up once the student click on the answer.

FIGURE 4.10: Module 5 – Animals Page

4.2.8 Test Selection Menu and Sample Test Page

There will be three tests to be tested in this learning application. The student can choose test by clicking on the option in the Test Menu. Then, there will be five different questions for each of the test in the application. Figure below show one of the test question where the question is basically based on MCQ question. The student needs to answer all question by click the radio button then proceed with clicking submit (*Hantar*) button at the end of each test.

FIGURE 4.11: Test Selection Menu and Sample Test

4.2.9 View Score Performance (Student) Page

One of the functions for students is to view score performance. After done with test, the student can check the marks for each test in Score Performance function. It will be updated when the student try again the test for next round.

FIGURE 4.12: Score Performance (Student's View)

4.2.10 Teacher's Log In and View Score Performance Page

Teacher will have the same login page as the student where he/she needs to log into with user-defined user name and password. After login successfully, the teacher can view a list of name with score according to respective tests for those who had registered in the application. Thus, the teacher can keep track who had registered with their score performance.

FIGURE 4.13: Log in Page and Score Performance (Teacher's View)

Note

Interface background is derived from Cartoon School Bus Children Scene at *http://xooplate.com/templates/details/15240-cartoon-school-bus-children-scene*

4.3   RESULTS AND DISCUSSION OF THE USABILITY TEST

The system had been tested with school children when the system was almost completed. The system is tested by 10 students under the instructions of the teacher and the developer. Each student tested all the lessons and exercise with accompany by their friend. Figures below shows a group of student tested the application under developer supervision.

FIGURE 4.14: Application System Testing

After the application prototype testing, the students need to fill in survey feedback form (*Refer to Appendix E, page vii*). The purpose of the survey is to collect the feedback from students regarding the usage of the application. There will be 4 questions in the feedback form which basically related to the interest of students, user friendly application and also understandable modules. The results from the survey are summarized as shown in the bar chart in Figure 4.15.
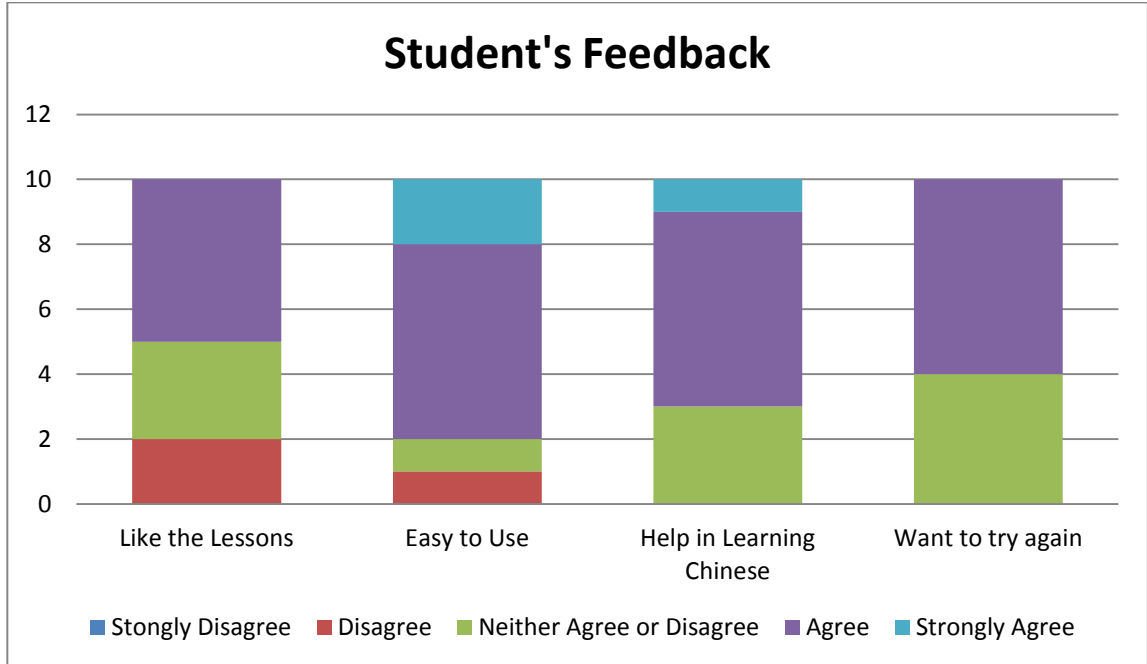
FIGURE 4.15: Student's Feedback for Application System Testing

The results in the bar chart show that five out of ten respondents like the modules lesson in the application. They like to answer the questions provided at the end of each module. There are also familiar with the modules because they had learned it in class and the application is a revision for them to learn Chinese language anytime and anywhere they want. However, some of them dislike the modules in the application because it is limited and it is easy for them.

Moreover, six out of ten respondents seems want to try the application again if it is available in the future as additional learning tool to learn Chinese Language. This is because they found it is interesting to learn with new approach by using mobile device. However, there is a limitation for those who do not have smart phone and their parents not allowed them to use smart phone at their age. That is why some of them neither agree nor disagree to try the application again in the future.

Regarding the modules, the students agree that it can help them in learning Chinese Language based on the short lesson and exercises. But, two of the respondents feel that the lessons are not enough and they want to learn more with a lot of exercises. There will be future enhancement for the modules learning part where the teacher may upload the learning materials such as exercise in the application so that the students will have variety of exercises.

Lastly, the students not agree with the usability of the application. The students feel that the application is not easy to use because some of them had never experienced using smart phone before and find difficulties in using it for the first time. Due to this problem, the narrator in the application could help the students if it includes clear instructions in the narration audio.

Apart from the student's feedback, the teacher as the observer of the testing are also require to give some feedback regarding the application. Firstly, the teacher is required to explore the modules and ensure that all the modules are based on the learning syllabus of *Bahasa Cina Kebangsaan* Standard 1. Figure 4.16 below shows that the teacher try and explore the application by herself. After done with exploring the application, the teacher was asked to evaluate it by filling up feedback form (*Refer to Appendix D, page VI*).

FIGURE 4.16: Teacher Explore the Application

Due to only one teacher teaching *Bahasa Cina Kebangsaan* in SK St. Bernadette's Convent, the result shows in Figure 4.17 below will only involve one respondent.
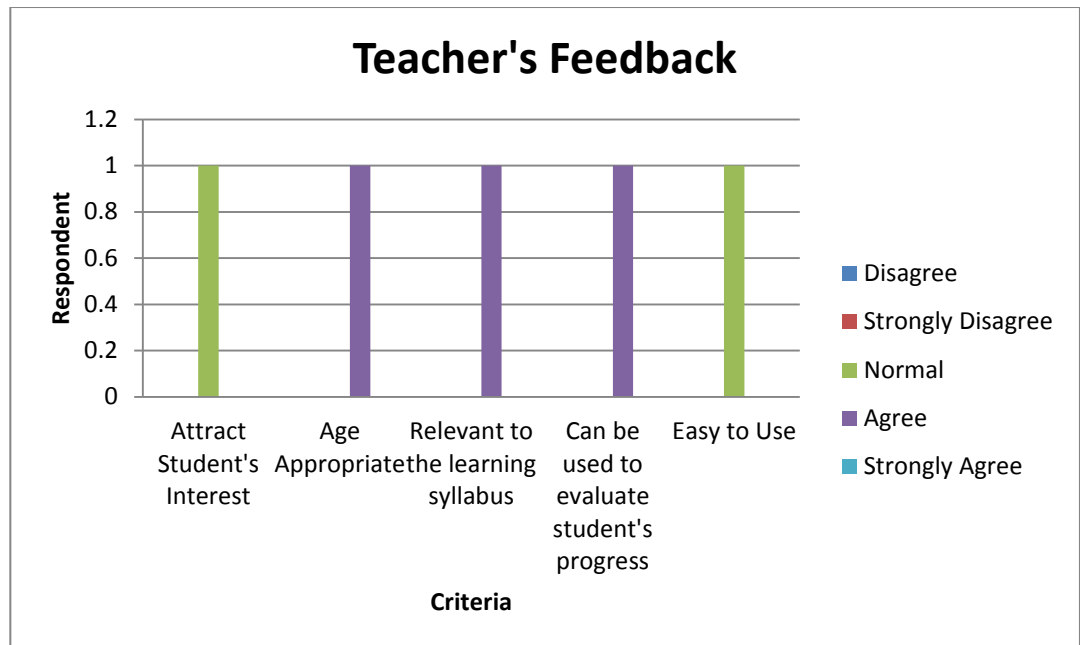

FIGURE 4.17: Teacher's Feedback for the System Testing

The evaluation of the teacher show that the application is able to attract student's interest based on the observation during user testing in the class. The students were excited to try learning BCK with different approach which is by mobile learning application. Furthermore, the application is ages appropriate due to the modules content are mainly designed for Standard 1 student learning *Bahasa Cina Kebangsaan* based on integrated curriculum.

Plus, the modules are relevant to the content teaching in the classroom thus they can really apply it as an additional tool for learning BCK. The application can be a revision for them to revise back what they had learnt in class during non-class hour. The student's progress are also can be evaluated using this application since it has the function for the teacher to track the student score of each test they take. The students' score displayed in the score progress is arranged according to the user that had registered in the application.

Lastly, the teacher neither agrees nor disagrees on the usability of the application. She feels that the narrator in the application is not enough in giving clearer instructions for the students especially for the first timer in using mobile device. Despites all the limitation of the application, the teacher believed that by using the application as additional learning tool, the student may maintain and develop their interest in learning *Bahasa Cina Kebangsaan* (BCK) as their second language.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1   CONCLUSION

In conclusion, the advancement in the field of Computer and Information Technology had broadened the scope of education in Malaysia. From traditional based learning environment, to electronic learning environment then upgrade to the new way of learning known as mobile learning that had been widely implemented in developed countries such as USA and UK. Ministry of Education in Malaysia should really pay a lot of attention to the mobile learning approach because it is getting popular nowadays as the technology advances day by day. With mobile learning, learning session can be done not only within class hours, but anytime and anywhere. Moreover, with this new approach of learning, learners may increase their interest of learning new language in the effective teaching environment by using mobile application as additional learning tools.

The preliminary study had been conducted in SK St. Bernadette's Convent, Batu Gajah to gain better understanding regarding the problem exist, the learning approach in learning BCK as second language for non-Chinese students and also modules to be included in the application.

After three months developing the application, the prototype application is tested with 10 students in standard 1 taking BCK as their elective subject at the same school. The results of the testing showed the excitement of the student towards the application which is a good sign for the implementation as additional learning tool in the real learning environment in class in the future. Overall, this application may increase the interest of young children to learn BCK as their second language.

5.2   RECOMMENDATIONS

There are still some improvements of the application to be made in the future in order to make it more reliable and interactive for young children to maintain their interest in learning BCK as second language by using mobile learning application. For future enhancement, the following features need to be added in the application:

(a) Teacher can upload materials such as learning modules and exercise from computer to the application.

(b) The learning modules with exercise can include writing Chinese characters correctly with the correct stroke order.

As a consequence, the learning modules and exercise in the application can always be updated and the students will have variety of learning modules and different exercises throughout the learning. Meanwhile, for the second recommendation, the ability to learn writing Chinese character in mobile application is a great way to learn Chinese character with correct stroke order.

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APPENDICES

APPENDIX A: Gantt Chart (FYP1 & FYP2)

	Task Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1	Planning Phase								
2	Research on Preceding Studies								
3	Identify Problem and Propose Solution								
4	Clarify Scope, Goal and Objective								
5	Submission of Extended Proposal								
6	Analysis Phase								
7	Prepare system requirement								
8	Conduct Survey and Interview								
9	Analyze System Requirement								
10	Analyzes user needs from Survey								
11	Proposal Defense								
12	Design Phase								
13	Develop UML Diagram								
14	Design the User Interface								
15	Familiarize with Android Programming Language								
16	Coding the User Interface								
17	Submission of Interim Report								
18	Implementation Phase								
19	Prototype Development								
20	Submission of Progress Report								
21	Usability Testing								
22	Pre-SEDEX Presentation								
23	Submission of final report (draft)								
24	Submission of Technical Paper								
25	Oral Presentation (Viva)								
26	Submission of Final Dissertation								

APPENDIX B: Interview Questionnaires

Interview Session

Objective of Interview:
- To gain relevant information and knowledge that may be applicable for developing a project prototype.
- To identify the main features or functionalities to be integrated into project prototype.

Date : _____

Name of Interviewee: _____

Interview Questionnaires

1. Introduction. Background of teacher. Experience in teaching Chinese Language in primary school. Total number of students taking Chinese language.
2. How Chinese language is been taught in primary school? May I know the syllabus of Chinese language subject?
3. Based on your experience, is there any difficulty in teaching Chinese language towards young children?
4. How to attract children interest and attention to learn this subject?
5. What is the performance of children in learning Chinese language so far?
6. Is there any computer-based learning in teaching this subject? If yes, explain.
7. Are you interested if there is a mobile learning application to be used in teaching and learning process of Chinese language? Would you use it, if any? Please comment.
8. What do you want to be included in mobile learning application? *I.e. Different type of modules. Exercise. Performance (Score).*
9. Do you think students will like the new approach which is mobile learning application in learning Chinese language?

LAMPIRAN A

BORANG MAKLUMAT PELAJAR

1. Nama   :_____

2. Darjah   : _____

3. Jantina   :

      ❖ Lelaki   (   )
      ❖ Perempuan   (   )

4. Bangsa   :
      ❖ Melayu   (   )
      ❖ Cina   (   )
      ❖ India   (   )
      ❖ Lain-lain   (   )   Nyatakan:

      _____

BORANG SOAL SELIDIK

Lampiran B: Soal selidik tentang minat pelajar dan penggunaan alat bantu mengajar terhadap proses pengajaran dan pembelajaran untuk Bahasa Cina Kebangsaan.

Arahan: Sila tandakan sejauh manakah anda bersetuju berdasarkan perasaan dan pendapat anda sendiri tanpa terpengaruh atau disuruh oleh orang lain. Dengan menggunakan skala dari 1 hingga 5, sila tandakan (/) pada satu jawapan sahaja. Sila pastikan anda menanda pada setiap pertanyaan.

1	**Sangat tidak setuju**
2	**Tidak Setuju**
3	**Kurang setuju**
4	**Setuju**
5	**Sangat Setuju**

Sikap dan minat pelajar terhadap pengajaran dan pembelajaran Bahasa Cina Kebangsaan.

Bil	Pertanyaan	1	2	3	4	5
1	Saya sangat meminati mata pelajaran Bahasa Cina Kebangsaan.					
2	Saya amat suka dan memahami kaedah pengajaran yang disampaikan oleh guru saya sekarang.					
3.	Mata pelajaran Bahasa Cina Kebangsaan susah bagi saya untuk pelajari.					
4.	Saya tahu dan pandai menggunakan					

	telefon pintar mudah alih (*Smart Phone*).					
5.	Saya pernah menggunakan telefon pintar mudah alih (*Smart Phone*) untuk penggunaan pembelajaran.					
6.	Saya suka menggunakan telefon pintar mudah alih (*Smart Phone*) untuk tujuan pembelajaran.					
7.	Saya bersetuju jika pengajaran dan pembelajaran Bahasa Cina Kebangsaan menggunakan telefon pintar mudah alih (*Smart Phone*) di sekolah.					
8.	Penggunaan telefon pintar mudah alih (*Smart Phone*) menjadikan saya lebih berminat dalam sesi pembelajaran.					

Terima Kasih ☺

APPENDIX D: System Feedback Survey (Teacher)

Section A: General Information

1. School Name: _____

2. Gender
   o Male
   o Female

3. Years of experience in teaching Chinese language in primary level.
   o Less than 5 years
   o 5 – 10 years
   o Over 10 years

Section B: System Feedback

Please rate the following according to your opinion.
(1 = Strongly Disagree to 5 = Strongly Agree)

	1	2	3	4	5
1. The system is able to attract children's attention.					
2. The system is age appropriate.					
3. The system is relevant to the content teaching in the primary school.					
4. The system is can be used to evaluate children's progress.					
5. The system is easy to use.					

~Thank you for completing this survey~

LAMPIRAN A

BORANG MAKLUMAT PELAJAR

1. Nama   :_____

2. Darjah   : _____

3. Jantina   :

   ❖ Lelaki   (   )
   ❖ Perempuan   (   )

4. Bangsa   :
   ❖ Melayu   (   )
   ❖ Cina   (   )
   ❖ India   (   )
   ❖ Lain-lain   (   ) Nyatakan: _____

LAMPIRAN B

BORANG TINDAK BALAS PENGGUNA

Lampiran B: Borang ini bertujuan untuk mengetahui tindak balas pengguna terhadap aplikasi ini dalam pengajaran dan pembelajaran untuk Bahasa Cina Kebangsaan.

Arahan: Sila tandakan sejauh manakah anda bersetuju berdasarkan perasaan dan pendapat anda sendiri tanpa terpengaruh atau disuruh oleh orang lain. Dengan menggunakan skala dari 1 hingga 5, sila tandakan (/) pada satu jawapan sahaja. Sila pastikan anda menanda pada setiap pertanyaan.

1	**Sangat tidak setuju**
2	**Tidak Setuju**
3	**Kurang setuju**
4	**Setuju**
5	**Sangat Setuju**

Bil	**Pertanyaan**	**1**	**2**	**3**	**4**	**5**
1	Saya berasa amat seronok menggunakan aplikasi ini.					
2	Aplikasi ini mudah dan senang untuk digunakan.					
3.	Penggunaan aplikasi ini membantu saya untuk lebih memahami pembelajaran Bahasa Cina.					
4.	Saya akan menggunakan aplikasi ini untuk membantu saya lebih memahami Bahasa Cina.					