

MALAYSIAN SIGN LANGUAGE FLASH CARD MOBILE APPLICATION

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BACHELOR OF TECHNOLOGY (HONS)
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Malaysian Sign Language Flash Card Mobile Application

By

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Dissertation Submitted In Partial Fulfilment of
The Requirements For The
Bachelor Of Technology (Hons)
(Business Information System)
September 2012

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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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CERTIFICATION OF APPROVAL

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UNIVERSITI TEKNOLOGI PETRONAS
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Abstract

Malaysian particularly is lacking the awareness to communicate with speech/hearing impaired OKU. The purpose of this project is to develop a mobile application intended to aid users to learn and assist communication using Malaysian Sign Language. The current problem faced by current solutions that aims to connect the communication gap between speech/hearing impaired OKU and hearing people such as through books and the internet is in the fact that they are not practically available and readily-accessible in certain circumstances. Classes and translator will cost a fortune to acquire; therefore, they are a rather undesirable alternative to improve communication between speech/hearing impaired OKU and hearing people as well as aiding the learning process of Malaysian Sign Language. The proposed system had developed to include a solution to all these problems. For one, being a mobile application allows for it to be readily-accessible and available at all times. It does not require any connection to the internet which can be limited in certain places or times. The application would allow hearing people to translate the words they wish to communicate to the speech/hearing impaired OKU as a hand gesture for the person to perform. The prototype had been developed using the Netbeans IDE (7.1.1) with Android SDK plug-ins due to the system being targeted for the current time being at the Android platform. The basic requirements of the system were based on the research conducted during this study to determine what criteria are to be studied and implemented in the application.

CHAPTER 1

PROJECT BACKGROUND

1.0 Chapter Overview

This chapter will be providing a quick introduction to the proposed project which will cover the background of study, problem statements, objectives and the scope of study.

1.1 Problem Statement

Malaysian particularly is lacking the awareness to communicate with speech/hearing impairment OKU.

MySL is the official language for speech/hearing impairment OKU, and had been established since 1998. However, the awareness of MySL among the non-disabled people is quite disappointing. Majority of Malaysian remains ignorant of MySL, and neglect the need to learn MySL which this is disrespectful of those with speech/hearing disabilities.

There are many instances of difficulties when in case of daily communications between non-disabled and OKU. These would cause miscommunications that lead to inequalities among them; in terms of opportunity, benefits and even daily needs.

For equal rights and opportunity, the public must be made aware of Sign Language to communicate to those who are less fortunate.

1.2 Significant of the Project

The proposed project is expected to create awareness for Malaysian to learn MySL by ease the learning of MySL using mobile application as a medium. The proposed project is also hoped to ensure the OKUs could have better communication channel with the non-disabled person.

1.3. Scope of Study

The aim of this project is to create a mobile application that will assist communication using MySQL. The need to have a firm understanding on MySQL is important to understand the language structure as well as having a complete set of signs for plentiful different situations. Therefore, further research on MySQL will be conducted to address these issues. The findings will go into providing a database of all the signs to implement within the application.

Research areas of this project consist of identifying the most suitable design principle that can be applied in developing the system logic and the interface. UAT (User Acceptance Test) will also be conducted in order to test the usability of this system.

1.4. Objectives

The objective of the research is to develop a system that can assist user to communicate better with speech/hearing impairment OKU and learn MySQL with ease. Another objective the system is expected to achieve is the usage among the speech/hearing impairment OKU; where it would be used to assist user with them to learn MySQL from smartphones.

CHAPTER 2

LITERATURE REVIEW

2.0. Chapter Overview

This chapter consist of the literature review which will define key terms, definitions, terminology and explanations on some of the area of study.

2.1 Sign Language Worldwide

A sign language is a language which uses manual communication and body language to convey meaning (Fischer & Susan D, 1974). The sign language is commonly used among the deaf communities around the world; however, the relationship between deaf and hearing had always been difficult. According to McIntosh (2000), deaf children with hearing parents would develop significant lower self-esteem as the parent would find difficulties to relate inaudible child with auditory world; and the romantic relationship between hearing-deaf is more unstable and less satisfying than hearing-hearing or deaf-deaf. The significant studies done for the last 40 years have formed the American Sign Language (ASL) to aid the translation, interpretation, and various educational practice in regards to deaf children (Rose & Smith, 2000).

The ASL was first introduced to Malaysia in the early 1960s by Mr. Tan Yap, the ‘Father of the Deaf’. Through many changes and adaptation to local cultures and context, the government then developed the Malaysian Sign Language (MySL) which has 80% similarity with ASL (Hurlbut, 2005). However, according to survey conducted by Hasuria (2005), most Malaysian had not recognized the importance of MySL as language that should be learn as a mode of communication in order to realize the concept of loving society which had been introduced by the Malaysian government.

There were not many communication facilities available for the deaf in Malaysia, making communications challenging for the speech/hearing impaired. Television was almost useless to deaf viewers as subtitles were always absent, almost non-existent. Malaysian Federation of Deaf (MFD) had come out with E-Pek@k project that helps the Deaf to implement information

technology as a new medium of communication. The project was successful, where ever since the inception, more and more speech/hearing impaired OKUs had been more proficient using IT. However since 2008, the project was suddenly stopped and ceases to be heard ever since.

2.2 Malaysian Sign Language

Malaysian Sign Language had been taught in special educational schools around Malaysia since its inception in 1998. The common misconception ‘only the deaf should know sign language’, should be corrected. As a matter of fact, the deaf community does involve hearing persons who could communicate using sign language; which includes the hearing parents, siblings, students of sign language, interpreters, teachers, as well as the organization that supports the welfare of the deaf (Hasuria, 2009).

According to Hasuria (2009), there are differences in the ‘grammar’ for Malaysian Sign Language as compared to the spoken Malay Language. Table 1.0 shows the example of the differences.

English	MySL
He did not came to class	HE. CLASS. EMPTY
I want to go to the market.	ME. MARKET.
Where does that girl live?	GIRL THERE LIVE WHERE?

Table 2.0

The order of sign eases the signing communication better with more comfortable pace between the signers. There are signs that represent verbs, pronouns, nouns, objects as well as idioms; meanwhile for items that does not have sign to represent them, is signed using finger spelling.

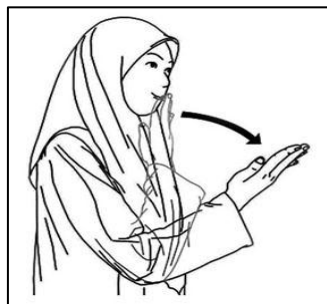


Figure 2.0 MySL for 'thank you'

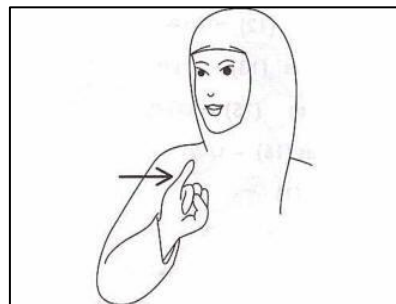


Figure 2.1 MySL for 'me'

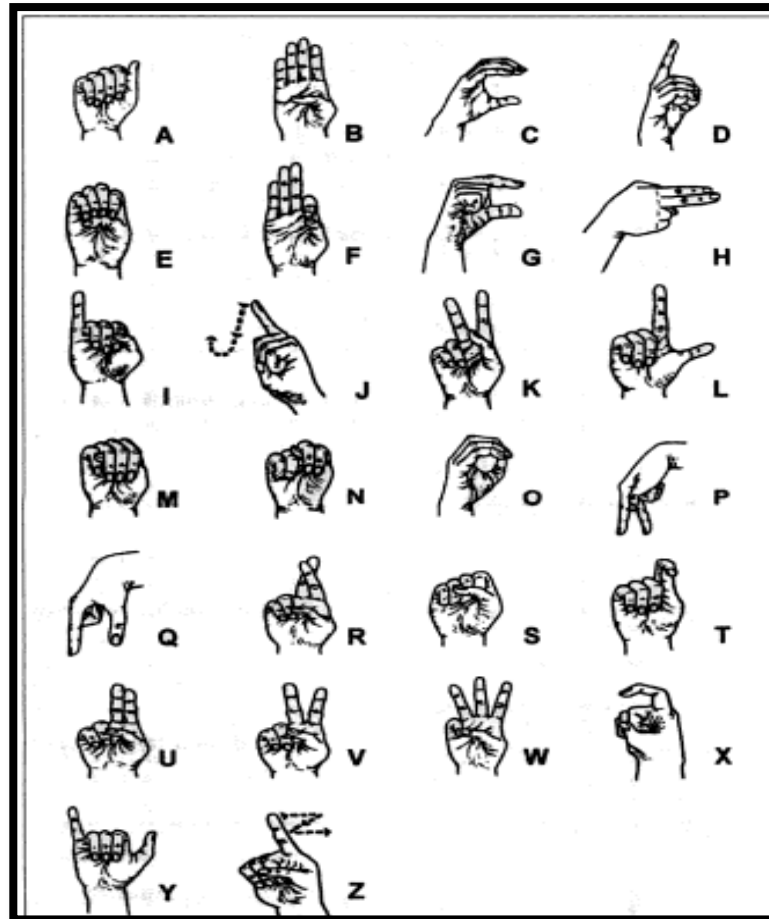


Figure 2.2 MySL Fingerspelling guide

2.3 Integrating Technology with Education

It is not a surprise that humans had focused to integrate technology with the colours and appeal of our surroundings, which leads to the growing presence of multimedia (Robyler, 2000). Educators had seen the strength of the integration of multimedia with learning which includes; enthusiasm of students (McCarthy, 1989), flexibility (Robyler, 2000), development of creativity and critical thinking (Turner, Dipinto, 1992), as well as improved writing and process skills (Dede, 1994).

Stemler (1997) finds that colours, graphics, interactivity and animations have an impact on system effectiveness based on the student participation and response. The usage of multimedia such as music, graphics even videos (through the use of Interactive Videodisc System) in American curriculum shows that the implementation of multimedia in learning is greatly improving day by day (Robyler, 2000).

2.4 Introduction to the Android Platform



Figure 2.3 Android

Android is the operating system (OS) for mobile devices such as smartphones and tablets developed by Google Inc., which is used by a number of different mobile device manufacturing companies such as HTC, Acer, Samsung, Sony Ericson, Dell, Creative, Asus and Toshiba. According to Andy Rubin, the Senior Vice President of Mobile at Google and co-founder of Android Inc. before its acquisition by Google, the numbers of mobile devices that use the Android OS have reached over 300 million devices worldwide as of February 2012 with 850,000 activations per day. As of the third quarter of 2011, Android's market share was estimated to be over 52.5% coming out at the lead in the mobile device market surpassing its main rival Apple Inc. with its iOS platform of mobile devices (Gartner, 2012). It is because of this reason that Android was chosen as the preferred platform of choice for the current implementation of the application.

Currently, there have been numbers of version releases of the Android platform with the current version being Android 4.1 (Jelly Bean). Jelly Bean is claimed to be the fastest and smoothest version of Android yet. Jelly Bean improves on the simplicity and beauty of Android 4.0, and introduces a new Google search experience on Android. Figure 2.4(b) shows the usage share of the different versions of the Android OS.

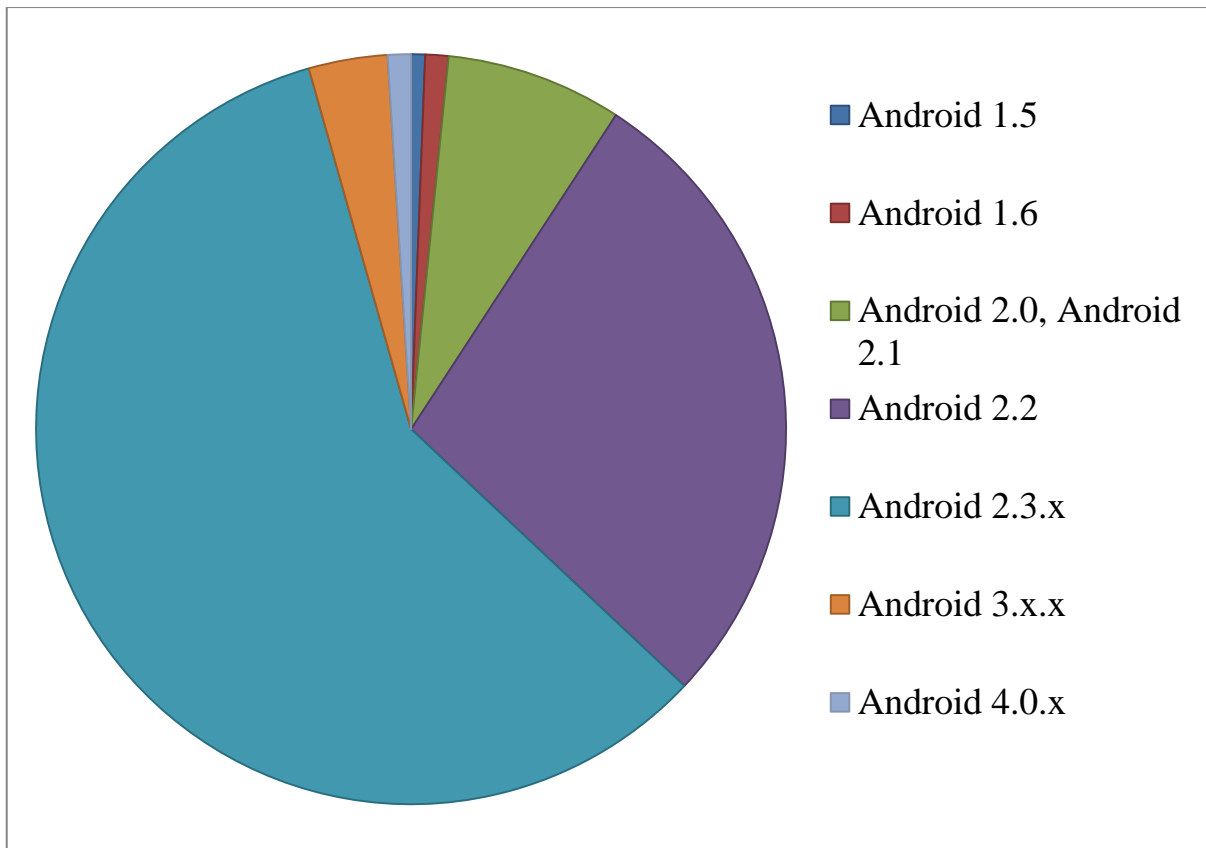


Figure 2.4 Usage Shares of Different Android Versions

From the chart, it makes sense that the development of the application will proceed on Android 2.2 (Froyo) and 2.3.x (Gingerbread) due to a higher number of users using this version of Android as compared to other versions (may be subject to change as development of the application begins around the end of the third quarter of 2012 where there should be an increase in Android 4.0.x users).

2.5 Mobile Application in Aid for Sign Language Learning

While there is no Android Application that teaches MySL, there are multiple Android mobile applications developed to aid ASL learning.

- a. American Sign Language Flash Cards.

The application teaches the alphabets in sign language. While it is free, the application did not teach the full extent of ASL, only the alphabets.



Figure 2.5 ASL Flash Cards

- b. Signing Savvy online sign language resource.

Signing Savvy is a sign language dictionary containing several thousand high resolution videos of American Sign Language (ASL) signs, finger spelled words, and other common signs used within the United States and Canada.

Signing Savvy Member App is for members of Signing Savvy. The app includes the ability to search for and view thousands of high-quality sign pictures. However, this is only applies to Signing Savvy members only, normal user can only see sign of the day.



Figure 2.6 Signing Savvy Mobile Application

c. ASL Translator

The application is very helpful where user can search for a phrase, word or idioms and the application would connect to its online database of videos and show the phrase, word or idioms in sign language. Its only weakness is that it requires users to connect to the Internet to see videos of ASL usage.

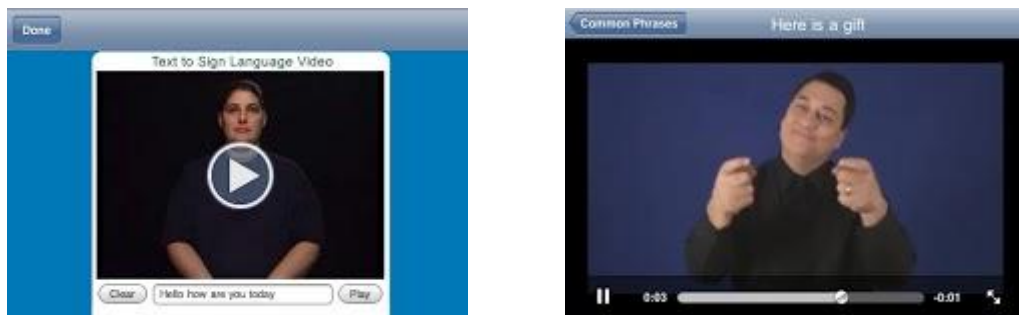


Figure 2.2 ASL Translator App

CHAPTER 3

METHODOLOGY

3.0 Chapter Overview

This chapter represents the strategies that consist of collecting and analysing data collected in order for meaningful analysis and interpretations of the research findings to be present as well as giving the understandings on how the research will be carried out — which includes the mode of data collection, how the data is analysed and the research tool design.

3.1. Research Methodology

Vital information for this research work will be collected through primary and secondary sources with the combination of:

- a) Unstructured Interview with hearing/speech impairment OKUs, and a teacher who teaches MySL.
- b) Acceptance survey will be conducted on the selected population, which consist of the students and lecturers of Universiti Teknologi PETRONAS, the general public of Bandar Seri Iskandar, as well as hearing/speech impairment OKUs.

3.1.1. Sample Design

Defining the population

An acceptance survey will be conducted in the Universiti Teknologi PETRONAS campus to the students and lecturers, as they are represent views from multiple states in Malaysia; the local residence of Bandar Seri Iskandar, regarding the importance of communications between hearing/speech impairment OKUs and the non-disabled.

Sample Size

The initial total number of 100 respondents is used to represent the overall population of Perak, which general assumption should be made with caution and knowledge regarding the local social structure.

Sampling Method

Opportunity sampling is a type of nonprobability sampling which involves the sample is selected from that part of the population which is close to hand. A sample population selected because it is readily available and convenient. However, since the method is open to tendency bias and does not represent the population as whole, no general assumption is made without knowledge of the social structure of the population itself.

3.1.2. The use of unstructured interview to gather first-hand data on communication issues

Unstructured interviewing is done as the researcher has developed enough of an understanding of a setting to have a clear outline for the discussion with the informant, but still remains open to having the understanding of the area of inquiry open to revision by respondents. According to Burgess (1984), the kinds of questions posed are crucial to the unstructured interview. The researcher should be good at questioning, probing, and adjusting the flow of conversations at an appropriate level.

3.1.3. Designing of data collection tools as questionnaires

The design of the acceptance survey will consist of close-ended questions. This is to enable conveniences for the respondents to complete the survey without trouble.

3.2. Project Development

3.2.1. Project Activities



Figure 3.0 Project Activities (Initiation-Design)

Initiation

The project starts from the discussion of ideas for the Final Year Project (FYP) with project supervisor. The project initiation begins when the needs or opportunities for the project are identified. The idea of the project will then be written properly for the project proposal.

Concept Development

Scope of the concepts is well-defined and literature review is carried out comprehensively to gain sufficient knowledge on the project problem statement.

Planning

In this phase, Gantt chart is prepared to ensure that all project activities are cleared and can be done by the time allocated. The planning phase also include the analysing of the system concept, conducting feasibility studies as well as conducting preliminary investigation of system requirement.

Requirement Analysis

In this phase, the result from the preliminary investigation is translated into a process flow diagram to ease the system developer's understanding regarding the system requirement.

Concept Design

This phase involves the design of model diagram; where the application development ideas are translated into a visual concept diagrams or proposed system interfaces.

3.2.2. Prototyping RAD

The analysis, design and implementation are performed concurrently and repeatedly until completed. The prototype is the first part of the system which will then evolve into the final system.

The greatest advantage of performing prototyping methodology is that the developer can quickly provide a system for the system to interact with, then improving the system after initial response from the users.

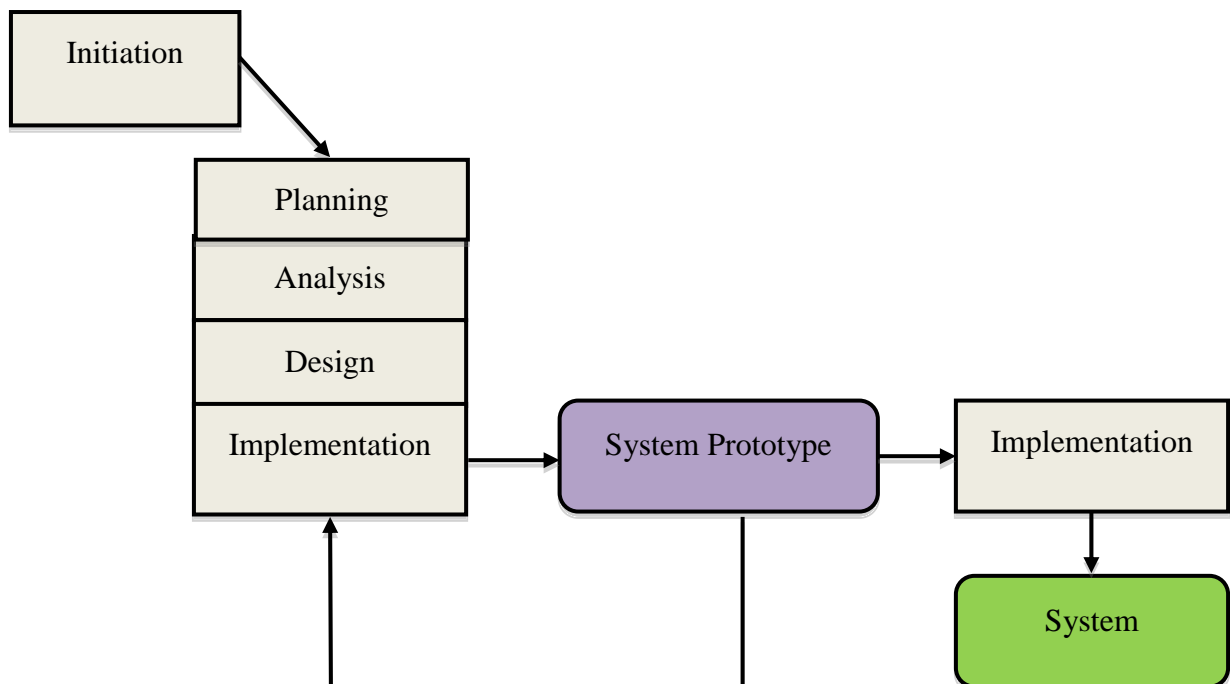


Figure 3.1: Prototyping Methodology Diagram

Planning Phase:

During this phase, planning for what needs to be studied to proceed with development of the system takes place. Research is conducted to determine what criteria needs to be scrutinized in order to establish an understanding on the basic requirements of the system, what functionalities are required, and what data is required to determine these factors. Further research on existing technologies that address the problem of communication between deaf and hearing people also need to be conducted to get a benchmark on the basic functionalities of the system.

Analysis Phase:

The analysis phase is conducted to perform a user need analysis to gather data and statistics that will determine the requirements of the system. This phase will involve conducting surveys and interviews to be conducted on the Deaf community to understand what technical difficulties they face when trying to communicate with hearing people. Any incomplete requirement analysis that occurs during this stage will be addressed during the prototyping phase that will allow for further inspection and testing. The deliverables of this stage will allow for the design of the prototype

Prototyping Phase

A prototype of the system will be developed during this phase. This will allow for numerous testing of the product during the iteration period for a number of purposes such as validating the system specifications and requirements, addressing any newly discovered requirements, and uncovering any design flaws. This phase will be repeated continuously to allocate room for improvement of the system until the prototype reaches the level of performance and scope that is expected of the system.

Implementation Phase

Upon finishing the initial prototype of the system and reaching a significant level of approval in terms of performance and execution, implementation of the system is conducted with the target user. At the end of this phase, the final product, the development of the system is complete and the final deliverable of the project is the perfected application.

3.2.3. Project's Gantt chart

Table 3.0 FYP Gantt chart

No	Detail/Week	1	2	3	4	5	6	7	8	9	10	11	12	
1	Conducting Research	█	█					Mid Semester Break						
2	Preparing project proposal		█	█										
3	Gathering Sources			█										
4	Initiating Extended Proposal <ul style="list-style-type: none"> • Problem Background • Literature Review • Methodology 			█	█	█	█							
5	Extended Proposal Submission						◆							
6	Proposal defence									◆				
7	Gathering requirements from expected user through <ul style="list-style-type: none"> • Interview 									█	█			
8	Analyzing Findings										█	█		
9	Drafting System Diagram Design											█	█	█
10	Compiling Diagrams												█	█
11	Interim Report Submission													◆

Final Year Project Part II

Table 3.1 FYP2 Gantt chart

Detail Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Programming Research	█													
Prototype Development		█	█	█	█	█	█	█	█					
Submission of Progress Report I		█												
Submission of Progress Report II							█							
Seminar								█						
Pre-SEDEX										█				
Submission of Final Report Draft											█			
SEDEX												█		
Oral Presentation													█	
Submission of Final Dissertation														█

3.3. Development Tools

Table 3.2 Development Tools

No	Category	Item	Description
1	Hardware	Mobile Device (PC)	Intel® Core™ 2 Due CPU
		40G disk drive	2.00GHz, 2000Mhz, 2Core(s)
		Pentium 4	100Mbps Ethernet
		17 inch monitor	80GB Hard Drive
			2GB DDR RAM
2	Development Tool	Netbeans 7.1.1	Android SDK for Windows
		Real Audio	Developing Audio Files
		Basic4Android	Rapid Application Development Tool
3	Operating System	Microsoft Windows 7	Microsoft Windows 7
4	Network	Always-on LAN or broadband recommended	Dual 100 Mbps Ethernet
5	Samsung Galaxy W	Android 2.3.6 Gingerbread	Android

Mobile Device

The mobile device to be used during the development and testing of the system is a smartphone running on Android 2.3.6. The system is designed to fit into high resolution screen with the capability to support older API version of Android while having standardized view in greater screen resolution of larger phone and newer android API. The system will be simulated and developed on Samsung Galaxy Wonder.

Software

The coding of the system will be conducted using an IDE, in this case the NetBeans 7.1.1 which is supported by the Android SDK. This will allow for easier set up of the project as well easier integration. The coding of the system will be conducted using JAVA and XML which is fully supported by NetBeans. The assistance of Basic4Android as a WYSIWYG (what you see is what you got) layout editor complements the development of the system.

CHAPTER 4

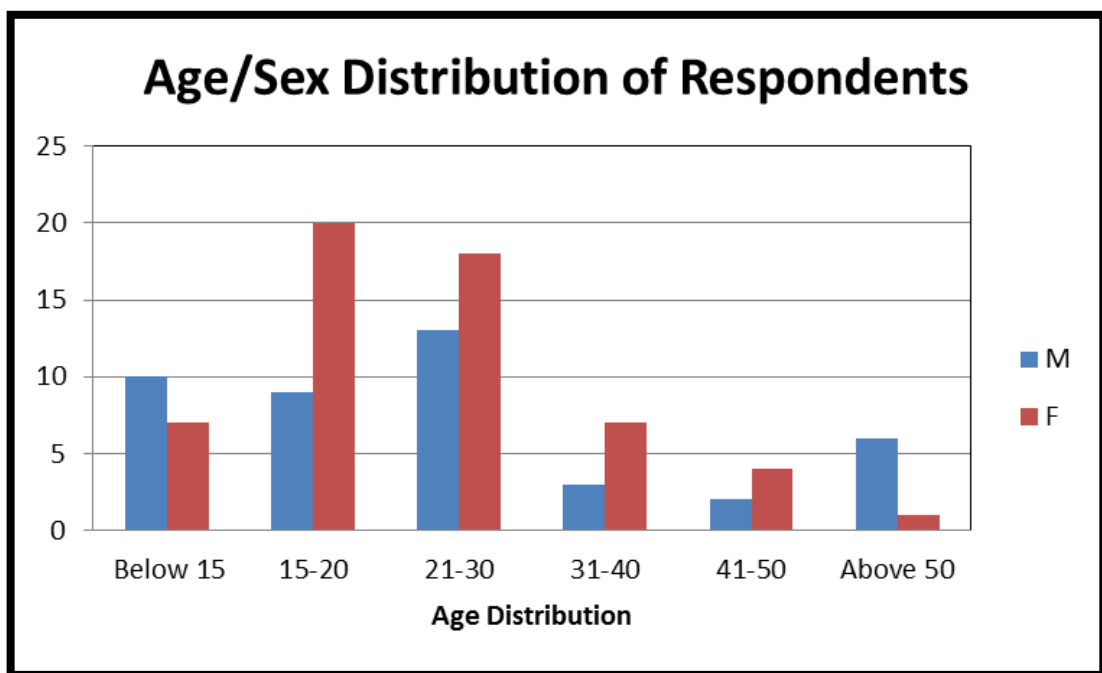
RESULTS AND DISCUSSION

4.0 Chapter Overview

This chapter will show the result from the interviews which is translated into a Use Case Diagram, Flowchart as well as the concept design of the proposed application.

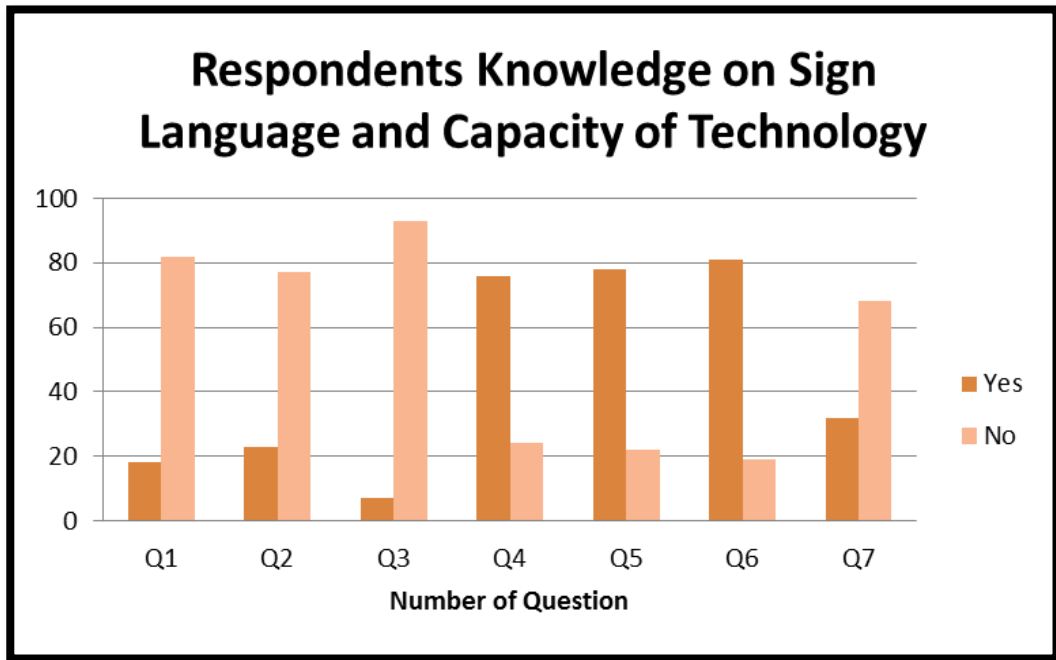
4.1 Result of Survey

Based on the survey of 100 respondents conducted in Bandar Seri Iskandar, a general view of the population is generated.



Graph 4.0 Age/Sex Distribution

Graph 1.0 shows the age/sex distribution of the respondents. In general, there are in total 43 Male respondents and 57 Female respondents. The majority age group is 15-20 years old; this is mainly because the population is composed by universities and high school students. The minority age group is 41-50 years old.



Graph 4.1 Respondents' Knowledge on Sign Language & Capacity of Technology

Graph 2.0 shows the knowledge on Sign Language of respondents and their capacity of technology.

Q1 – Q4 represents the respondents' knowledge regarding Sign Language. The result of the survey shows that 82% of the respondent does not have family members with speech/hearing impediment. There are 77% of the respondent have never experienced situation where they have to communicate with speech/hearing impediment OKUs. The graph shows only 7% of the respondent able to communicate using Sign Language, which this is a very disappointing; yet expected result from the questionnaire. However, the respondents shows positive result when 76% have the willingness to learn Sign Language if they have the chance.

Meanwhile Q5 – Q6 represent the technology capacity among the respondents. 78% of the respondent replied that they own at least one smartphone. The brand of phone that regularly shows in the questionnaire is Samsung Galaxy series and iPhone series. 81% of the respondents believe that learning should be integrated with smartphones; and some of the respondents already have the capacity to learn using their smartphones. However, only 32% of the respondents are willing to pay for Malaysian Sign Language learning application.

4.2 SWOT Analysis

Based on the survey and the observation conducted, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis can be made.

Table 4.0 SWOT Analysis of MySL Flashcard Application

• Strength	Weaknesses
<ul style="list-style-type: none">• To date, MySL Flashcard is the first MySL learning application in the Android market.• Categorization of words allow for easy access	<ul style="list-style-type: none">• Does not provide animated movement of hand gestures
Opportunity	Threat
<ul style="list-style-type: none">• The deaf community would support the further improvement of the application.• Deployment of the application can reach a wider audience with possibilities of porting the application to other platforms such as the iOS, Symbian and Windows Mobile upon completion.	<ul style="list-style-type: none">• General public consumers' interest might be limited without proper channels of advertisement.• Relatively low familiarity with Android smartphones might affect effectiveness of some people in using the application.

4.3 Use Case Diagram

The Use Case Diagram is a list of steps outlining interactions between ‘actors’ with the system to achieve a goal (Alexander &Beus-Dukic, 2009).

MySLFlashCard user will have three main use cases, which are;

- i) View Word of the Day
- ii) Word Search
- iii) View Words by Category

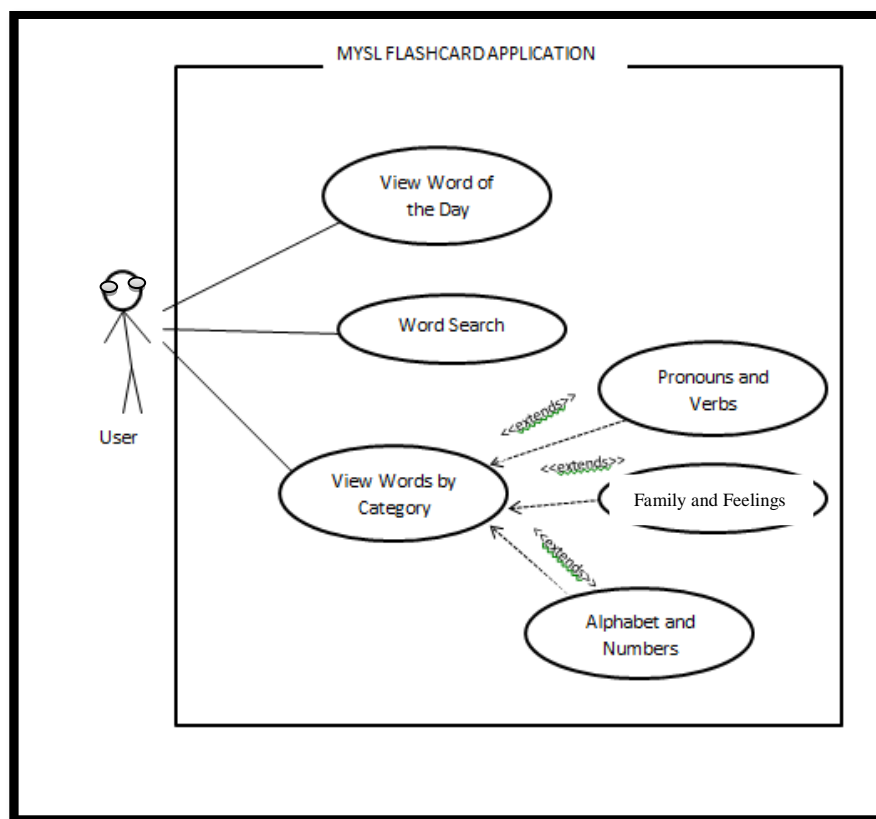


Figure 4.0 Use Case Diagrams

4.4 Activity Flow Diagram

Activity Flow Diagrams are used to describe the business and operational workflows of components in a system and helps to visualize a step-by-step solution to a given problem.

The system flow is described with the three use cases from the use case diagram;

- i) View Word of the Day

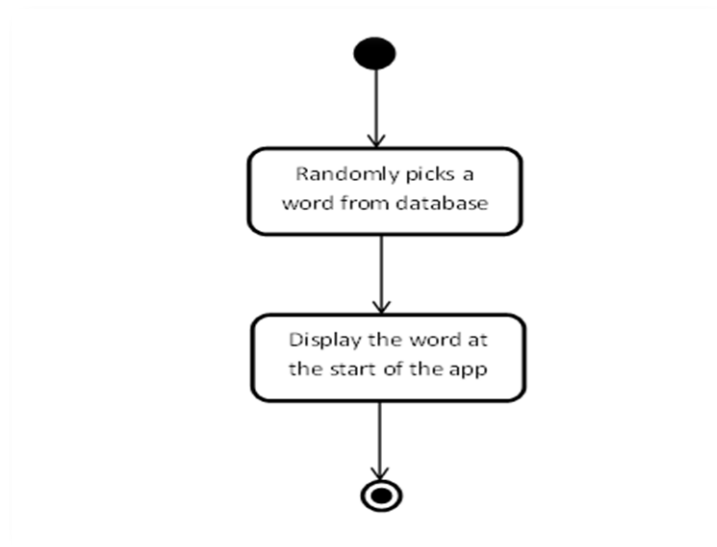


Figure 4.1 Activity ‘Word of the Day’ Diagrams

This function allows user to learn random new sign every time the user access the application. By randomly generating the sign, the user would have learned different sign for every access. This function also helps the user to every time the application is restarted to refresh his/her memory for better learning of the sign language.

ii) View Words by Category

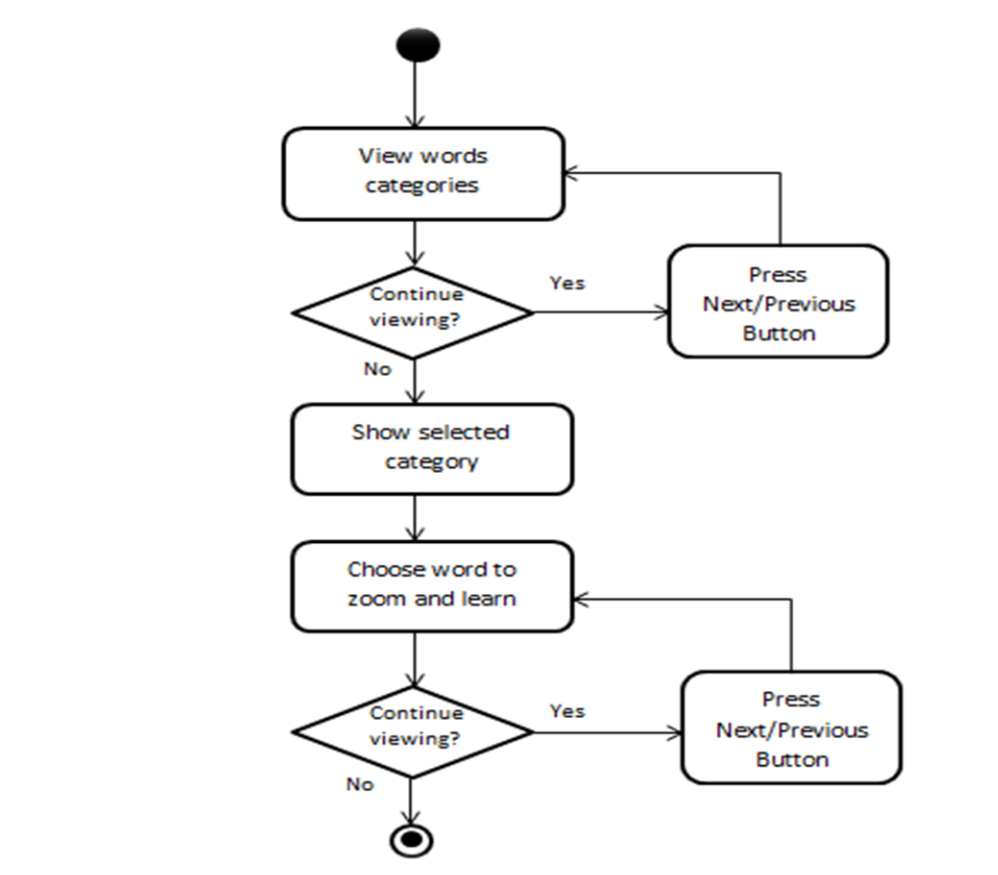


Figure 4.2 Activity ‘View Words by Category’ Diagrams

By sorting the signs by categories, user can browse through the categories and learn MySQL in a more systematic method. The categories include; Alphabets, Numbers, Pronouns, Greetings, Feelings, Family, Communications and Questions. These categories will be updatable in the future. However, sufficient signs are given in the first place for enriched user experience.

iii) Word Search

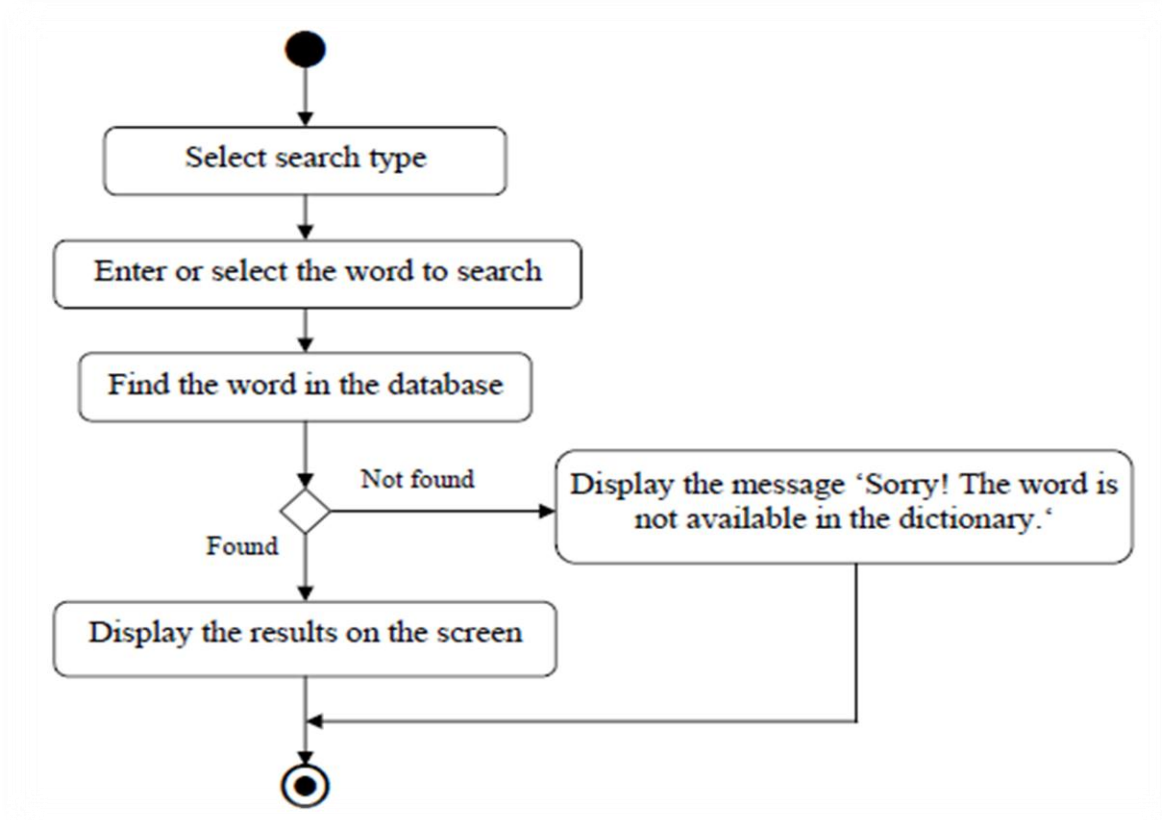


Figure 4.3 Activity 'Word Search' Diagram

By utilizing the Word Search capability of the application, the user will be able to search for specific sign without hassle. This function also saves user time if the sign language is needed to be used impromptu. User will only have to type the word or phrase him/her looking for and the resulting search will enable user to quickly use the sign language to convey the user's intention.

4.5 Class Diagram

Initial Class Diagram

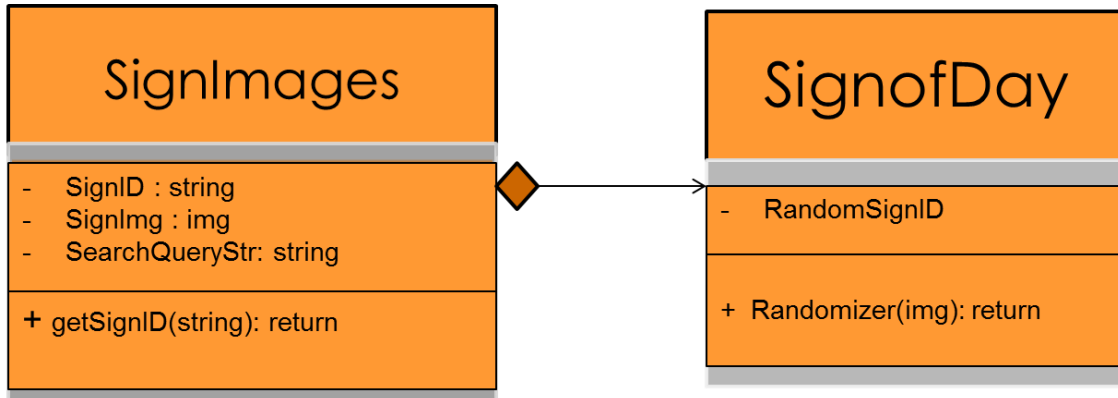


Figure 4.4 Initial Class Diagram

Completed Class Diagram

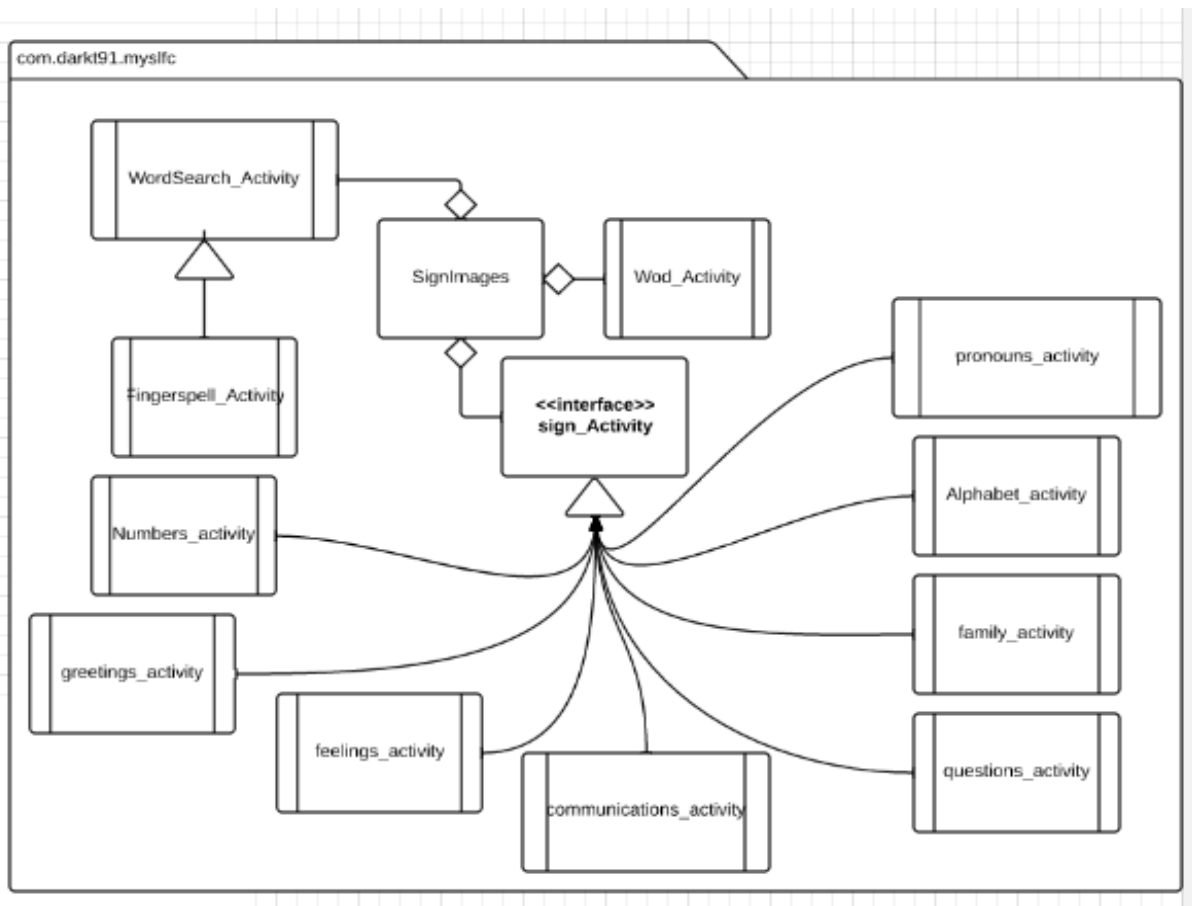


Figure 4.5 Completed Class Diagram

4.6 Initial Interface Concept Design

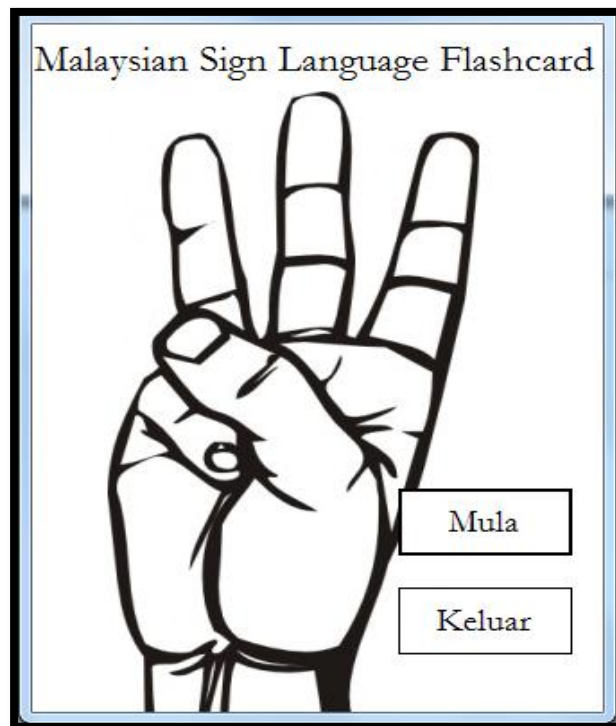


Figure 4.6 Home Screen of MySLFlashCard



Figure 4.7 Word of the Day Screen



Figure 4.8 View Word by Category Screen

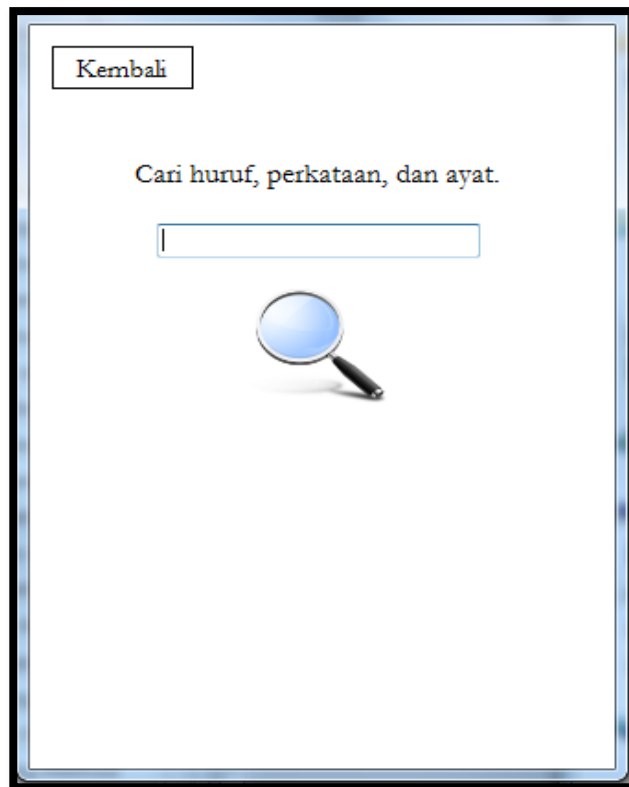


Figure 4.9 Search Word Screen

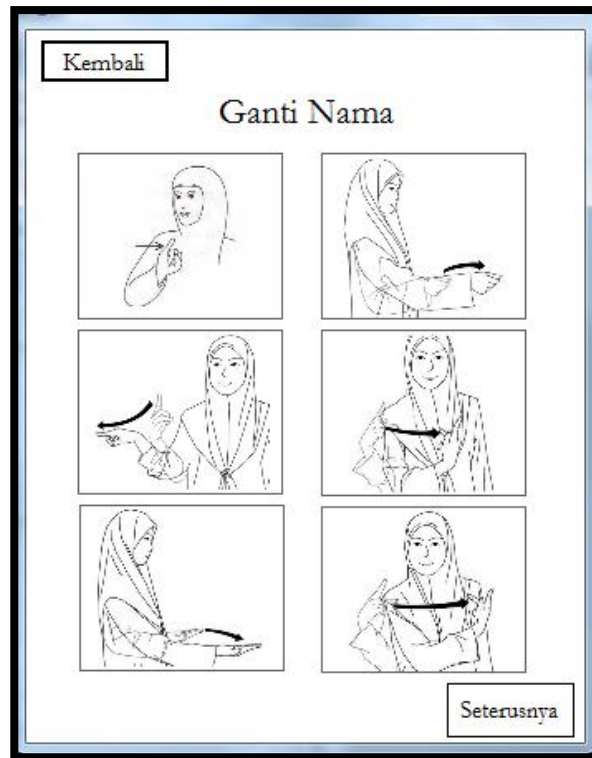


Figure 4.10 Word by Category: Pronoun-‘Kata Ganti Nama’

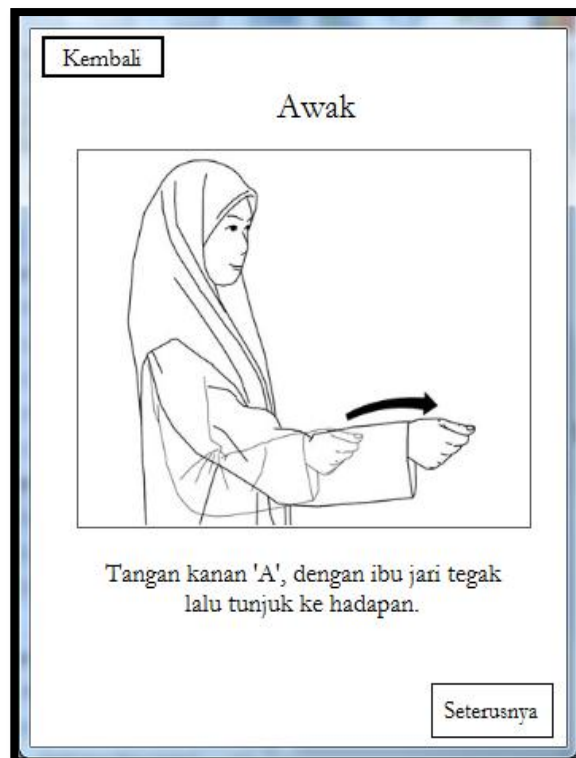


Figure 4.11 Example of Word: 'Awak'

4.7 Logo and Application Icon

Logos are the single biggest representation of a brand. They are used across multiple forms of media as well as by and affiliates or any advertisements that are used to promote the brand. To enhance the looks and feels of the application as well as for better marketing capability, a logo symbolizing sign language is created for the application.



Figure 4.12 The Logo of MySLFlashCard

Icon typically serves to enhance the look and feel of an application; hence they are often visually appealing. Therefore, MySL Flashcard Application implements the use of icon for visual enhancement to the user.



Figure 4.13 The Icon of MySLFlashCard

4.8 Screenshot of Prototype 1

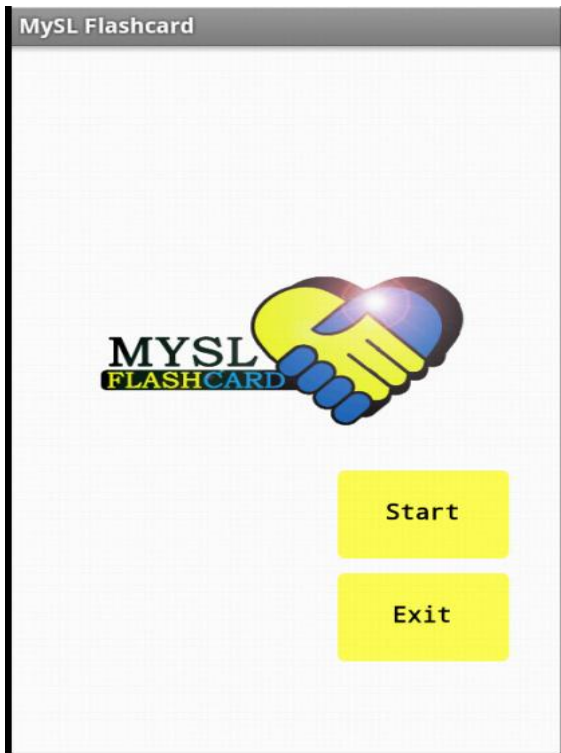


Figure 4.14 Home Screen

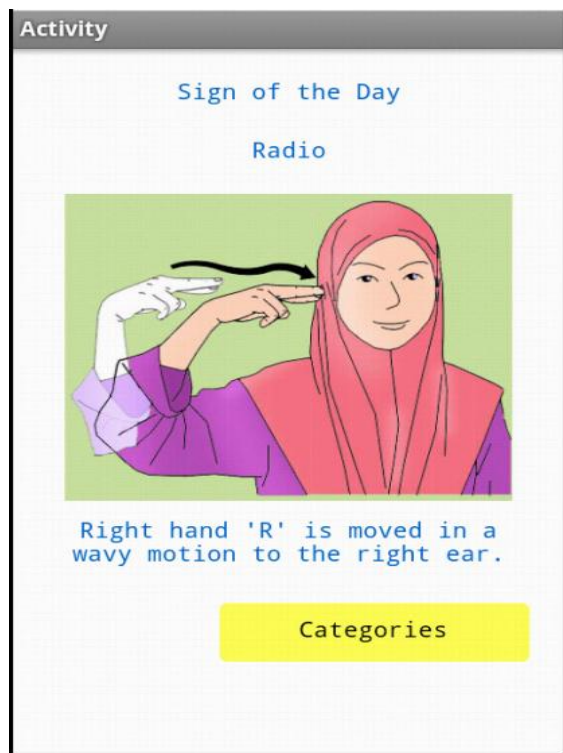


Figure 4.15 MySLFlashCard Sign of the Day

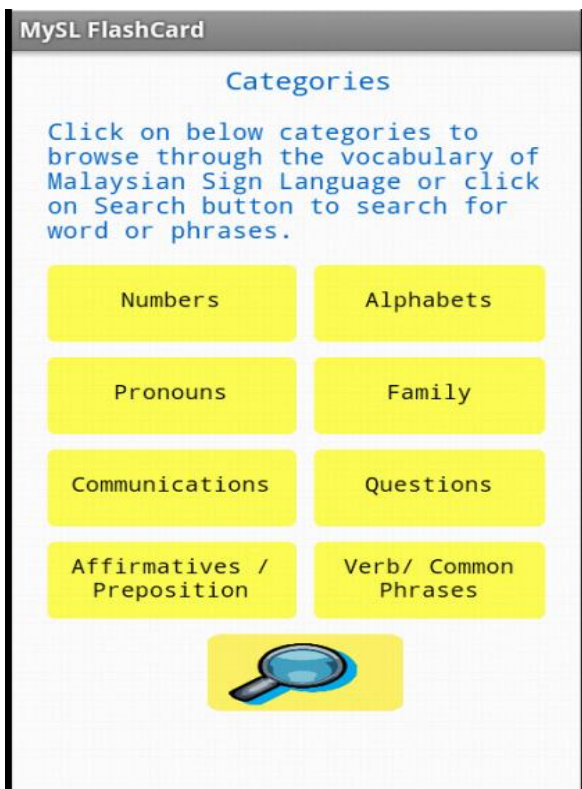


Figure 4.16 Browse through categories

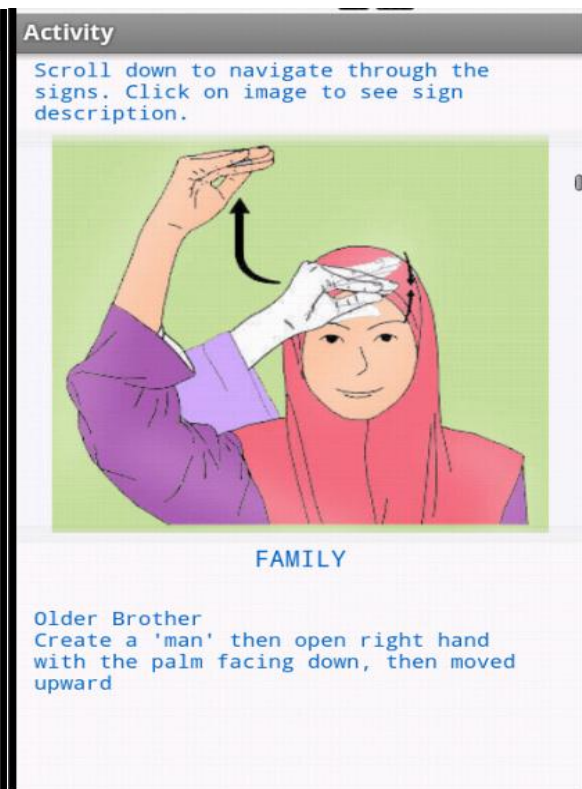


Figure 4.17 Category of Family was chosen.

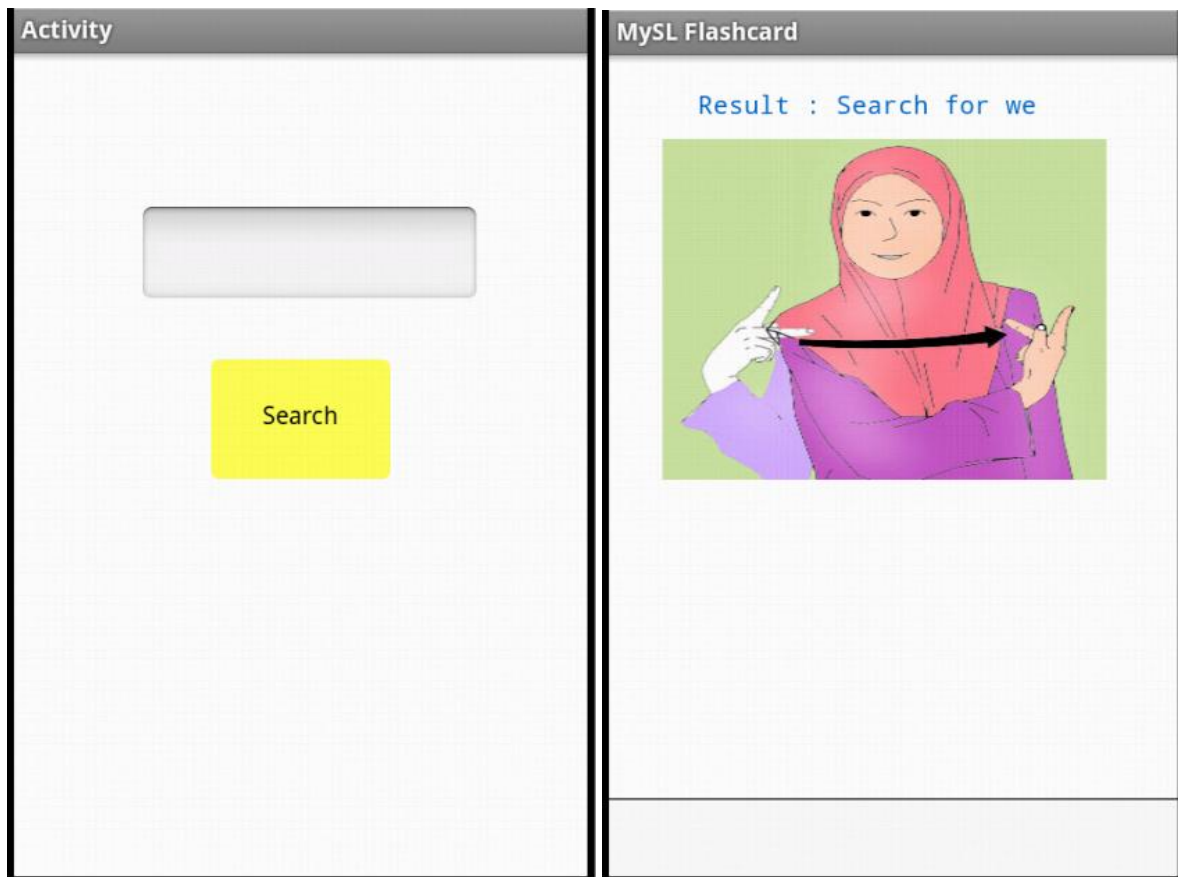


Figure 4.18 Search was chosen.

Figure 4.19 Search result for the word 'We'.

Differences between Initial Design and Prototype 1

There have been several changes in order to improve the initial design for the system for the prototype. These changes include;

1) Coloured Images to Replace Colourless Images

Colour has been shown to have an impact on comprehension, memory and moods. According to research by Cherry (2012), colour stimulates the visual sense and encourages the retention of information. The research also shown that colour can dramatically affect moods, feelings and emotion. Which means that fundamentally, colour is a very powerful communication tool and can be used to signal action, influence mood, and cause psychological as well as physiological reactions.

Hence, the application is developed with coloured images to enhance visual attraction of users as well as improving users' ability to learn and memorize the signs.

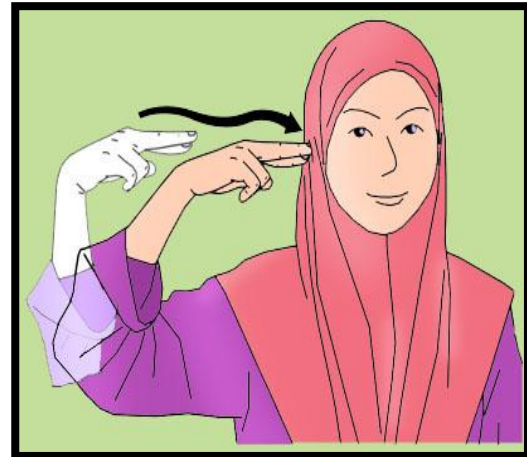


Figure 4.20 Colour Image of 'Internet' Sign Figure 4.21 Colour Image of 'Radio' Sign

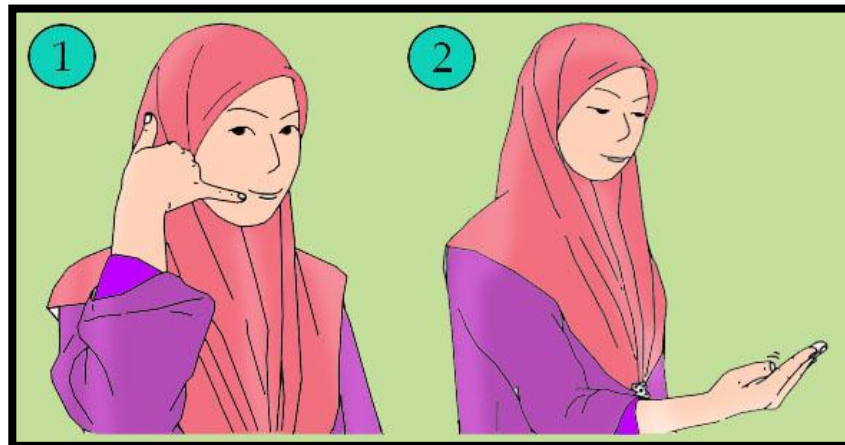


Figure 4.22 Coloured Image of 'Mobile Phone' sign.

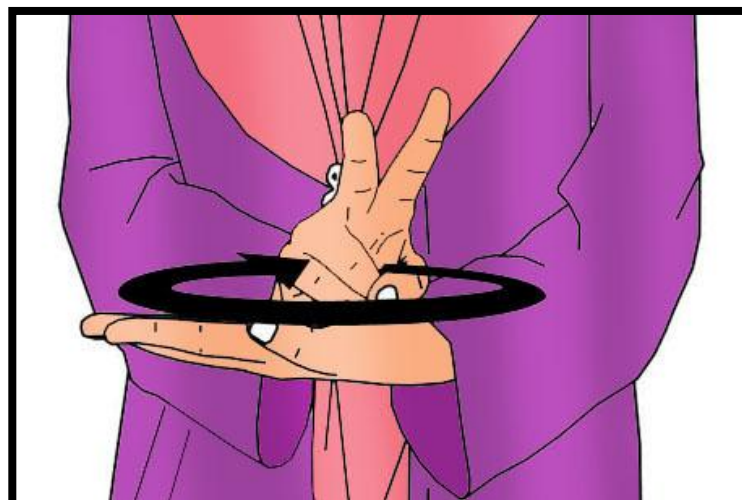


Figure 4.23 Coloured Image of 'VCD' sign.

2) Layout

The layouts of the application are also had been changed to have a better look and feel of the system. The layout of the sign images will need to be easy on the eye and while not cluttering the information the signs trying to convey. As more categories are added, with more images in each category, a better image viewing method is required.

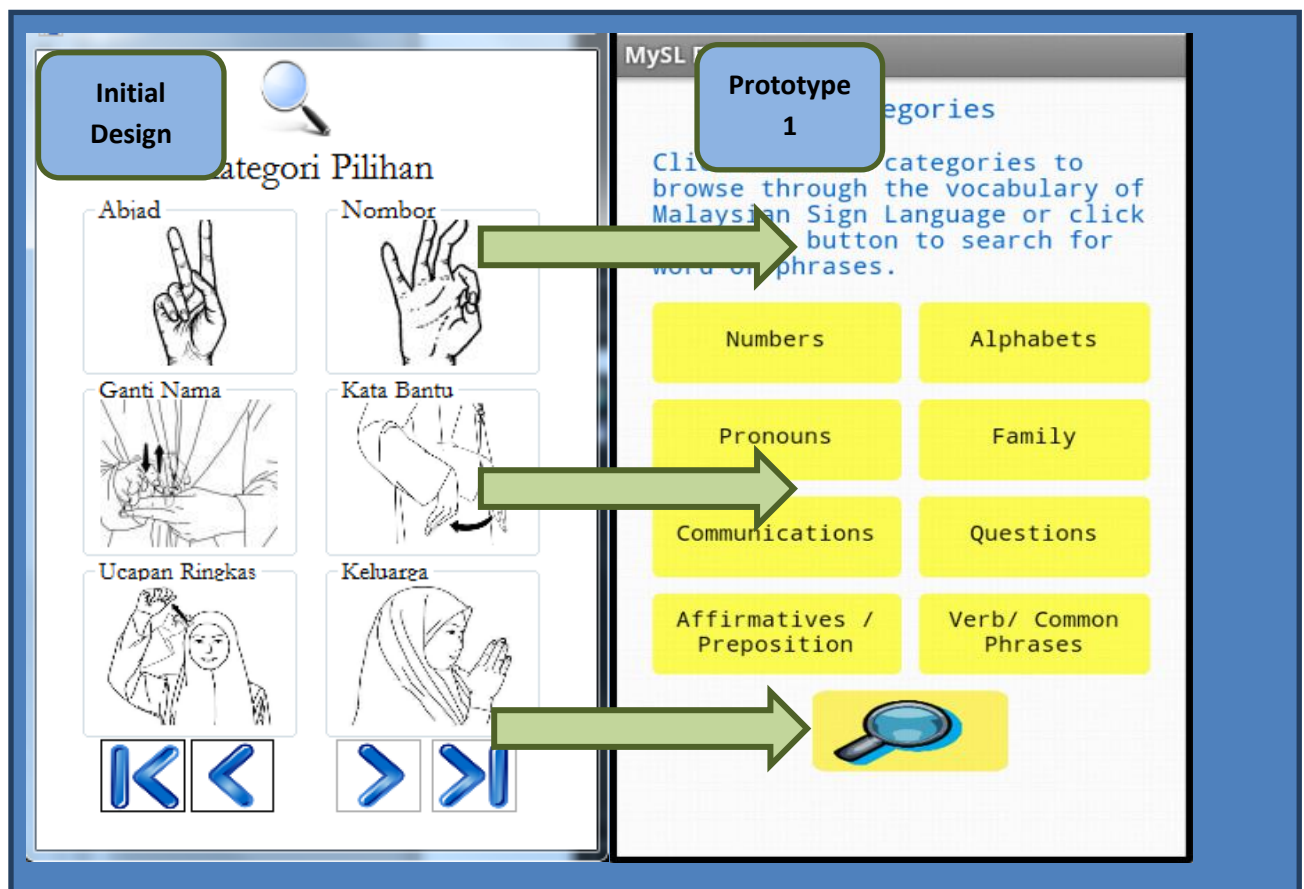


Figure 4.24 Changes from Initial Design to Prototype 1 of MySL Flashcard Application

3) Image Scrolling View

The scrolling view is a special type of Frame Layout in that it enables users to scroll through a list of view that occupy more space than the physical display. Scroll View gives user a scrollable layout for large data. In this case, multiple images of signs for each category can be presented in a single layout with more organized manner.

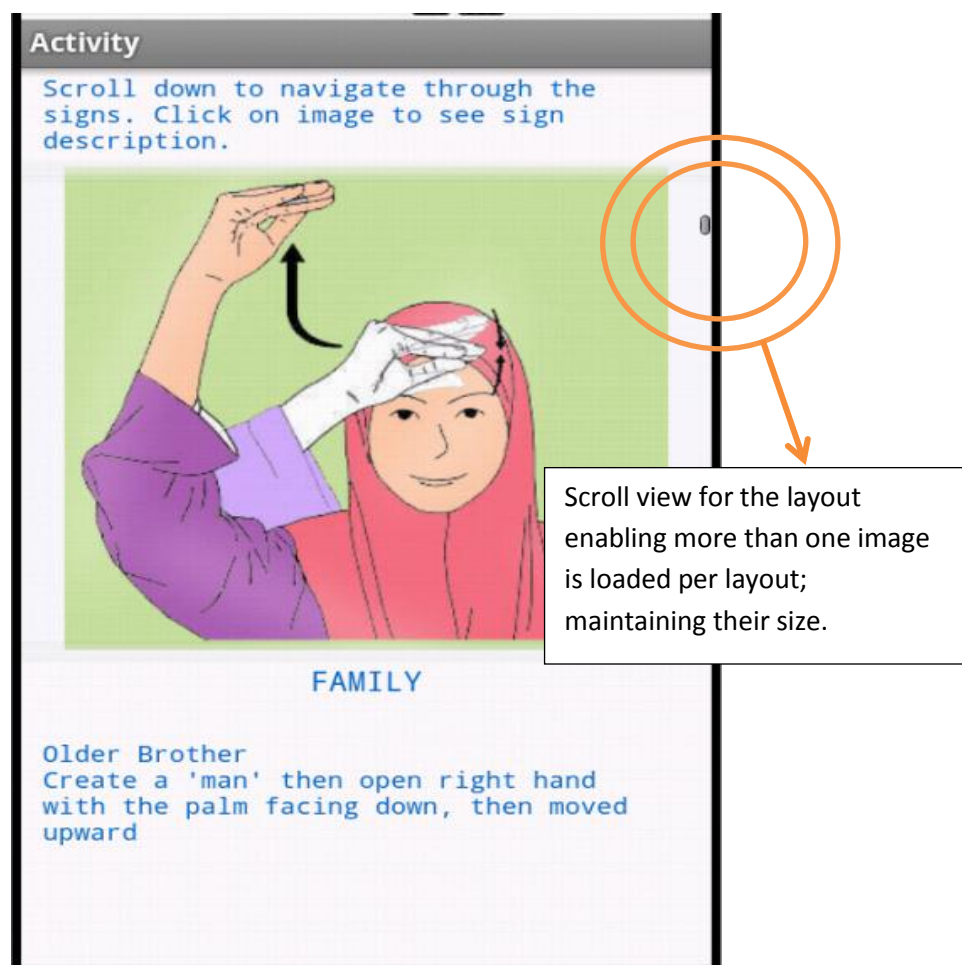


Figure 4.25 Scroll View of MySL Flashcard Application

4.9 Testing Result

The prototype is distributed to controlled number of participants in determining the following criteria in the implementation of the application;

- Images of the signs are easy to understand and demonstrated.
- The effectiveness of attractive user interface.
- Faster access to the sign needed as compared to books and dictionaries.
- The application provides easier method in communicating with a deaf person.

The method of conducting a survey through the use of questionnaires is utilised whether or not the signs are easy to understand as well as the ease of accessing the signs using mobile phones compared to using books and the internet. The test scenarios include error-checking as well as information gained by the user, and open-ended questions are given to gain information on improving the application. The bugs of the prototype were taken into notice, while the suggestions received by the open-ended questions is collected, and summarized into the pie chart below.

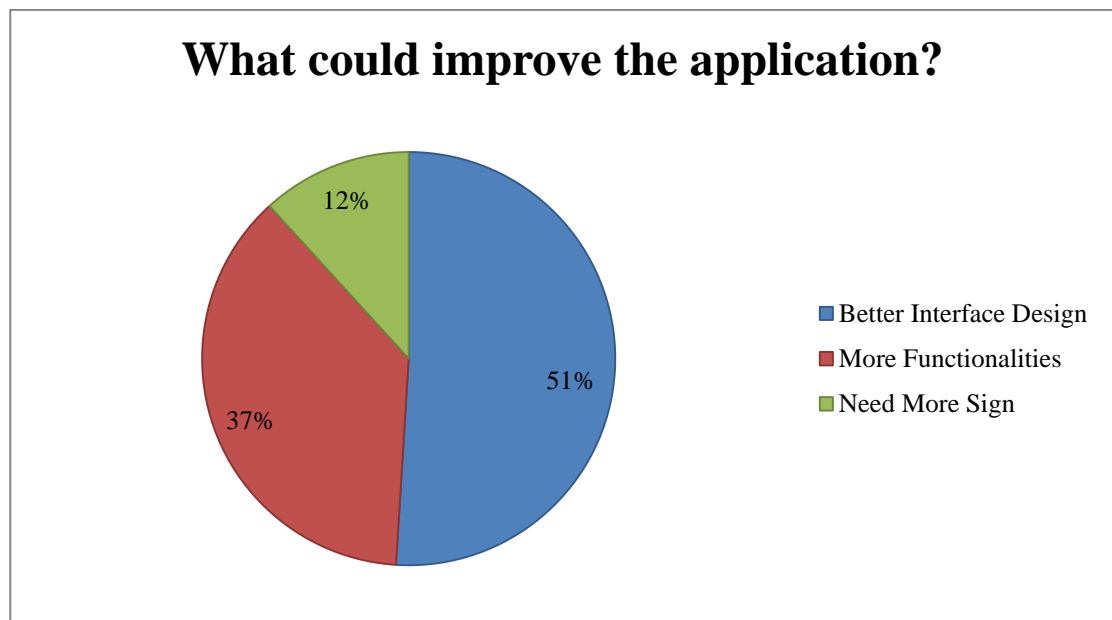


Figure 4.26 MySLFlashCard for prototype testing

Functionalities added after prototype testing:Finger-spell the Word

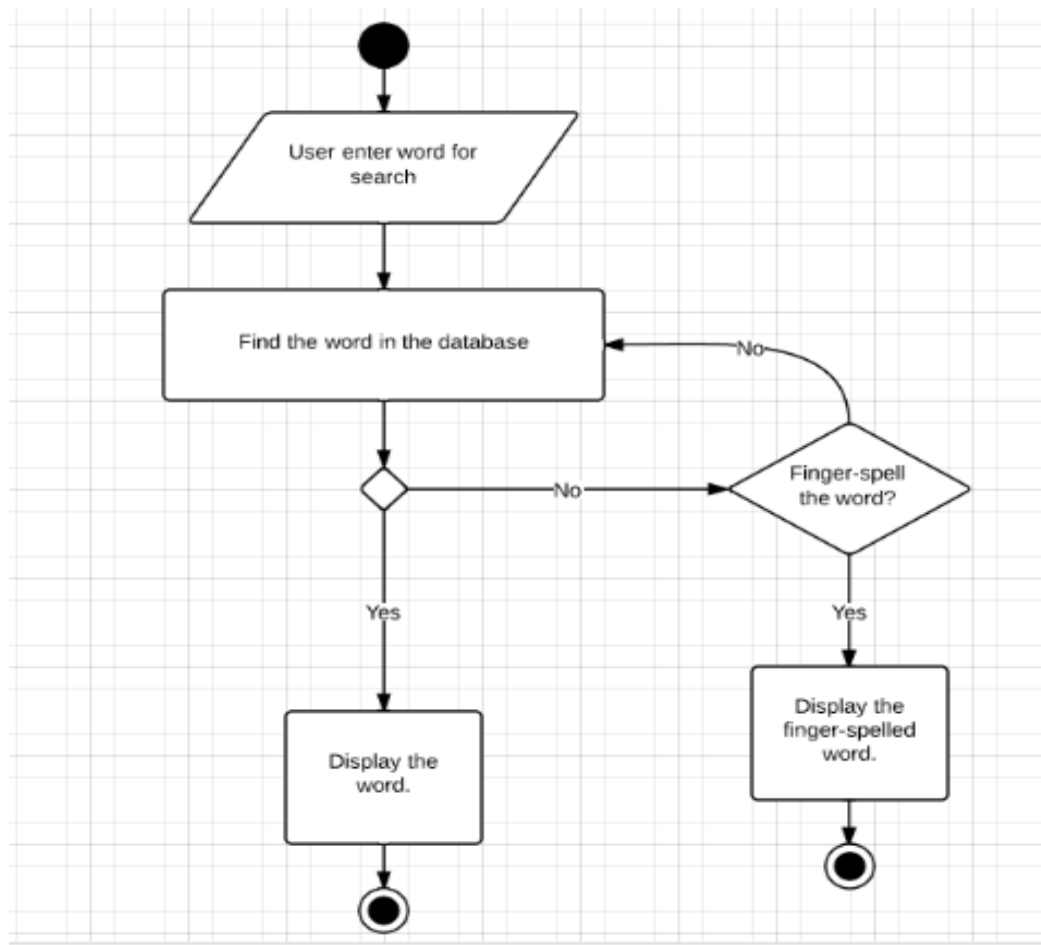


Figure 4.27 Activity 'Finger Spell' Diagram

This function is an addition towards the Word Search function where it enables user to spell the word he/she was looking for. This function also helps user to spell names, places, brands or any words that were not included in the application. This method also enables user to communicate with speech/hearing impaired OKU without having trouble to search for complex signs.

Interface improvement added to the system after prototype testing:

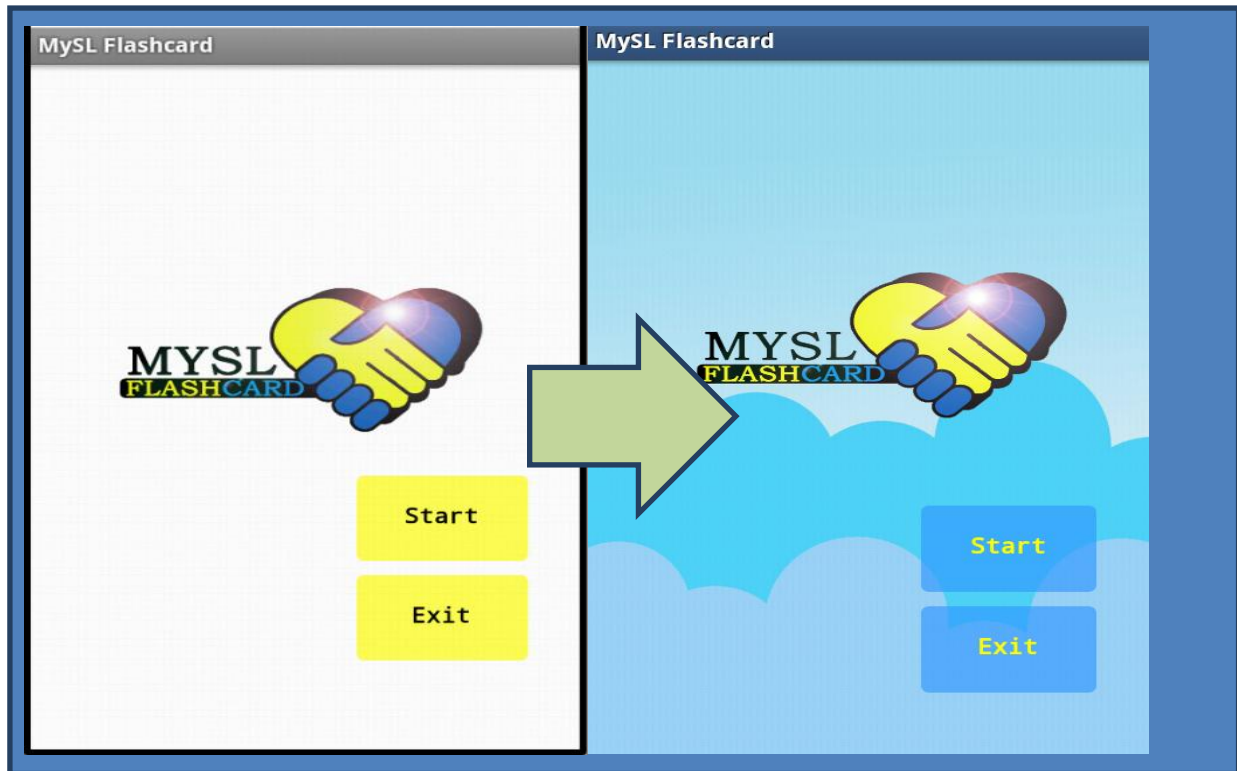


Figure 4.28 MySQL FlashCard graphics improvement

Blue colour is used with the application because, according to Pytel(2006), the colour blue induces calm mind thus ensuring the user to learn in an optimum condition. In an intensified state of mind with induced creativity and increasing learning capability; the information are easily absorbed by the user to better learn and memorise the sign language images.

4.10 MySLFlashCard Finalised Interface

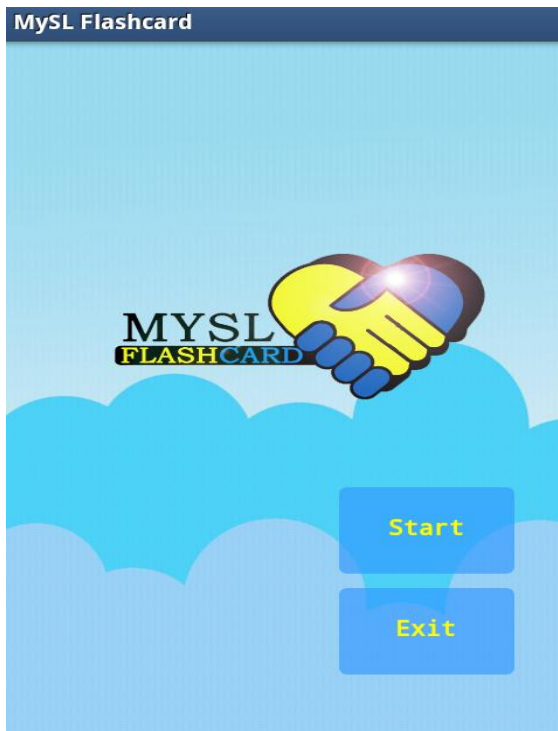


Figure 4.29 Home Screen



Figure 4.30 MySLFlashCard Sign of the Day

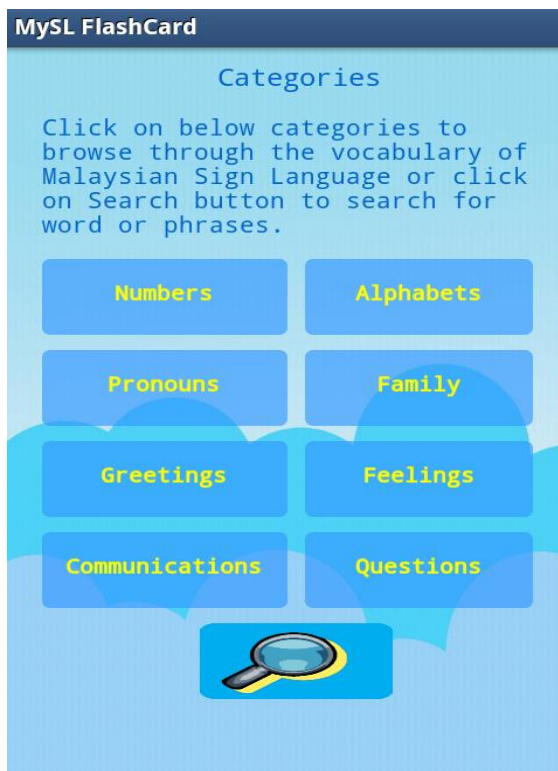


Figure 4.31 Browse through categories

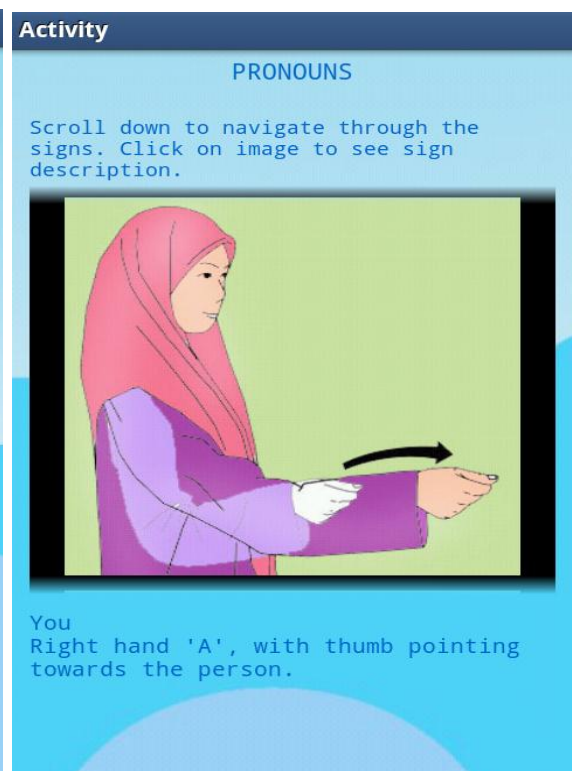


Figure 4.32 Category of Pronouns was chosen.



Figure 4.33 Category of Family was chosen.

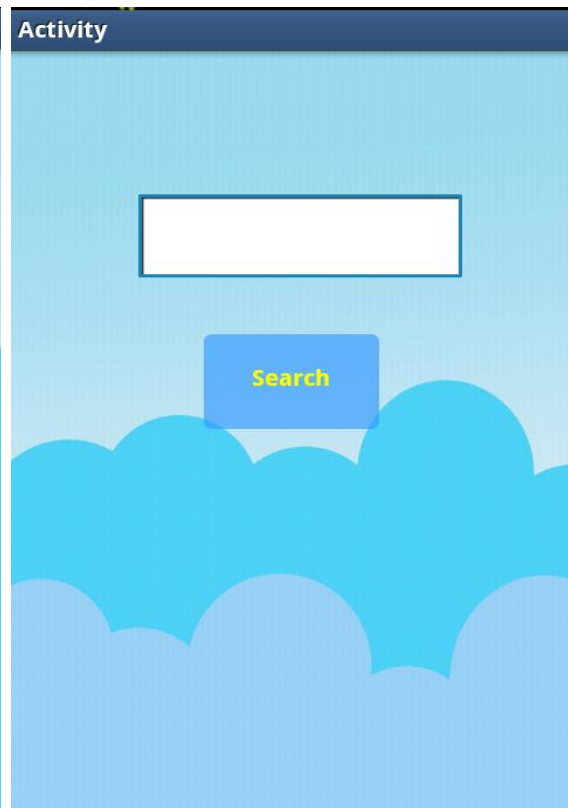


Figure 4.34 Search was chosen.



Figure 4.35 Search result 'dear'.

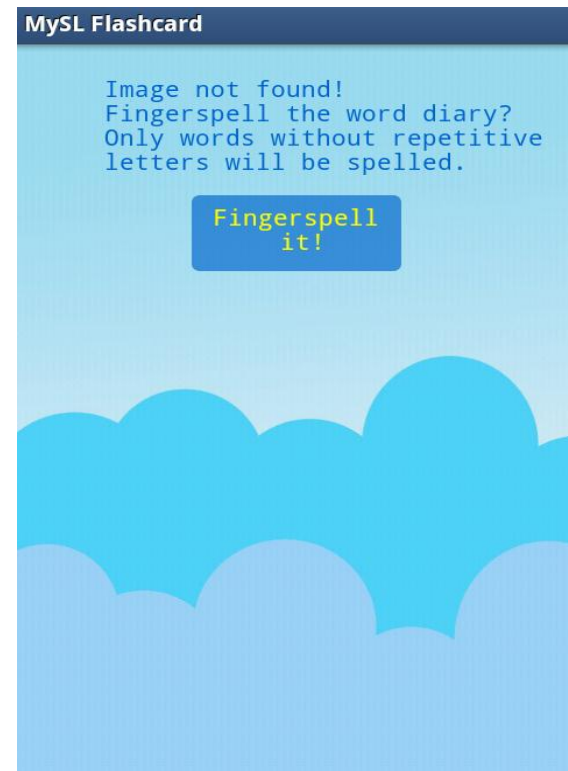


Figure 4.36 The option to Fingerspell is prompted when the word 'diary' is searched.

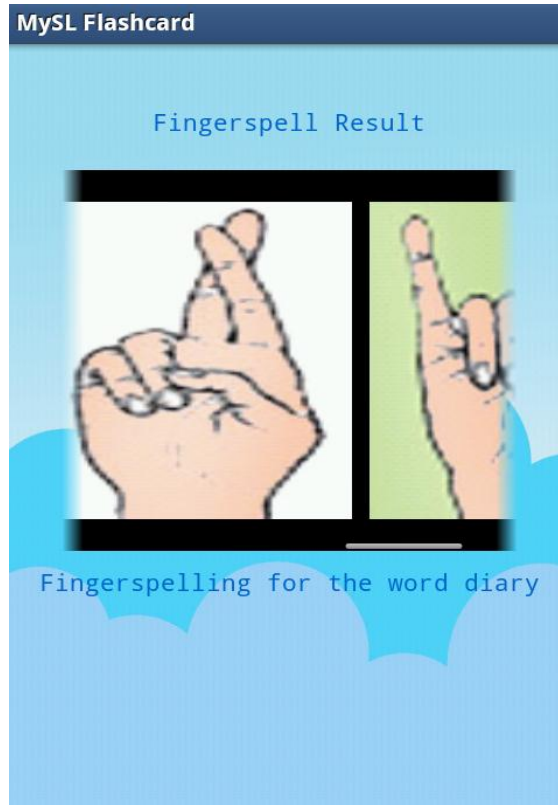


Figure 4.37 Fingerspell result for the word 'diary'.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0. Conclusion

As for conclusion, in hope to bring equality towards the nation, both non-disabled and speech/hearing impaired must be equalized. The daily miscommunications between non-disabled and OKU lead to inequalities among them; in terms of opportunity, benefits and even daily needs. In order to do so, the non-disabled must learn compassion and provide equal opportunities for the speech/hearing impaired, by learning sign language as a start.

By introducing MySLFlashCard Mobile Application, the problem of daily miscommunications between non-disabled and OKU can be solved. If the non-disabled people are able to learn sign language and engage with the speech/hearing impaired the inequalities among them can be eliminated.

With mobile technology, learning can be highly efficient. Incorporating learning with mobility would be very effective to promote the learning of Malaysian Sign Language towards the general public, schools and employers of Malaysia. Hence, The MySL Flashcard Application is expected to enable the users to learn and communicate better with speech/hearing impairment OKUs with ease.

5.1. Recommendation

There are numerous undertakings that can proceed to improve upon the developed application. Among them are:

- Use of animated images/videos to represent hand gestures.
- The use of digital image processing to translate the sign language to written language.
- Inclusion of MySL of every different state.
- Port to other platforms such as the iOS, Symbian and Blackberry OS.

Due to time restrictions and limited technical capability, several of these improvements are not feasible to be implemented into the system within the given time frame. The implementation of animated images or videos to portray the hand gesture movement will allow a more precise description of the sign which will correspondingly allow the person using the system to perform the sign more accurately however, there are lack of resources regarding online availability of such videos; thus will consume more time to develop such resources.

Furthermore, for the purpose of the project, only 90 images from the collection of words and phrases to be included in the application. Further inclusion of the whole vocabulary of MySQL including the use of MySQL in different states can be implemented if time is permissible. Because of insufficient time to include all these features, the source code of the application will be uploaded to Basic4ppc forum in order to allow for open-ended development of the application for interested individuals or groups that wish to improve the application.

By utilizing the open source codes, the application can also be ported onto different platforms such as iOS, Symbian, Blackberry OS and Windows Mobile to allow for wider use and availability for the public.

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Appendix: Questionnaire

Final Year Project
Department of Computer & Information Sciences
Universiti Teknologi PETRONAS

Section I: User Profile

Instructions: Please tick () one of the options provided or specify otherwise.

Date: _____

Gender: Male Female

Age Group: below 15 15-20 21-25 26-30 31-35

(Years) 36-40 41-45 46-50 Above 50

Race: Malay Chinese Indian others, please specify: _____

Occupation: _____

Section II: User Knowledge on Sign Language

Do you have family member(s) who have speech/hearing impediment?

Yes No

Have you encounter any communication with speech/hearing impediment?

Yes No

Are you capable of communicating using Sign Language?

Yes No

Would you like to learn Malaysian Sign Language?

Yes No

Section III: User Technology Capacity

Do you have a smartphone? If yes, state the model _____

Do you believe learning should be integrated with smartphones?

Yes No

Will you purchase an application that teaches Malaysian Sign Language?

Yes No

Appendix: Testing Form

MySLFlashCard User Acceptance Testing Form	
<p>Complete this form and e-mail it to darkt91@gmail.com. Your feedback regarding the mobile application is highly appreciated. Also note that not all smartphone may be compatible with MySLFlashCard.</p> <p>Be as complete as possible. The more information provided the more this application could further improves in the future.</p>	
Date:	
Name:	
Contact Phone Number:	
E-mail Address:	
UAT ITCMFC-001	
Application is run on:	
Android Version:	
Test Scenario	Result
1. Signs images are clear and instructions are understandable	
2. Searched word matches the sign output.	
3. Finger spelled words output matches the input.	
4. Application runs smoothly without errors	
Describe shortly what type of error faced (if any)	
Are the signs sufficient for basic conversation?	
Please suggest any new functions to add for a better application.	
Other notes of importance:	