**Phoneme Based English Learning System**

by

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Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information Communication Technology)

AUGUST 2013

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# ABSTRACT

It is widely accepted that English is recognised as an important language. However, in terms of proficiency, the level of English in Malaysia is not on par with international standards despite being heralded as a country with a high proficiency in the language. Although there has been governmental assistance given to improve the teaching methods in Malaysia, it does not touch upon the environment and methods of teaching. Language learning should be personalized to a degree, with a system that is tailored to suit the primary learner. Phonemic Awareness, a subset of phonics, is a method which focuses on learning the sounds of letters, and it has been seen as a method which helps increase reading and speech proficiency. The objective of this research is to understand the level of phonemic awareness in students, and to find out what is the best way to create a mobile application that caters to their needs, which then leads to the development of such an application. This research's scope covers kindergarten students, and by extension primary school students and the study of creating a Phoneme based English learning software for them. In doing so, it also covers the development of a standalone Flash based system, capable of running on most types of mobile phones. The system will be primarily developed using Adobe Flash Professional CS6. Next, the system will cover two methodologies: Qualitative Interviews for the Research Methodology, which is implemented because the interview relies on the teacher's experience in teaching; and Prototyping for the Development Methodology, as the system will undergo several revisions and refinements before being officially deployed to the public to ensure maximum usability. Although the system was initially planned with kindergarten students in mind, it seems that some kindergartens have already implemented some form of phonemic awareness methods in their current syllabus. However, insight has been given on the important elements needed in a learning based courseware, and that will serves as the basis for the implementation of the Mobile Phoneme Based English Learning System.

# CHAPTER 1:  INTRODUCTION

## 1.1 INTRODUCTION

In recent years, the Malaysian government has introduced many incentives and methods to improve the level of English literacy and proficiency amongst students, mostly because in spite of students having around 11 years of formal English education in school (See Appendix A), Malaysian students are still not able to communicate in English proficiently. This included inviting 370 native speakers from foreign countries in a bid to supervise the teaching of the English language in various schools across the country (Star Online, 2010), particularly for Primary School students (7-12 years old).

However, while the main focus of those plans centre around primary school students, they have neglected to give extra attention towards kindergarten aged (4-6 years old) students. For most students in Malaysia, kindergarten will be their first exposure towards learning the English language properly, particularly if it is not their first language spoken at home.  Furthermore, despite being taught English in kindergartens, students are still not able to communicate well in Primary School.

There are several methods employed by teachers for teaching English to students. One such method is by employing phonemic awareness. Phonemic Awareness is defined as the ability to focus and control phonemes in the spoken word. It is a subset of Phonological Awareness, which is a branch of linguistics concerning the awareness of systematic sound organisation and structure in languages. Studies have shown that a combination of phonemic awareness and letter awareness are essential indicators in predicting a student's success in reading (Patricia A. Antonacci, Catherine M. O'Callaghan, 2012). This will also impact a student's speaking and listening skills, since they will learn about how to properly pronounce words while reading.

This study aims to investigate the levels of phonemic awareness of the English language in kindergarten students by investigating a select group of students and teachers. This will then help facilitate the development of a system which will then help instil phonemic awareness and proper pronunciation skills in kindergarten students.

## 1.2 BACKGROUND OF STUDY

### 1.2.1 English in Malaysia

When it comes to English proficiency, Malaysia is considered to be the second best amongst Asian countries ("English Proficiency Index", 2012). For a country which does not consider English as the official language, Malaysia has managed to achieve a 'high' proficiency level, showing competency in speaking and communicating well. It also means that Malaysians are able to read and write in the language adeptly.

Although the above shows that Malaysians are quite proficient in English, the actual level of English proficiency amongst locals as per local observation is actually quite low. While it is true that Malaysians appear to be quite skilled in the command of the English language, the overall quality of their spoken and written English has been in a steady decline over the years. This is mainly because of the dominance of Bahasa Malaysia as the national language, making it the default language for the general public, especially when in use in regards to governance, official announcements, business and education. Simply put, there is less need to study proper English as long a Malaysian is proficient in their mother tongue.

In regards to the above, one of the main problems Malaysians face in regards to English proficiency is that they are not able to pronounce English words properly. Due to having

more exposure to Bahasa Malaysia, Malaysians often substitute Malay phonemes and sounds instead of pronouncing words in proper English. There is also an element of confusion in pronunciation since both Bahasa Malaysia and English share the same alphabets.

### 1.2.2 Mobile Phoneme Based English Learning System

To solve the problems brought on by the above study, a Phoneme Based English Learning System should be developed as it basically helps to teach students individual phoneme sounds, and how to manipulate them into pronouncing words. It will also help them to identify letter patterns in relation to phonemes.

The proposed system is important for education of kindergarten aged children in learning the English language as it serves as another method of learning pronunciation. When exposed to phonemes at an early age, it helps children understand mouth movements as well as the proper techniques involved in creating proper English related sounds, which by extension, allows them to pronounce words properly. As a result of that, children are also able to read out loud properly, and this will greatly benefit them when they enter primary school. This allows them to further understand the link between sounds and the written word, and their connection to speech.

To engage their interest, the proposed system will have a colourful and vibrant GUI to appeal to the target users. It will teach phonemic sounds in a flash card format, with each phoneme presented in a graphical format, along with audio cues. The system will also provide simple exercises to promote phoneme repetition, which is essential in developing phoneme awareness in students.

To realise this, the system will use Adobe Flash Professional CS6 as the main developing platform. This is because the main target market are young, and to engage

them, it is best to use colourful graphics and animations, which could be done in Adobe Flash Professional CS6 as it has various animation and graphical options. This development platform also contains ActionScript, and object oriented language based code, which allows for more control over various multimedia aspects in the development of the system. Furthermore, with the AIR SDK pre-embedded within the software package, the developed system is easily ported over to mobile systems without compromising the original code structure.

The system itself will be ported over to mobile systems, with a standalone executable version for offline usage, which allows for usage without having other proprietary software installed alongside the system or owning a smartphone with internet access. . The reason this is so, instead of being on the web is that student from rural areas without access to the internet or mobile phones can still interact with the program, since most kindergartens, schools and villages have at least one offline computer at their disposal. The interface will also be very simple so that even teachers with low levels of computer literacy can use it, as what matters is that the program is able to deliver clear phoneme sounds at the end of the day.

## 1.3 PROBLEM STATEMENT

When it comes to languages, it is widely known that English is one of the world's most important languages, as it is the language frequently used as a medium of knowledge, especially in tertiary level education. However, in Malaysia, the standard of English is declining, and this is quite alarming considering Malaysia's status as a Commonwealth country. A lot of incentives have been taken in order to counteract the current situation, but most of them start at Primary School level.

Children typically start exhibiting language acquisition skills at a younger age, and not taking advantage of this will set them back a few years when they begin Year One. This is why proper teaching techniques should start in kindergarten, and by extension, in Years One to Year Three as to provide a good foundation for learning the language as times goes on.

To aid language learning, one of the many techniques which can be employed is by teaching Phonemic Awareness. Phonemic Awareness is a part of phonological awareness, which enables users to hear, recognise and manipulate phonemes, which are linguistically the smallest unit of sound that can be used for word meaning differentiation (Patricia A. Antonacci, Catherine M. O'Callaghan, 2012). As such, proper exposure to phonemic awareness will increase a person's pronunciation skills, and in turn, will also help bolster their knowledge in reading. These skills are best acquired early on, preferably during kindergarten or primary school level, when language and reading skills are being introduced and developed. However, learning phonemes in a classroom setting is quite difficult as it requires extra attention to mouth movement and sounds. This does not help in situations where students are positioned further from the teacher as they cannot see or hear how the phonemes are delivered.

There is some software in the market which attempts to address the above problems by having a one on one interaction model with the user. Unfortunately, although some systems which are based on phoneme manipulation exists in the current market, most of them are either not used specifically for teaching younger children, or are unavailable to the Malaysian market. Most of these programs also assume that the user is adept at using phonemes already, and does not really teach phonemic awareness.

The Phoneme Based English Learning System will attempt to address most concerns regarding the matter at hand. It will also serve as a teacher's aide and will help complement existing teaching strategies. The system must be used with teacher

participation as well, as the teacher should encourage students to come up with their own words with the phonemes they have learnt. This is so that they can learn to associate speech and word patterns with phonemes, and thus improve on various aspects of their language learning ability. The core layout of the system will be designed akin to flash cards, and will be enhanced with HCI elements that will appeal to kindergarten age students to facilitate their interest. In addition to that, the system will attempt to demonstrate how to use individual phonemes by showing mouth movements and emitting sound sample in order to show proper techniques in pronouncing phonemes.

This system can then serve as a standard method of learning pronunciation and reading amongst kindergarten and primary school students.

## 1.4 OBJECTIVES

### 1.4.1 To understand the phonemic awareness levels of kindergarten students (ages 4-6) and its effect on their future learning capabilities, especially in primary schools in regards to the English Language

The research conducted throughout this paper will highlight why phonemic awareness is important amongst kindergarten students, and how it is actually lacking in our educational system, as well as how it impacts their learning of the language in primary school. Research materials include journals, questionnaires, interviews, conference papers and relevant websites to support the main issue at hand.

### 1.4.2 To determine the best possible method to create a system that caters to kindergarten students

In relation to the above, this research aims to find out what is the best approach in order to instil phonemic awareness into kindergarten age students. At the same time, the

system must be designed around the capabilities of the students, and thus must take into account their abilities and understanding of various multimedia components.

### 1.4.3 To develop a system that teaches phonemes and proper pronunciation

The system is expected to provide audio cues to signify how each phoneme will sound like, as well as show common examples of words associated with the phoneme to stimulate the student's interest in learning the language. The system will also have simple point and click games to test phoneme knowledge as a form of repetition after each phoneme lesson.

### 1.5 SCOPE OF STUDY

### 1.5.1 Phoneme based English teaching software for students

This study focuses on teachers at kindergartens, as well as the kindergarten students (aged 4-6) themselves, as a benchmark on what sort of English capabilities that they will have upon entering primary school. The study focuses on how teachers are using existing techniques and software to teach their students prior to the proposal of this system, on the teacher's side of things. For the students, it will centre more on how they've been learning English as well as what kind of programs or layouts do they like to see, i.e. the colours, pictures, graphics etc. The system will then be developed based on the input given by the focus group.

### 1.5.2 Developing a mobile Flash based system

The development of this system is heavily reliant on the use of Adobe Flash Professional CS6, as it is bundled together with ActionScript, which is used to

manipulate various objects which are going to be created within the software. The usage of ActionScript makes the program approach development from an object oriented point of view, and concerns the reuse of assets and objects. When developing a mobile based system, it is imperative that the assets and objects used be as small as possible as to not overtax the user's computer when the system is running, and this is where the software's compression and the option for server storing will come in handy.

## 1.6 FEASABILITY ANALYSIS

### 1.6.1 Technical Feasibility

Technical Feasibility concerns the technical resources needed by the developers, as well as their own capabilities in being able to handle the actual development of the system itself. It concerns to what extent can the project be developed, and until what stage.

The system will be developed in Flash, with a heavy emphasis on a fancy UI for the target market. It must also fulfil the condition of being user friendly. As the basics of Flash has already been taught during the course of the programmer's studies here, it is just a matter of allocating enough time to create art assets and to code each page with suitable animations. Audio and/or video clips must also be recorded and rendered to a smaller file size, as to not take up too many resources during run-time.

Given that the development time occurs over two semesters, it is possible to get all of the above done within the timeframe given as long as asset creation is done alongside data analysis. The problem that may arise from this comes from the aesthetic appeal of the program, and the creation of the assets which fits the target market. This will require more research into the areas of children and their computer skill capabilities.

The other matter at hand is choosing the right software development model. A standard SDLC model goes from one cycle to another without revisiting past cycles. With an iterative model, this ensures that rigorous testing is done after each new module is added to the system. This also helps eliminate early bugs and defects which would otherwise go undetected until the testing and quality assurance stages.

## 1.6.2 Economic Feasibility

Economic Feasibility concerns the financial state of the project first and foremost. It then concerns 4 key issues, which are development cost, operational cost, tangible benefits and intangible benefits.

In terms of development costs, this will mostly be incurred in finding the correct hardware to use. Recording videos with clarity requires a decent digital camera with at least 12 megapixels to ensure the lack of jaggies and frame rate issues. Recording raw audio by itself also requires a good microphone that eliminates most of the background noise, and reduces static. The licensing of the main development tool, Adobe Photoshop CS6 will also become an issue, as this program has all the functions needed in order to develop the system. However, GIMP and other software not related to the main development, such as OpenOffice and Audacity, are open source, and do not add to the overall costs. In recent events, the usage of GIMP has been replaced with Paint Tool SAI, a shareware program, due to the fact that Paint Tool SAI has less jaggies on the graphics when imported into Flash.

In terms of operational cost, this will ultimately depend on whether the system is being implemented as a standardized program across the country. This will require the program to be certified under the Ministry of Education, which has its own stringent

rules on the distribution of educational software. The system would then have to be updated and redistributed if a new educational directive is given to keep in line with the set standards.

In terms of tangible benefit, this system should hopefully aide students to achieve better reading and pronunciation competency. Not only that, it will also become another set of teaching aide for the teachers. Students can also use the program as reference, and access it any time they have problems with pronunciation.

The intangible benefits from the usage of this system will be students having a better command of the English language, which will help them later on in their academics. In turn, this will ensure that they are able to pursue better educational choices, as more options are opened to them if they have decent competency in English. As a result of this, they are also more likely to be employed by multinational companies whose main language in the office is English.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 ENGLISH EDUCATION IN MALAYSIA

It is said that internationally, Malaysia is ranked as the second best amongst select Asian countries when it comes to English mastery and proficiency as a secondary or tertiary language, and is ranked 13th out of 54 countries overall, with a proficiency level of 'High' ("English Proficiency Index", 2012).

However, in stark contrast to the study above, The Star Online reported that the state of English proficiency in Malaysia is in a steady decline, with barely any improvements over the past few years, especially in comparison to the 1980s (Hariati Azizan, Lee Yen Mun, 2011). This sentiment is shared by The Malay Mail, and they are of the opinion that the root cause of this problem is in fact the Razak Report published in 1956 (Stephen Doss, 2012). Both articles highlight the fact that Malaysians are beginning to develop poor communication and speaking skills as times goes by. Also, this relates to the fact that students are mostly taught the bare basics of English with the sole intent of passing English class without any stresses on proper language usage. This is true in a sense that although students are able to pass most of their English exams with distinction or credit, they are actually unable to speak the language in a real world scenario.

Although English education in Malaysia starts at a very early level, in institutions known as kindergartens, preschools or *tadika*, they lack pedagogical cohesion, which results in some students being unable to fully develop a good foundation in English pronunciation and vocabulary. Even though the government has provided some guidelines (See Appendix B), it is still not concise and only provides a general idea of what should be done. In addition to that, once they move on to primary school, there is less focus given to English in favour of the national language, and the lessons are mostly given on assumption that students already posses adequate pronunciation and reading skills.

This lack of cohesion is reflected in the fact that there is a noticeable gap in English proficiency between urban and rural, national and vernacular schools, which has been noted by The Edge Malaysia (Chua Sue-Ann, 2012). Even though national school students enjoyed a 0.8% increase in the number of students who received a grade of A for their UPSR examinations in 2012, their counterparts in vernacular schools did not score as well, as there was a decrease of 1.9% of students who received a similar grade. Had there been a standardised method and system of learning English from kindergarten, this gap would have been minimized. It would also reduce disadvantages faced from certain students who came from preschools which do not have skilled English teachers when it comes to learning English.

## 2.2 HOW ENGLISH IS TAUGHT IN KINDERGARTENS

A recent study conducted by Ng Pei Fern and Yeo Kee Jiar (2012) has shown that amongst all teaching content regarding literacy, the ones related to phonemic and phonological awareness were almost never taught in class. The study shows that sound segmentation, sound blending, final and initial sound identification, all of which are related to phonological and phonemic awareness, were all rated in high percentages of never being taught in class, with sound segmentation topping the percentages at 99% (See Appendix C).

On the other hand, contents related to letter awareness and decoding are given extra focus. Thus, while there is focus on identifying letters and words and sentences, there is no importance given to how those words actually sound, and how they are pronounced. Below is a phonemic chart, showing proper pronunciation of certain word patterns, which has not been utilized fully in a school type setting. It shows all 44 phonemes used in the English language, as well as when and how they are used and how they differ from each other in terms of sound.

| | monophthongs | | | diphthongs | | Phonemic Chart voiced unvoiced |
|---|---|---|---|---|---|---|
| **VOWELS** | iː<br>sheep | ɪ<br>ship | ʊ<br>good | uː<br>shoot | ɪə<br>here | eɪ<br>wait | |
| | e<br>bed | ə<br>teacher | ɜː<br>bird | ɔː<br>door | ʊə<br>tourist | ɔɪ<br>boy | əʊ<br>show |
| | æ<br>cat | ʌ<br>up | ɑː<br>far | ɒ<br>on | eə<br>hair | aɪ<br>my | aʊ<br>cow |
| **CONSONANTS** | p<br>pea | b<br>boat | t<br>tea | d<br>dog | tʃ<br>cheese | dʒ<br>June | k<br>car | g<br>go |
| | f<br>fly | v<br>video | θ<br>think | ð<br>this | s<br>see | z<br>zoo | ʃ<br>shall | ʒ<br>television |
| | m<br>man | n<br>now | ŋ<br>sing | h<br>hat | l<br>love | r<br>red | w<br>wet | j<br>yes |

The 44 phonemes of Received Pronunciation based on the popular Adrian Underhill layout.

adapted by EnglishClub.com

Figure 1.0 Phoneme Chart

This is quite alarming since it shows that students are not really benefitting from other learning content which should have been available to them. Also, they are not able to fully connect sounds to the letters and words that they have been taught in class, simply because phonemic sounds are not taught alongside normal reading.

In terms of literacy strategies, there is a strong focus on drilling and repetition type exercises (See Appendix D). However, reading aloud alone and reading after teacher also ranked highly. While the drilling and repetition exercises normally encourage memorization, when combined with reading aloud without phonological awareness, it creates a sense of word-sound memorization, instead of being able to segment sounds into separate parts, and to apply this concept to other similar words.

This sentiment is echoed in another journal (Normazidah Che Musa, Koo Yew Lie, Hazita Azman, 2012), in which they stress that the poor and underutilized use of learning strategies correlates to the meagre reading ability of students.

Thus, we can see that learning English in a school type setting is very inconsistent, and there is no stress on learning the links between word patterns and sounds. Knowing phoneme patterns in words would greatly reduce the amount of direct word memorization and pronunciation, and instead makes them approach the language by pattern matching instead. This will reduce the stress of studying many different words and how they sound, and replacing that concept with putting sounds to word components with certain spelling patterns. In consequence, this will make it easier for students to transition into Year One, as they are able to keep up with the huge amount of vocabulary introduced at this level.

## 2.3 CHILDREN AND COMPUTERS

Being younger, children possess unique cognitive and motor skills which are exclusive to a certain age range. While not as coordinated as adults, they are still able to perform simple tasks at a minimal level.

Zhigang Fang, Weibin Luo, and Jie Xu (2011) have noted in their research that children at around 3-7 years of age, which is in line with the age of kindergarten students in Malaysia, have limited cognition and short attention span, and are generally unaware of their surroundings. Their judgment is based entirely on representative thinking, which relates to intuitive and image thinking. This is echoed in a study by Youngju Lee (2009), who states that children as young as 3-4 years old are able to cope with simple software, provided pictorial directions and visual cues are used.

However, in relation to computers, the GUI must be designed in such a way that it takes into account the child's current age group and mental psychology and capacity at the time. For instance, when designing something interactive using the Human Computer Interaction (HCI) model for 6 year olds, that program is not meant to be used by 3 year

olds since they have different moods and movement skills which makes them unable to interact with a system the way a 6 year old can.

It is also important to note that children need instant stimuli and reaction to what they are reacting to. Thus, the system needs to provide instant feedback, as to prevent excessive interaction and input by the children using the system. This can be done by having simple animations or having a sound playback, which is again, the main feature of the system being developed.

Based on that, we can note that designing for children of this age requires the use of lots of images to tie in what they have learnt to their way of thinking, and that they need the program to react instantly once they input something. This is so that they can easily absorb knowledge to the best of their thinking. It is also wise to simplify actions onscreen as to not involve too many complex movements like dragging and flicking, as it would confuse and frustrate the children if they are not able to perform the actions or get the desired feedback.

## 2.4 THE CURRENT PHONEMIC PROGRAMS AVAILABLE

There is currently no system that specifically teaches phonemic sounds to students in Malaysia. Most commercial systems focus more on converting text to phonemes either with or without audio cues. The programs are also very basic in appearance and lack an interesting GUI to capture the interest of pre-schoolers. They also require input from users to generate phonemes instead of showing examples directly.

Below are some examples of existing programs and why they are not suitable for use with the target market.

i.    Vocaloid

The Vocaloid software is a phoneme based system designed for creating voiced lyrics for use in song composition. The voices which pronounce the phonemes are very clear and precise, and encompass a wide range of pitches and keys. It is designed as a sound synthesizer, and not as an educational tool.
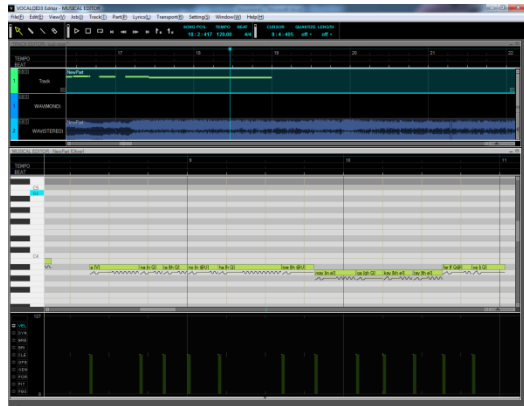


Figure 2.0 Vocaloid

ii.  http://www.speech.cs.cmu.edu/cgi-bin/cmudict?

The CMU Pronouncing Dictionary is a webpage which converts text into their phoneme equivalent. It has no other features and no audio or video cues in order to show how said phonemes are pronounced. Furthermore, being a webpage, it requires constant internet access, which might not be feasible if the system is deployed in an area with little internet coverage.
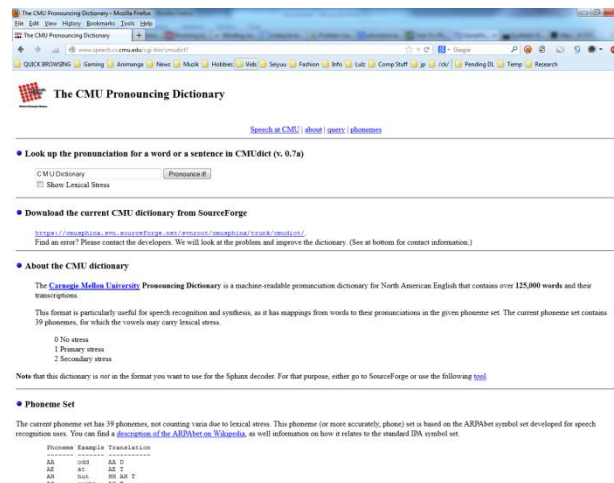


Figure 3.0 The CMU Pronouncing Dictionary

iii.  speechLab

http://www.synthetic-reality.com/speechLab.htm

A text to voice phoneme converter, it is able to record phoneme sounds from users to be used in phonemic manipulation based on text. It is a precursor to Vocaloid in a sense. While this program is good in a sense that it shows how text and phonemes are related, the interface is

cumbersome, and it requires users to actually have basic phonemic knowledge to use it.
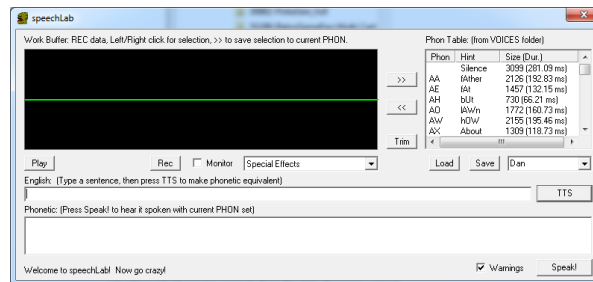


Figure 4.0 speechLab

The systems at http://www.earobics.com/index.php and http://www.braintrain.com/ are both commercial programs designed to help a multitude of users in creating phonemic awareness, along with other education related learning systems. However, these programs were designed around American users, and thus, overseas users are locked out from using or even sampling these programs. Also, both of these programs use American English, and they have a different set of phonemes compared to the one used here (British English).

A study by Yen Shou Lai et al (2007) was also done in regards to this issue. They have come up with a solution which involves teachers and students recording their voices and then using sound based matching algorithms to see if the students can match their teacher in pronouncing phonemes. The drawback of this system is that it is tailored to fit students in China only, and the UI is relatively simple and basic. It is also heavily reliant on the teacher's pronunciation skills and accent, so most student will ultimately learn how to speak like their teacher, instead of developing their own key skills based on their own voice and pitch.

# CHAPTER 3: METHODOLOGY AND PROJECT WORK

## 3.1 METHODOLOGY

### 3.1.1 Research Methodology

This project deals with the education of a younger generation. Thus the data obtained for use in this research must cover various aspects and facets of phonemic awareness and education as an alternative for teaching the English language. In addition to that, the relationship on HCI elements and kindergarten students' computer abilities must also be researched, as both of these are interrelated with the development of the project.

Thus, it is important to study this case from all angles. This is why a Qualitative research methodology is employed, to provide a better understanding of the current teaching techniques, as well as other areas such as the children's ability to handle computerized methods of learning. To support the information and data obtained from the above, the Analytical research methodology is also employed, to compare and contrast between the current teaching methods in Malaysia.

The Qualitative research methodology concerns the experience and understanding of a subject matter. This is suitable for gathering data on how the teachers actually teach in class and the methods that they normally use. It is also used for gathering data on how children are exposed to computers and their reactions to them. The method involved in this methodology would be conducting a simple interview with the teachers and the students, with topics ranging from teaching methods to computer literacy. This method is chosen as it will get the most detailed experiences from the teachers and the questions themselves are more open ended, so they are able to provide insight on some otherwise overlooked subjects . It is also chosen because when dealing with younger children, it is better to directly hear from them as this will ensure that they fully understand the questions that are asked, and as such, will answer accordingly with little margin of error.

The interview questions will differ for both groups (teachers and students) as the former will focus more on teaching and phonemic awareness, and the latter will focus more on computers and their reaction to UI elements.

In addition to the above, information from past research papers will also be used to supplement the findings above. As there have been many types of researches done based on phonemic awareness, such as the paper by Ng Pei Fern and Yeo Kee Jiar (Oct 2012), it will provide valuable insight on the other methods of teachings and how common or uncommon the proposed method is used in actual teaching environments. They can be also used to supplement children and their aversion towards certain UI elements, and that can be used as a design guide later on.

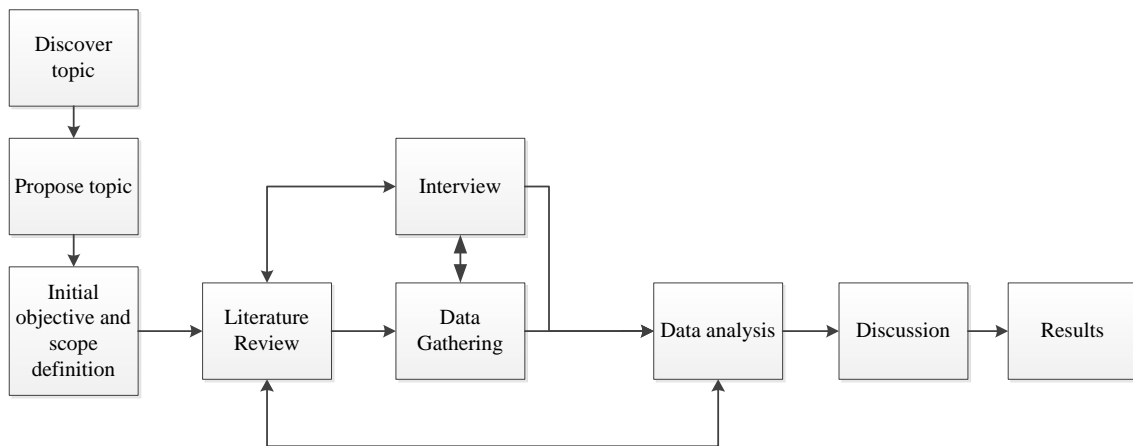This is the process flow for this methodology



Figure 5.0 Research Methodology

### 3.1.2 Development Methodology

This project will be developed by using the prototyping methodology. Although the phases within this model follows those of the standard Software Development Life Cycle, ie Planning, Analysis, Design, Implementation, Testing and Deployment; it focuses more on getting a small scale working model done, and then adding to it until it resembles the final product and is deemed satisfactory for deployment. Prototyping is also a suitable methodology for rapid development. A speedy development process ensures that a working model is available for testing after each iteration of the development process.



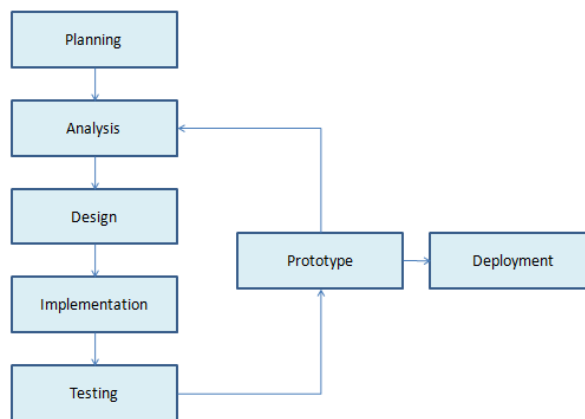Figure 6.0 Prototyping Methodology

Each phase in this methodology has its own sub tasks. The list below highlights each phase and their relevant tasks.

i.  Planning

In this phase, a feasibility study was done, and from there, it was used as a basis to create a suitable project timeline as well as project flow. It showcases the main project activities as well as the deliverables and key milestones.

ii.     Analysis

This phase requires the gathering of user requirements. It will also cover the comparisons between the current systems in the market, as well as how the proposed system can improve or innovate itself amongst the current system, if any. It will link this to what the end user's expectations are, and try to address the concerns the end user might have. From here, the research methodologies explained in Section 3.1.1 will be used, and the end result will be used to design the look and feel of the system.

iii.    Design

This phase focuses more on the system backend design and how to develop the system. The main UI mock up is designed, and this is then translated into graphics and various sound and video data testing. These are then prepared for the next stage. The system flowchart is also done in this phase.

iv.     Implementation

This phase concerns the actual coding and development of the system based on the specifications and design elements gathered from the above three phases. This phase also aims to solve any critical bugs and errors that might have arisen during development, so that a relatively bug free system prototype is produced.

v.      Testing

The deliverables from this testing phase are the results from testing sessions with the end user. This is in the form of an interview with system testing and instructions. As this is a prototyping based model, this

phase, along with phase ii, iii and iv will be iterated over and over until a satisfactory system model is produced.

vi.    Deployment

The system is distributed to the end user, along with user training and a basic user support and installation. Any documentation regarding the system is also finalised during this phase.

This is the basic flowchart of the system. It details the system's flow and work process.
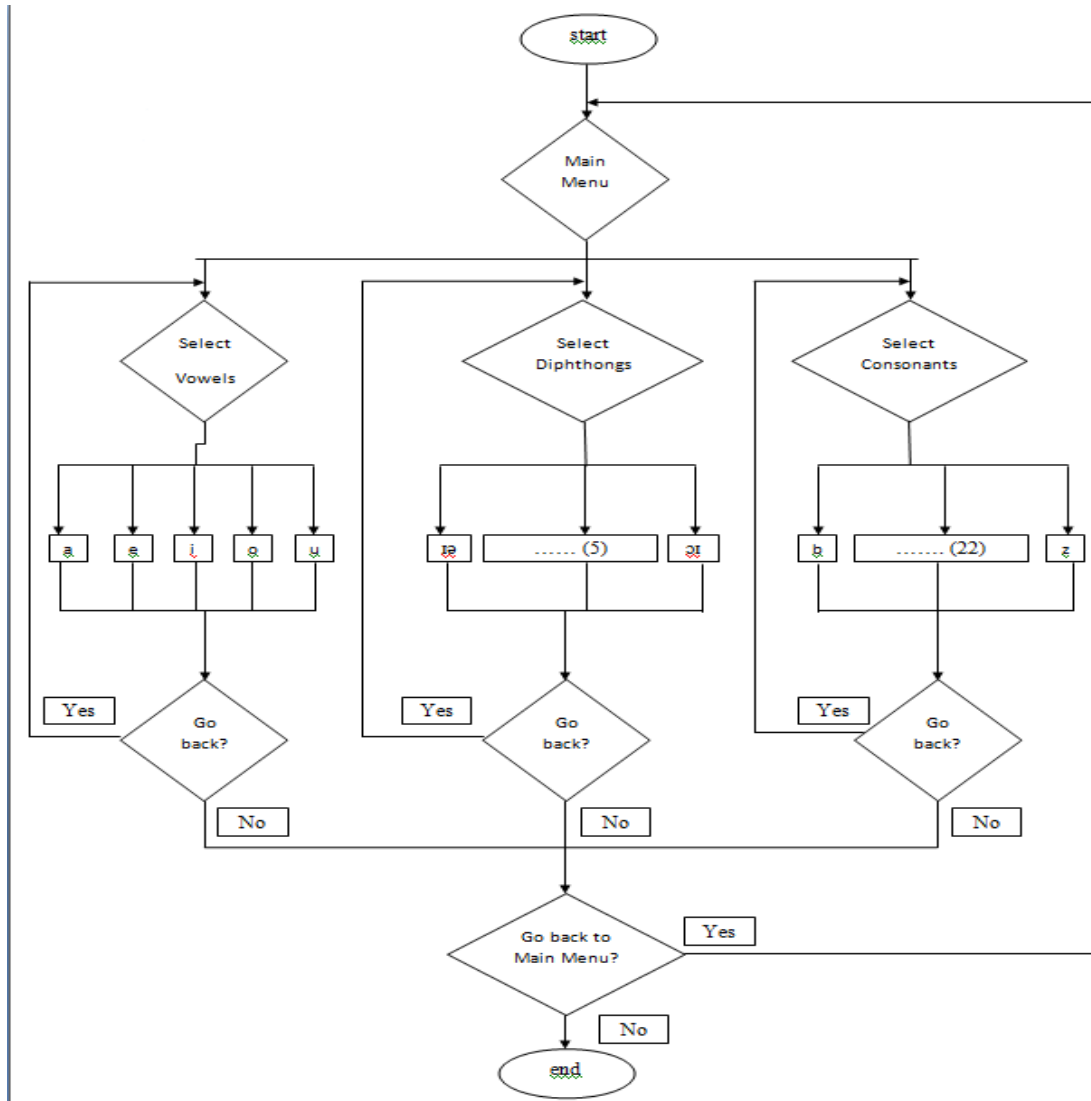


Figure 7.0 System Flowchart

27

## 3.2 SYSTEM CODING

```
stop();

myPause=function(){

clearInterval(myID);

}

b_back.onPress = function() {


        consonantSound = new Sound(this);

        consonantSound.attachSound("sound_consonant");

        consonantSound.start();

        gotoAndStop(3);

};

pic_a.onPress = function() {

        aSound = new Sound(this);

        aSound.attachSound("sound_a");

        aSound.start();

        myID=setInterval(myPause,1500);

};

a_ant.onPress = function() {
```

```
            a_antSound = new Sound(this);

            a_antSound.attachSound("sound_a_ant");

            a_antSound.start();

            myID=setInterval(myPause,1500);

            a_ant.gotoAndPlay(1);

};


a_apple.onPress = function() {


            a_appleSound = new Sound(this);

            a_appleSound.attachSound("sound_a_apple");

            a_appleSound.start();

            myID=setInterval(myPause,1500);

            a_apple.gotoAndPlay(1);

};
```

## 3.2 PROJECT TOOLS

The tools used this project involved both hardware and software. On the hardware aspect, the project required the use of a suitable video recording device which can clearly record short videos of mouth movements as well as the phonemic sounds uttered by a speaker. In this case, a mobile phone camera was sufficient as only close-ups on the mouth and lips were required. There was also a pressing need to keep file sizes compact due to the amount of video and audio files used, and the trade-off in this case was the overall quality of the video. Additional sound files were also needed for the overall presentation of the system, and thus a good quality microphone was required. Sound files were recorded and then edited using specific software in order to maintain quality and reduce filesize.

The main tools used in the development of the system are Adobe Flash Professional CS6, Paint Tool SAI and Audacity. Adobe Flash Professional CS6 is a multimedia authoring tool which focuses more on manipulating graphics and animations, to be used as part of the Adobe Engagement Platform (which includes a suite of the Flash player, authoring tools and server products) or as a standalone executable. This, combined with ActionScript, the scripting language that comes with the authoring tool, gives a lot of control over the multimedia elements that are to be used in the process of developing the system. However, in terms of asset development, Adobe Flash Professional CS6 is limited in a sense that it lacks proper drawing tools, and must be supplemented by another drawing based program in order to build graphical assets. It does however, have excellent library services, with a tree-like structure, which ensure that assets are kept in an orderly manner with minimal need for duplication, as assets can be reused and recalled. Other than that, it offers a way to keep resources within the program itself to a minimum, by providing means of accessing media from an external file, which is useful for calling video files from an external folder. It also comes bundled with the AIR SDK, which helps in porting the system as a mobile system.
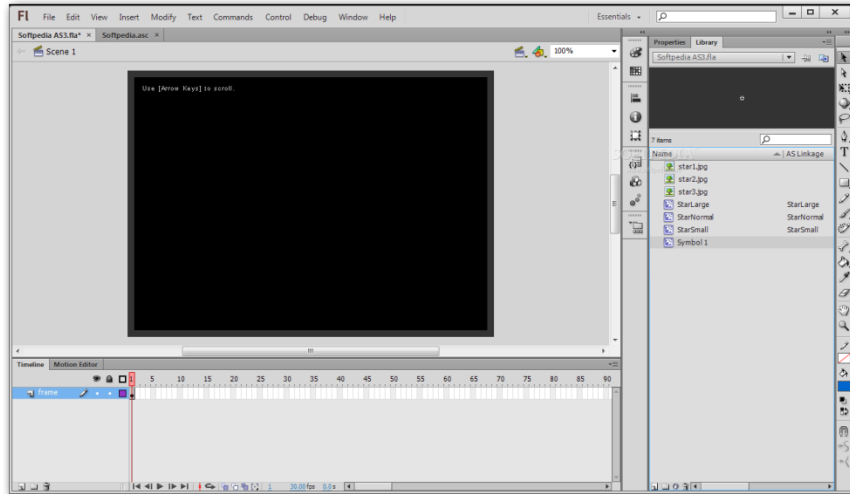
Figure 8.0 Adobe Flash Professional CS6

The previous report mentioned the use of GIMP as a drawing tool to supplement asset creation. GIMP was deemed insufficient as although it has many additional tools and plugins to create images, it sometimes handles canvas resizing awkwardly, and is sometimes unable to save transparent pixels for png files consistently. Paint Tool SAI, an alternative program, solved all those problems. It also has better tablet support and is overall much smoother in terms of drawing, and has superior anti-aliasing, making 'jaggies' less obvious compared to GIMP.

Figure 9.0 Paint Tool SAI

## 3.3 GANTT CHART

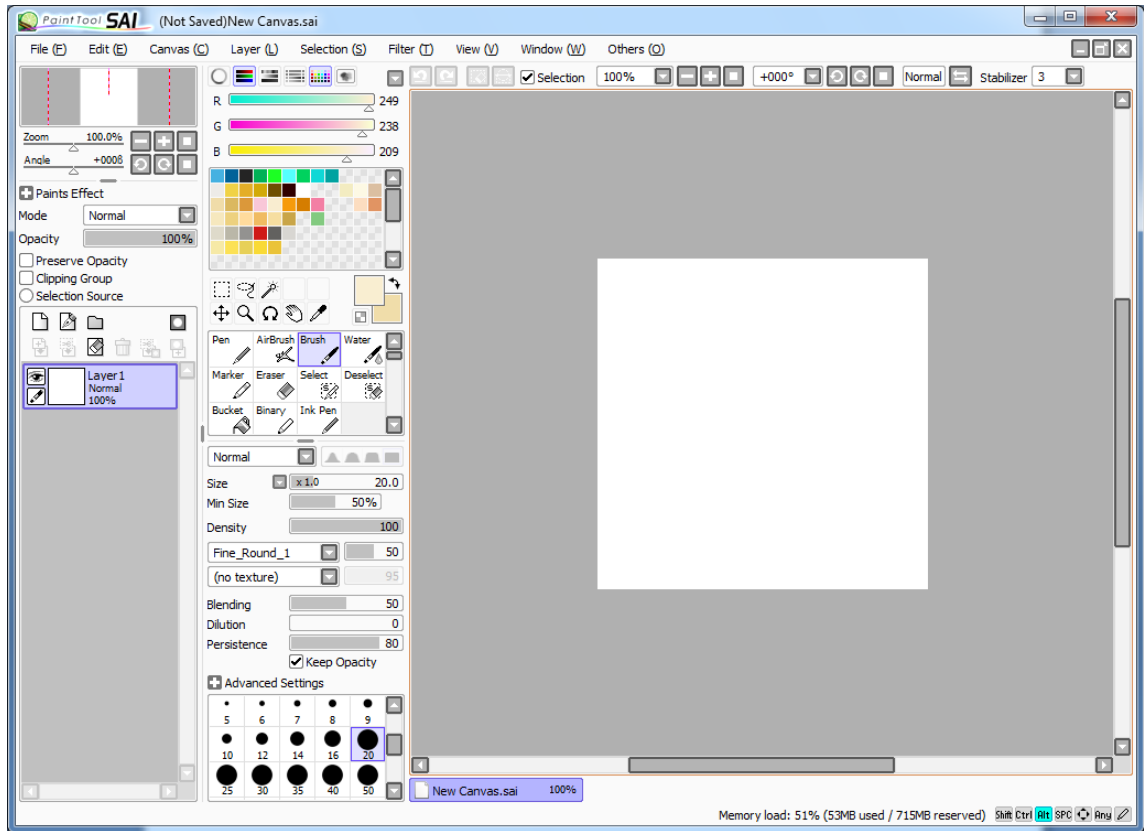| | WEEK | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TASK | 21/1 - 28/1 | 28/1 - 4/2 | 4/2 - 11/2 | 11/2 - 18/2 | 18/2 - 25/2 | 25/2 - 4/3 | 4/3 - 11/3 | 11/3 - 18/3 | 18/3 - 25/3 | 25/3 - 1/4 | 1/4 - 8/4 | 8/4 - 15/4 | 15/4 - 22/4 |
| 1 | **Project Title Submission** | ■ | | | | | | | | | | | | |
| 2 | **Proposal Submission** | | ■ | | | | | | | | | | | |
| 3 | **Planning Phase** | | ■ | ■ | ■ | ■ | | | | | | | | |
| 4 | - Feasibility Analysis | | ■ | | | | | | | | | | | |
| 5 | - In-depth Literature Review | | | ■ | ■ | | | | | | | | | |
| 6 | **Extended Proposal Submission** | | | | | ■ | | | | | | | | |
| 7 | **Analysis Phase** | | | | | | ■ | ■ | | | | | | |
| 8 | - Data Gathering | | | | | | ■ | | | | | | | |
| 9 | - Data Analysis | | | | | | | ■ | | | | | | |
| 10 | **Design Phase** | | | | | | | | ■ | ■ | ■ | | | |
| 11 | - Design System Architectural Design | | | | | | | | ■ | ■ | ■ | | | |
| 12 | - Design System GUI Mock-up | | | | | | | | ■ | ■ | ■ | | | |
| 13 | **Proposal Defense** | | | | | | | | | | | | ■ | |
| 14 | **Interim Report Submission** | | | | | | | | | | | | | ■ |

Figure 10.0 Gantt Chart Semester 1

| | WEEK | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 13 | 13 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TASK | 20/5 - 27/5 | 27/5 - 3/6 | 3/6 - 10/6 | 10/6 - 17/6 | 17/6- 24/6 | 24/6 - 1/7 | 1/7 - 8/7 | 8/7 - 15/7 | 15/7 - 22/7 | 22/7 - 29/7 | 29/7 - 5/8 | 5/8 - 12/8 | 12/8 - 19/8 | 19/8 - 26/8 | 26/8 - 2/9 | 2/9 - 9/9 |
| 1 | Prototype Development | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| 2 | Testing and Debugging | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| 3 | Interim Report Amendment | ▣ | ▣ | ▣ | | | | | | | | | | | | | |
| 4 | Progress Report Submission | | | | ■ | | | | | | | | | | | | |
| 5 | Further testing and Results Analysis | | | | | ▣ | ▣ | ▣ | ▣ | ▣ | ▣ | | | | | | |
| 6 | Poster Design | | | | | | | ▣ | ▣ | | | | | | | | |
| 7 | Pre-SEDEX | | | | | | | | | ■ | | | | | | | |
| 8 | First Dissertation Submission | | | | | | | | | | | ■ | | | | | |
| 9 | System fine tuning | | | | | | | | | | | ▣ | ▣ | | | | |
| 10 | Viva | | | | | | | | | | | | | ■ | | | |
| 11 | SEDEX | | | | | | | | | | | | | | ■ | | |
| 12 | Technical Report and Online Dissertation | | | | | | | | | | | | | | ■ | | |
| 13 | Final Dissertation | | | | | | | | | | | | | | | | ■ |
| 14 | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | |

Figure 11.0 Gantt Chart Semester 2

## 3.4 PROJECT ACTIVITIES AND KEY MILESTONES

### 3.4.1Project Activities

There is significant focus on the development of the program, in order to quickly find faults in the system for the final build. As per the Pre-SEDEX presentation, there are suggestions of making the program more 'complex' with the addition of more game-type elements, and increasing multimedia type elements such as text and music. These elements will be implemented and further tested in order to gauge actual market needs as well as current technological developments.

Alongside the development of this program is concurrent documentation and analysis which would be added into the dissertation. The analysis includes test results and output, and if the system runs as expected based on early development criteria. In this case, since the end product is more of an audio-visual product, stringent checks must be done in order to find out whether the components are synchronized with each other. Checks are also done in order to find out potential user errors, and failsafes developed in order to prevent system failure. Frequent checks using different resolutions are also done, as the program was done using 800 x 600 native resolutions, to take into account the lower spec computers found in various kindergartens.

Thus, the actual final build of the program will have a minor graphical overhaul with extra interactive options in order to engage the user in the system. Additionally, the system will still take into account the actual screen size in relation to the target user's motor skills and will scale down the components as necessary. Furthermore, the system will also implement online storing of videos as to not burden the users with large installation sizes.

### 3.4.2 Key milestones and Deliverables

The key milestones for this project would be the progress report, Pre-SEDEX, Dissertation draft submission, SEDEX, Viva, Technical Report and Final Dissertation submission. However, alongside these milestones are also continuous system developments and documentation, in order to support and show tangible output for each of those milestones.

The progress report is basically an updated version of the interim report, based on input given during the proposal defence. It also highlights the work done during the course of the project which includes the development of the prototype, as well as the methodologies and project documentation. It also discusses the project and work done as well as necessary further actions to be taken based on the preliminary work done on the initial prototype. The deliverable for this phase is the report.

Pre-SEDEX is basically a showcase of the final build of the prototype, along with relevant documentation. This is presented in a presentation style format, along with a poster exhibition, summarizing the project and its various discussions and end result. For this stage, the main deliverables are the prototype and the poster.

The main presentation, SEDEX and VIVA are both done at the same time. Both are in standard presentation format and require updated versions of posters and slides, if needed. The final build of the system is also displayed at these events.

The technical report is the penultimate milestone and deliverable for this project. It focuses more on the technical aspect and design of the system. There is also emphasis on the specifications of the project as well.

Finally, the final version of the dissertation is to be submitted at the end of the project, taking into account all findings and updates from the various presentations and further testing.

# CHAPTER 4: RESULTS AND DISCUSSION

## 4.1 INTERVIEW ANALYSIS

An interview was conducted amongst three different kindergartens; Tadika Mutiara Montessori, Taska Little Caliphs Cilik Imtiaz and Taska Adnin with a standard set of interview questions, distributed amongst 6 participants. The interview was conducted in an open ended manner, in which the participants were encouraged to provide additional details or suggestions in relation to the subject matter. The participants were all kindergarten teachers with varying degrees of teaching experience, ranging from 1 month to 15 years. The purpose of this interview is to see how they approach teaching English at this level and seeing how prepared the students are for learning in English in primary school.

| Question | Remarks |
|---|---|
| How long have you been teaching English in kindergarten? | Ranges from 1 month to 15 years |
| Is English an important language to learn at an early age? | All participants agree that it is important. However, they disagree regarding the first language status.<br><br>"English must be introduced as early as possible and taught alongside Malay" |

| | "Malay is the national language, so it must be taught first, then English" |
|---|---|
| When should English be taught to children? | All participants agree that it must be taught as soon as possible.<br><br>"From birth, by talking to them everyday"<br><br>"As soon as 2 years old, when they can learn to recognize sound patterns and isolate sounds" |
| What kind of teaching methods do you employ in order to teach English to students? | "A combination of Phonics and memorization and drilling"<br><br>"Belajar sambil bermain" (Learning while playing)<br><br>"One-on-one interaction" |
| Are you personally aware of a | 4 of the 6 respondents are aware of it. The ones |

| | |
|---|---|
| method called Phonemic Awareness and what it is? | who are not employ traditional drilling and repetition exercises. |
| What is your personal opinion in regards to using Phonemic Awareness as a supplementary method of teaching English? | Out of the 4 respondents who are aware of this fact, all of them agree that it is a good method. But they highlighted that students start off "slower" compared to their counterparts who learn direct reading. |
| Do you think that using computers is a good method of teaching English? If so, how do we tailor it so that children are more interested in the system? | The 6 respondents agree that it is a good method. But they differed in opinion regarding the system tailoring.<br><br>"I think it needs more pictures and animations, with lots of sounds"<br><br>"The children are more tech savvy, so having games and sounds are important"<br><br>"It must be easy to use as their hands cannot handle the mouse well" |

| What are the key elements needed to make children more interested in the system? | All respondents agree that the elements needed are |
|---|---|
| | 1) Sound |
| | 2) Video |
| | 3) Graphics |
| | 4) Animation |
| | 5) Colourful text |

Table 1.0: Interview Analysis

## 4.2 OBSERVATION

Tadika Mutiara Montessori allowed for an observation of how they taught English in class. The method they employed was phonics, which encompasses phonemic awareness.

Firstly, they implemented a system in which a student is taught to be independent, and is able to amuse her or herself when not being taught. Language lessons are taught on a one-to-one basis, and require full interaction between teacher and student, meaning that other students are left to their own devices most of the time.

During the lesson, students are exposed to different levels of letter and phoneme recognition. They are first taught how to trace letters using their sense of touch by touching letters shaped out of sandpaper with their fingers. At the same time, they are

taught the phoneme and sound of the word. Then, they are showed relevant pictures in relation to the phoneme (for example, for the phoneme related to the letter "C", they are shown pictures of cats, cars, or caps).

After learning a set of consonant and vowel type phonemes, they are then taught how to build words using letters. This is to help their word building and blending process. They are shown some pieces of cardboard letters, and are then told to rearrange them according to the sound the teacher makes. After that, they are either given books to read, like the Pink series, which focuses on three letter words and word blending, or they are shown pictures of three letter items, and are required to spell them out themselves by using letter shaped blocks.

The advanced students are given opportunities to play with computer based courseware, such as the one on Starfall.com. This is again with supervision from a teacher. The program allows students to interact with graphics and animations, and even has games and sing-a-long songs based on phonemes. However, there is less attention given to this method as the tactile based methods seem to take up more time.

This method ensures that students are given full attention individually. However, there is a lack of feedback or response from the materials themselves, making it mostly a one way interaction between the hardware (teaching tools and books) and the student. In the long run, some students will tire of the method as it is quite monotonous. On the other hand, once the students are aware of the concept behind phonemic awareness, their skills in reading and speaking are considered to be much better than their counterparts who are taught using standard memorizing and reading drills.

## 4.3 SYSTEM FINDINGS

The final version of the program is executable but in local form and emulated instead of being able to run natively on the intended device. The screen transition issue present in the previous builds have been corrected via interval implementations, as well as delayed action upon visiting a new page. The transition issues do not affect the added portability of the system onto mobiles however.

For final build of system, the suggested features are the added elements based on the flow dictated by the previous prototype. Graphics have been overhauled, with added interactable elements such as touch based animations that respond to user input.

The issue found is in regards to storing multimedia files has been solved by storing it in an online video server hosted online. In this case the video files are stored independently from the main system as the files themselves are huge in size and will bloat the main system. This will cause issues in regards to distributing the files later. Thus, suitable storing pointer methods must be made and specific directions given so that the video files are able to be accessed despite having the system installed in different locations. However, this does not affect audio files since the files themselves are small, and thus direct embedding in the system is recommended.

As per the Pre-SEDEX presentation, suggestions have been made to add game-like systems to cater to a more tech-savvy generation. This has been taken into consideration and will be implemented via simple dragging and matching games in order to help with sound identification.

### 4.3.1 System Evaluation and Analysis

The system was subjected to rigorous testing by the developer and a select group of users, comprising of kindergarten students and teachers. This was so that any early bugs and errors are able to be found and eliminated before the next prototype is rolled out. The system was tested 5 times with satisfactory results. The reason why there was no formal testing conducted was because of a lack of manpower, and the overall simplicity of the first prototype, which was designed to have only the basic functions with no additional frills. Other than graphical hiccups, there were no egregious errors in regards to the main functionality of the program.

These were the questions asked during the testing session:

Testing Interview Guidelines:

**Age group: 4-6**

1) Is the system easy to use?

2) Does it look interesting?

3) Do you like the pictures and sounds?

4) Do you like the videos?

5) Do you think you can learn a lot from this system?

6) Can you tell me what you have learnt from this system?

7) Was the system very clear in what it is teaching you?

**Teachers:**

1) Is the system user friendly?

2) Does the look of the system engage the interest of the students?

3) Are the graphics and interface annoying?

4) Are the video and sound clips helpful in teaching children how to pronounce the letters?

5) Is there any way to improve upon the system?

6) Are you able to find any bugs/errors in the system?

Following that, this table explains some of the testing results gathered.

| Criteria | Testing activity | Results |
|---|---|---|
| Ease of use | Screen navigation – get to the page given in 2 minutes | Teachers had no problem with this task as they can already read. Students struggle as they do not know the category of words, and kept misclicking icons and buttons.<br><br>Other feedback: The screen transitions too fast, and some children complained of dizziness. The sounds also overlap |

| | | when the next page is clicked too fast.<br><br>Bottom line: Success with teachers, but not so with students |
| --- | --- | --- |
| | Icon identification – can the users tell apart which icon is used for which section? | Just by looking at the icons, teacher have an advantage as they can read the labels. Students had to do a lot of guesswork and memorization, but they were able to remember the positions of the icons and what they relate to<br><br>Other feedback: design different icons for different pages and functions. Add animations to make it more vibrant. Use less text labeling and show meaningful pictures |

| | | as buttons. |
|---|---|---|
| | | Bottom line: Needs a slight graphical overhaul, but otherwise functional. |
| Clarity | Video playback – is the video clear, sound and picture wise? | Both teachers and students agree that the video is clear and has clear sound. However, the video is a bit dark.<br><br>Suggestions: brighten up the video |
| | Sound playback – are the sound effects loud and clear enough? | Both teachers and students agree that the sound is clear, and that they are able to discern individual sounds from each section. |
| Bug and error testing | Sound and Video | Sound and video files sometimes playback together and overlap before the page changes |

| | | Suggestions: find a way to delay the reaction time after button presses to let sound and video files finish loading first |
|---|---|---|
| Aesthetics and Usability | User Interface – is it aesthetically pleasing? | The students are generally very happy with bright colours. However, they were easily bored with the simple interface. The teachers also said that there should be more graphics and animations to sustain their interest, as well as more sound effects. |

Table 2.0: System Analysis

## 4.4 PROJECT STORYBOARD



Figure 12.0 Start Screen

The user is first directed to the start screen where they will have to click on the start button to proceed. The GUI is designed with a crayon aesthetic to simulate colouring materials which children are being exposed to in class. The character and bushes are animated to attract attention towards the screen.

Figure 13.0 Category Screen

On this screen, phoneme categories are displayed, and users can choose between them. It is suggested that this screen be changed into proficiency levels instead, grouping different batches of phonemes based on difficulty and importance.
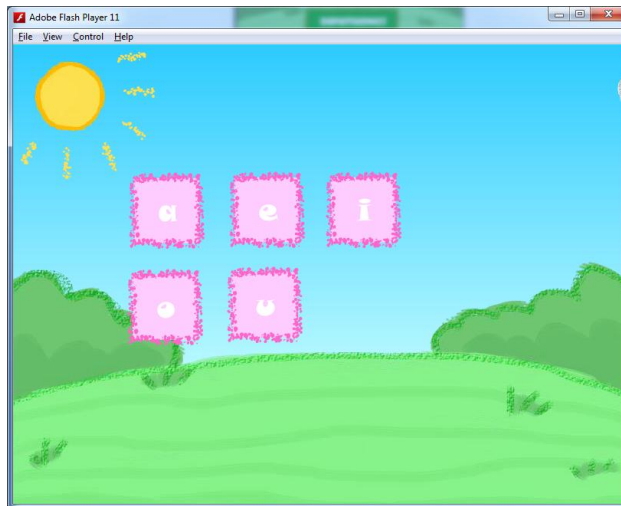


Figure 14.0 Phoneme Screen

This screen shows phonemes based on the category picked before. In this case, these are vowel phonemes. Users must choose one phoneme to proceed.
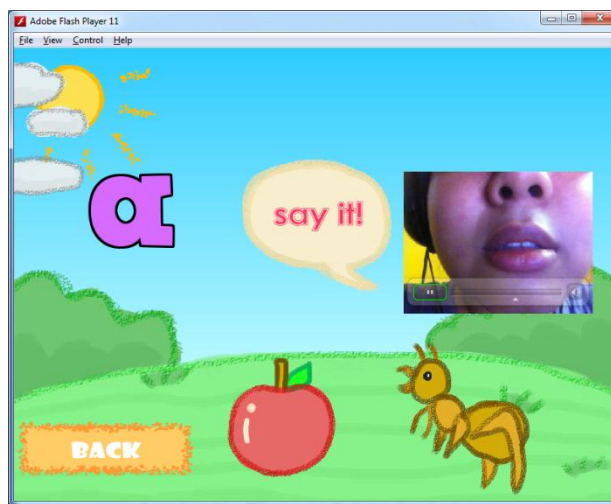


Figure 15.0 Individual Phoneme Screen

Once a phoneme has been selected, it will move into this screen. There will be a video showing mouth movements to demonstrate how to pronounce the selected phoneme, as well as an audio file singing along to a song showcasing the phoneme after clicking on the objects shown on screen.. This is for the element of example through repetition. The video can be played back as many times as the user wants.

These graphics are merely a placeholder based on the first prototype. For the actual software, the graphics will be more streamlined to appeal to a broader age group.

# CHAPTER 5: CONCLUSION

The final build of the system has managed to accomplish the main objectives and scope of the project, in which it mainly focuses on teaching phonemes to the target market, as well as the actual development and research into the system. After testing and user feedback, a further understanding of how teaching software are developed is achieved, and this in hand, helps in the relationship between developer and client. Additionally, feedback from the panel of examiners also helped to further improve the final build based on the criticisms give.

Suggestions have been made to further enhance the system and to turn it more 'game-like' in nature as this is what the current trend is for the current market. Thus, for future expansions of the system, more game elements will be implemented. To make up for the shortcomings of actionscript, the system would most probably be developed together with either JAVA or another form of Object Oriented Programming. The main interface 'look' and design will still overall be developed with the existing tools as they have easier support for the artistic side of the system. The expansions however, will still incorporate the main idea of the system, in which it will first and foremost, demonstrate how individual phonemes sound like, and how to pronounce them properly.

In conclusion, based on the work done thus far, the system can be developed, but there needs to be more rapport with the target group and their parents, in order to figure out the current trends. Although systems like these are able, at their barest form, to function as intended, the lack of further enhancements in the form of multimedia will hurt long time development.

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**APPENDICES**

**1.0 Appendix A**
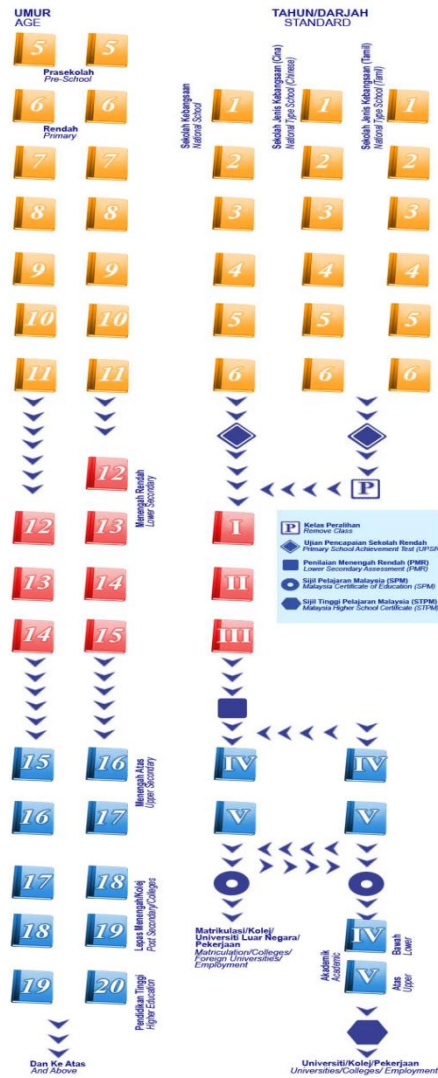


Age based Education Level chart from the Ministry of Education

This chart shows the level of education most citizens of Malaysia are expected to be at based on their age groups. In this chart, the point of interest is at age 5 and 6, on the top left corner. It states that at this level, the children at this age group are in Prasekolah

level, or kindergarten. However, some 4 year olds are also included as this chart excludes *Taska* students. This is the target group for this project.

## 2.0 Appendix B



Guidelines proposed by the Ministry of Education for Kindergarten Education

This is the guidelines given by the Ministry of Education to all kindergarten and preschool operators in the year 2012. It only shows an example of what contents should be taught, but not the actual content and teaching methods.

# 3.0 Appendix C

### Table 2
#### The Number and Percentage of Teachers Reported Literacy Content Focus (n=96)

| Literacy Content | Never | | Little Focus | | Some Focus | | Main Focus | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | N | % | n | % |
| Segmenting of sounds | 95 | 99.0 | 1 | 1.0 | 0 | 0.0 | 0 | 0.0 |
| Blending of sounds | 90 | 93.8 | 6 | 6.2 | 0 | 0.0 | 0 | 0.0 |
| Final sounds identification | 51 | 53.1 | 39 | 40.6 | 4 | 4.17 | 2 | 2.1 |
| Initial sounds identification | 45 | 46.9 | 36 | 37.5 | 11 | 11.5 | 4 | 4.2 |
| Book Concept (directionality, book title) | 4 | 4.2 | 32 | 33.3 | 48 | 50.0 | 12 | 12.5 |
| Guided story book reading | 4 | 4.2 | 31 | 32.3 | 39 | 40.6 | 22 | 22.9 |
| Print-rich environment | 14 | 14.6 | 24 | 25.0 | 33 | 34.4 | 25 | 26.0 |
| Letter name recognition | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 96 | 100.0 |
| Letter sound recognition | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 96 | 100.0 |
| Capital and lowercase letter recognition | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 96 | 100.0 |
| Syllable decoding | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 96 | 100.0 |
| Word decoding | 0 | 0.0 | 0 | 0.0 | 34 | 35.4 | 62 | 64.6 |
| Phrase decoding | 0 | 0.0 | 13 | 13.5 | 30 | 31.3 | 53 | 55.2 |
| Sentence decoding | 19 | 19.8 | 11 | 11.5 | 42 | 43.8 | 24 | 25.0 |
| Encoding (spelling/writing) | 16 | 16.7 | 26 | 27.1 | 36 | 37.5 | 18 | 18.8 |
| Reading fluency training | 24 | 25.0 | 36 | 37.5 | 21 | 21.9 | 15 | 15.6 |
| Reading comprehension | 29 | 30.2 | 31 | 32.3 | 23 | 24.0 | 13 | 13.5 |
| Independent Story Book Reading | 22 | 22.9 | 54 | 56.3 | 16 | 16.7 | 4 | 4.2 |
| Prewriting practice | 0 | 0.0 | 0 | 0.0 | 4 | 4.2 | 92 | 95.8 |
| Writing (Copy) letter | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 96 | 100.0 |
| Writing (Copy) word | 0 | 0.0 | 0 | 0.0 | 14 | 14.6 | 82 | 85.4 |
| Spelling of letter based on letter name | 18 | 18.8 | 27 | 28.1 | 28 | 29.2 | 23 | 24.0 |
| Spelling of words | 7 | 7.3 | 36 | 37.5 | 33 | 34.4 | 20 | 20.8 |
| Spelling of letter based on letter sound | 84 | 87.5 | 7 | 7.3 | 3 | 3.13 | 2 | 2.1 |
| *Intentional Writing (memo, shopping list) | 12 | 12.5 | 38 | 39.6 | 30 | 31.3 | 16 | 16.7 |
| Developing interest in reading & writing | 0 | 0.0 | 36 | 37.5 | 34 | 35.4 | 26 | 27.1 |

Table retrieved from Preschool Teachers' Self-Report Beliefs and Practices on Early Literacy Instruction and Early Literacy Intervention showing The Number and Percentage of Teachers Reported Literacy Content Focus

This table is used in conjunction with the literary review on page 15

## 4.0 Appendix D

**Table 3**
**The Number and Percentage of Teachers Reported Literacy Strategies Focus (n=96)**

| Literacy Teaching Strategies | Never | | Little Focus | | Some Focus | | Main Focus | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| Repetition and drills | 0 | 0.0 | 0 | 0.0 | 3 | 3.13 | 93 | 96.9 |
| Reading aloud | 0 | 0.0 | 2 | 2.1 | 2 | 2.08 | 92 | 95.8 |
| Reading after teacher | 0 | 0.0 | 3 | 3.1 | 4 | 4.17 | 89 | 92.7 |
| Matching words with pictures | 0 | 0.0 | 12 | 12.5 | 19 | 19.8 | 65 | 67.7 |
| Using stories | 0 | 0.0 | 24 | 25.0 | 46 | 47.9 | 26 | 27.1 |
| Using songs/music | 2 | 2.1 | 25 | 26.0 | 43 | 44.8 | 26 | 27.1 |
| Using colours in reading materials | 8 | 8.3 | 27 | 28.1 | 42 | 43.8 | 19 | 19.8 |
| Preparing print-rich environment | 14 | 14.6 | 24 | 25.0 | 33 | 34.4 | 25 | 26.0 |
| Using multisensory (at least three) | 19 | 19.8 | 23 | 24.0 | 30 | 31.3 | 24 | 25.0 |
| Using games | 9 | 9.4 | 38 | 39.6 | 27 | 28.1 | 22 | 22.9 |
| Using humour | 4 | 4.2 | 33 | 34.4 | 30 | 31.3 | 29 | 30.2 |
| Showing relevance in literacy learning | 12 | 12.5 | 31 | 32.3 | 29 | 30.2 | 24 | 25.0 |
| Using movement (action, etc) | 58 | 60.4 | 18 | 18.8 | 12 | 12.5 | 8 | 8.3 |
| Using association | 57 | 59.4 | 25 | 26.0 | 12 | 12.5 | 2 | 2.1 |
| Using imagination or visualisation | 55 | 57.3 | 28 | 29.2 | 9 | 9.38 | 4 | 4.2 |
| Reading own selected story books | 45 | 46.9 | 23 | 24.0 | 15 | 15.6 | 13 | 13.5 |
| Using authentic text materials | 47 | 49.0 | 27 | 28.1 | 14 | 14.6 | 8 | 8.3 |
| Safe and non-threatening environment | 8 | 8.3 | 21 | 21.9 | 42 | 43.8 | 25 | 26.0 |
| Involving parents in literacy instruction | 47 | 49.0 | 24 | 25.0 | 25 | 26 | 0 | 0.0 |

Table retrieved from Preschool Teachers' Self-Report Beliefs And Practices On Early Literacy Instruction And Early Literacy Intervention showing The Number and Percentage of Teachers Reported Literacy Strategies Focus

This table is used in conjunction with the literary review on page 16