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THE EFFECTIVENESS OF MODALITY PRINCIPLE ON 3D TALKING HEAD LINGUISTIC LEARNING AID ON PRONUNCIATION AMONG TERTIARY LEVEL STUDENTS

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THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE
(MASTER BY RESEARCH)

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ABSTRACT

This study aimed to investigate the effectiveness of various modality effects on 3D talking-head on pronunciation learning among tertiary level students. The research methodology is based on quasi-experimental study which investigates the effects of three different multimedia presentation strategies of 3D talking-head MALL on the learning achievement of students with low English pronunciation skills. The data is in the form of performance test scores of the pre-test and post-test. A number of 60 college students were selected as samples and they were divided into three groups of 20 students in each group. The scores obtained were analyzed statistically with one-way analysis of covariance (ANCOVA), with the pre-test scores as covariate. After adjusting for pre-test scores, there was a significant difference on post-test achievement of 3D talking-head with audio and text MALL in comparison with both 3D talking-head with audio alone MALL and audio and text alone MALL application. The adjusted mean scores indicate that students in the 3D talking-head with audio and text MALL application obtained a better mean score than students in the 3D talking-head with audio alone MALL application and audio and text alone MALL application. Therefore, it can be concluded that multiple sources of information to identify and decode language input are advantageous for effective pronunciation learning among non-native speakers.

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TAJUK: Keberkesanan Modaliti dalam 3D "Talking-Head" terhadap Pembelajaran Sebutan dalam Kalangan Pelajar Peringkat Pengajian Tinggi.

ABSTRAK

Kajian ini bertujuan untuk melihat keberkesanan pelbagai kesan modaliti dalam 3D *talking-head* terhadap pembelajaran sebutan dalam kalangan pelajar peringkat pengajian tinggi. Metodologi kajian adalah berdasarkan pendekatan kuasi-eksperimen yang melihat kesan tiga strategi persembahan multimedia yang berbeza dalam 3D *talking-head* MALL terhadap pencapaian pelajar dengan kemahiran sebutan Bahasa Inggeris yang rendah. Data adalah dalam bentuk skor pencapaian ujian pra dan ujian pos. Seramai 60 pelajar kolej telah dipilih sebagai sampel kajian dan mereka telah dibahagikan kepada tiga kumpulan dengan 20 pelajar dalam setiap kumpulan. Skor yang diperolehi telah dianalisis dengan analisis sehala kovarians dengan skor ujian pra sebagai kovariat. Selepas pelarasan bagi skor ujian pra, terdapat perbezaan yang signifikan terhadap pencapaian ujian pos 3D *talking-head MALL* dengan audio dan teks berbanding dengan 3D *talking-head MALL* audio sahaja dan *MALL* dengan audio dan teks sahaja. Skor min yang diselaraskan menunjukkan bahawa pencapaian pelajar-pelajar 3D *talking-head MALL* dengan audio dan teks adalah lebih baik berbanding pelajar dalam 3D *talking-head MALL* dengan audio sahaja dan *MALL* dengan audio dan teks sahaja. Oleh demikian, kesimpulan boleh dilakukan bahawa pelbagai sumber maklumat untuk mengenal pasti dan *decode input* bahasa adalah berfaedah untuk pembelajaran sebutan yang berkesan dalam kalangan bukan penutur asli.

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Ahmad Zamzuri, M. A., & Kogilathah, S. (2013). 3D talking-head mobile app: A conceptual framework for English pronunciation learning among non-native speakers. *English Language Teaching, 6*(8), 66-76.

Kogilathah, S., Ahmad Zamzuri, M. A., & TanW. H. (2014). Usability and user satisfaction of 3D talking-head Mobile Assisted Language Learning (MALL) for non-native speakers. *Procedia-Social and Behavioral Sciences, 131*(2014), 4-10.

Kogilathah, S., & Ahmad Zamzuri, M. A. (2012). Effects of 3D talking-head mobile phone application in improving English pronunciation among tertiary level students: A research proposal. *Proceedings of International Conference on Integrated Knowledge ICIK2012,* Malaysia, 78-89.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

It is widely acknowledged that multimedia plays an important role in linguistic learning, predominantly through animation applications. Such tools make significant contributions to the language learning process among various age groups of learners (Tamburini & Paci, 2002). This is particularly true of 3D talking-head animations, which serve as a virtual teacher or guide in many computer-assisted language learning applications (Wik, 2011; Wik & Hjalmarsson, 2009; Voce & Hamel, 2001). 3D talking-heads serve as an essential instructional material for supporting language learning, mostly in terms of pronunciation aspects among non-native speakers (Badin, Tarabalka, Elisei, & Bailly, 2010).

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Unfortunately, non-native speakers face difficulty in using English as a second language due to poor pronunciation skills (Fraser, 2000). The difficulty arises mostly among those who only pay serious attention to learning English after the school years (Gilakjani & Mohammad Reza, 2011). The problem seems even more critical among Malaysian tertiary graduates who will face job searching challenges following the graduation, where effective English communication skill is crucial to determine their career success either locally or internationally (Azizan & Mun, 2011a). A survey conducted by Kelly Services (M) Sdn. Bhd., known as the Kelly Global Workforce Index, has revealed that communication skills as one of the top five most desired skills required by the corporate sectors (Azizan & Mun, 2011b). A survey from the Malaysian Employers Federation (MEF) has also revealed similar findings (Figure 1.1). This clearly emphasizes the importance of the skills, particularly for career development purpose.

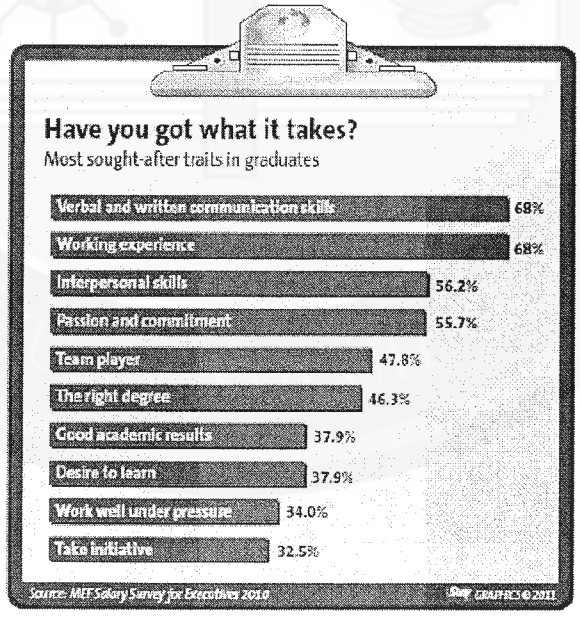


Figure 1.1. Most Sought-After Traits in Graduates (Azizan & Mun, 2011b)

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The standard of English among Malaysian youngsters is actually declining; the communication skills among school leavers is viewed poor by employers. Study revealed that an average of six out of ten Malaysian graduates could not convey the message effectively in interviews due to poor English communicative skills (Azizan & Mun, 2011b). Many steps have been taken to address this issue in terms of education, including collaborating language learning and multimedia, collaborating language learning and technology, and so on. With today's rapidly-evolving mobile technology, m-Learning is a new approach in aiding education.

Academia and the mobile world have begun to forge a new path for language learning which has lead to the introduction of Mobile Assisted Language Learning (MALL) (Kukulska-Hulme & Shield, 2008). Throughout the years, a great deal of research, studies, and forum discussions on the topic of MALL have been performed to identify an effective way of implementing such benefits into for successful language-learning programs. Therefore, this research is principally aimed to identify the effective way of incorporating 3D talking-head animation in MALL, specifically in assisting English language learning as a second language among tertiary level students. The focus of the study will mainly be on pronunciation skills, as in acquiring strong English communication skills, pronunciation plays an important role in shaping the language (Wei, 2006; Derwing, 2003)

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1.1 Background of Study

Debate on animation typically relates to movies, cartoons or special effects. There have also been many positive results showing that animation makes a significant contribution to the education field (Balasubramanyam, 2012; McMenemy & Ferguson, 2009; Doyle, 2001). Studies showed that implementation of animation in learning have led to promising outcome for decade (Williamson & Abraham, 1995). Animation has a potential role in improving human learning process, particularly in promoting a deeper understanding of the subject matter (Mayer & Moreno, 2002). Animations have become incorporated as part of computer-based multimedia learning aids in many subject matters, including language learning (Cheng Lin & Fang Tseng, 2012; Kayao□lu, Da□ Akbaş & Öztürk, 2011; Sundberg, 1998).

Notably, numerous initiatives were undertaken in establishing English as second language acquisition globally, which eventually resulted in introduction of Computer-assisted Language Learning (CALL). In CALL, 3D embodied agent or 3D talking-head animation becomes the prominent virtual aid for teaching pronunciation, vocabulary, articulation, and so forth (Engwall & Bälter, 2007; Wik, 2004; Wik & Hjalmarsso, 2009). However, similar applications seem lacking in m-Learning initiative, particularly those focusing on teaching pronunciation.

No doubt, good English communication starts with proper pronunciation (Saran, Seferoglu & Cagiltay, 2009). Improving pronunciation has positive effect on increasing the overall communicative power (Gilakjani & Mohammad Reza, 2011).

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Learners who begin to learn English after their school years typically experience severe difficulties in mastering lucid pronunciation. This difficulty increases as they age (Gilakjani & Mohammad Reza, 2011). There are several factors that might influence the acquisition of proper pronunciation, such as speaking native language which involves an accent, the age of the learners, learners' motivation, the opportunity for the learners to learn, the learners attitude towards learning pronunciation, the time the learners have, and several other causes (Gilakjani & Mohammad Reza, 2011). For that rationale, various approaches must be considered to facilitate pronunciation skills development among various level of learners, specifically on mobile platforms, which appear to be a must-have tool among contemporary tertiary level students.

As stated earlier, Mobile Assisted Language Learning (MALL) has developed as a new teaching aid in the educational field in recent years (Chinnery, 2006). Numerous researchers have noted that in-class activities are not sufficient for effective language learning. Learners should be given opportunities to learn the language beyond simple classroom activities (Saran, Seferoglu & Cagiltay, 2009). Advancement in technology, particularly mobile technologies, has paved a new path for educational improvement in distance language learning via mobile technology. Gaining evidence from research and practice clearly indicates the potential of mobile technologies as effective learning and communication tools by a wide range of learners in a mixture of settings (Kukulska-Hulme, 2010).

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Mobile learning has given the luxury of learning anytime and anywhere, a concept known as ubiquitous learning, for any learning style of students (Godwin Jones, 2005; Kadyte, 2004; Kukulska-Hulme, 2005). The development of mobile and wireless technologies had opened up a huge array of possibilities in the domain of language teaching too (Joseph & Uther, 2009).

Studies have been carried out to demonstrate that mobile learning can enhance and ease the learning process for different groups of learners, especially in MALL (Idrus, 2011; Sood, 2010; Fotouhi-Ghazvini, Earnshaw, Haji-Esmaeili, 2009). Several methods are practicable in MALL, including the use of multimedia messages in improving pronunciation (Saran, Seferoghu & Cagilitay, 2009). Multimedia has made a significant contribution in MALL. In recent studies, researchers explored the usage of multimedia messages (MMS) via mobile phones for improving pronunciation of words. For instance, a study by Saran, Seferoglu and Cagiltay (2009) looked on the effectiveness of three different mode of delivery, namely web base, handouts and MMS. They found that students in the MMS delivery mode outperformed students in handout and web base delivery mode. However, application of animation, particularly 3D talking-heads, is mostly computer based. There has been research done on 3D talking-heads using mobile phones as voice interactive services, but there has been little research done on the use of 3D talking-heads as pronunciation learning aids. This study will fill the gap by focusing on the effectiveness of 3D talking-head mobile applications to aid pronunciation learning.

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Basically, the term talking-head refers to a computer generated animated character, lifelike video character, or just a simulated person on a website that is able to talk and hold a conversation with human users (Lun, n.d). The talking-head is also used by graphic designers working on facial animation and facial expressions combined with audio-visual speech processing (Lun, n.d). 3D talking heads are widely used for web services or as agents to replace real humans (Lun, n.d). Also, these talking-heads will appear as virtual tutor or teacher in learners' computers and eventually contributes in various aspects of language learning process such as from reading to pronunciation and to conversation and practice (Busa, 2008). Talking-heads have also become a tool for children learning their first language and for disabled people such as the deaf (Busa, 2008). It is due to the realistic speech and expressions, and the convincing emotions applied on the talking-heads which results in patient and exciting interactive tutors for learners to learn the second languages efficiently (Massaro, 2006b).

On the other hand, character which is designed with non realism appearance has its own advantage. A user usually would like to have an eye-catching, expressive face with easy to identify unique communicational, cognitive and emotional expressions such as paying attention, agreeing and joy (Ruttkay & Noot, 2000). Nevertheless, users tend to feel creepy when a virtual character looks too human like or too realistic (MacDorman, Green, Ho, & Koch, 2009). Nowadays, computer graphic characters are designed to look like real people and it has become less convincing, such as the computer graphic heroes in The Polar Express and Final Fantasy: The Spirits Within (Geller, 2008; Pollick, 2009).

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This was illustrated by a famous graph produced in 1970 by a Japanese roboticist, Masahiro Mori, known as the Uncanny Valley.

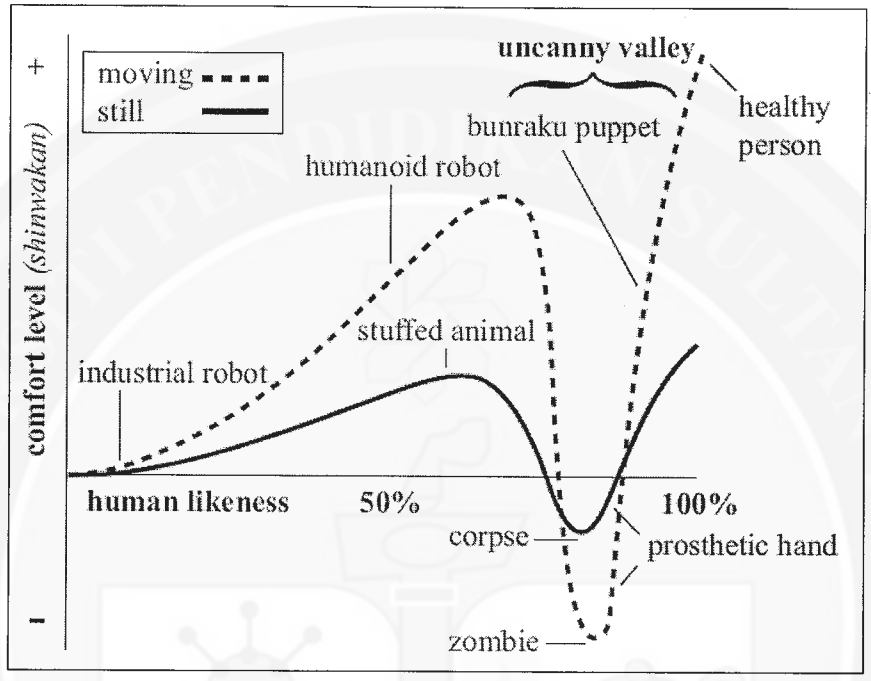


Figure 1.2. Masahari Mori's graph of The Uncanny Valley (MacDorman, Green, Ho, & Koch, 2009)

Figure 1.2 shows Masahiro Mori's proposed relation between human likeness and the comfort level in which it explains when robots look too human, even the slightest flaws will make it look creepy (MacDorman, Green, Ho, & Koch, 2009). Mori also added that this situation deepens when movements are added to the character (MacDorman, Green, Ho, & Koch, 2009). Adapting these findings, the 3D talking-head model for this research will be developed into non-realistic facial proportions yet with proper modeled features of human to show the movement of the lip.

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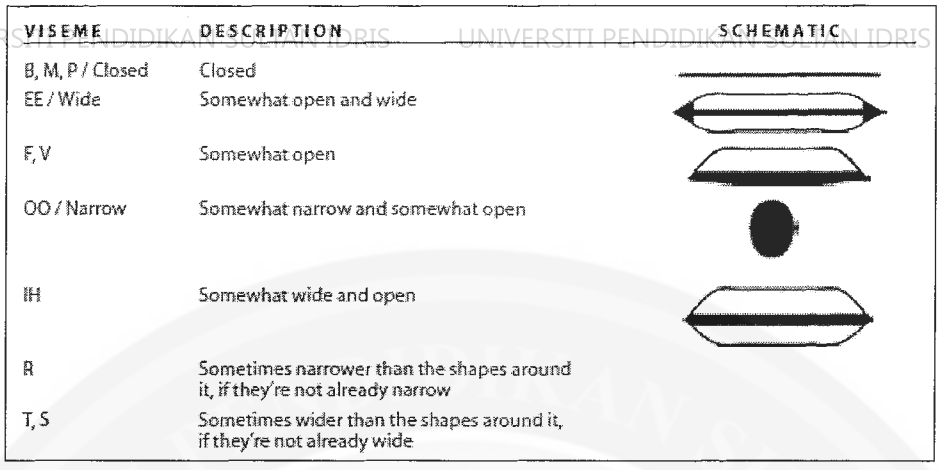
It is believed to give a realistic environment and comfortable experience to the user of the application.

The main feature of a talking-head is lip synchronization (Lun, n.d). Lip synchronization, also known as lip sync, is one of the important parts of any animated character for speech (Arkinson, n.d.). Numerous research and experiments have been conducted to improve the art of lip synching (Lewis, 1991). There are several methods of creating lip sync, including metamorphoses, automated lip sync, rotoscoping through obtaining live-action footage of actors performing the desired motion, and adopting a canonical mapping from a subset of speech sounds onto corresponding mouth positions (Gueorguiev & Velcheva, 2005; Frank, Hoch, Trogemann, 1997; Lewis, 1991). Metamorphoses lip sync method is carried out by replacing one mouth with another mouth shape; meanwhile, automated lip sync uses special plug-in in 2D or 3D animation software to synchronize the lip movement with audio. This research believes that to ease implementation and increase the accuracy of lip syncing, usage of automated lip sync technique combined with recorded human voices would be the best choice.

There are two things needed to create lip sync, which are phonemes and visemes (Osipa, 2010). Visemes are visual phonemes or usually known as shapes that represent open/close/narrow wide mouth, meanwhile phonemes are sounds that are created when we speak (Osipa, 2010). For this research purpose, both visemes and phonemes must be examined, as pronunciation must consider both the movement of the mouth and also the sound of a word as it is pronounced (Osipa, 2010).

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VISEME	DESCRIPTION
B, M, P / Closed	Closed
EE / Wide	Somewhat open and wide
F, V	Somewhat open
OO / Narrow	Somewhat narrow and somewhat open
IH	Somewhat wide and open
R	Sometimes narrower than the shapes around it, if they're not already narrow
T, S	Sometimes wider than the shapes around it, if they're not already wide

Figure 1.3. Viseme representation on an open/closed narrow/wide mouth (Osipa, 2010)

Lip synching has several contributions in language learning especially in improving pronunciation. English is a language which depends upon; airflow, lip shape, tongue position, teeth position and jaw movement (Baxter, 1993), where the process can be practiced through watching the lip syncing activities (Sumby & Pollack, 1954; Benoı & Le Goff, 1998). Apart from these, in recent studies on learning pronunciation, new methods and methodological prediction have been introduced such as using nonverbal features and full-frontal communicativity (Rodgers, 2001). Full-frontal communicativity is one of the 10 scenarios introduced by Rodgers (2001), engaging all aspects of human communicative capacities such as facial expression, gesture, tone and so forth to shape the teaching of second language (Rodgers, 2001). Moreover, speech is enriched by facial expressions, emotions, and gestures produced by a speaker (Massaro, 1998).

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In current usage of talking-head especially in CALL, facial expressions are also necessary to make language learning more efficient and robust (Wik & Hjalmarsson, 2009). Previous studies in the field of neuroscience, cognitive science, and psychology have demonstrated that emotions have a significant role in attention, planning, reasoning, learning, memory, and decision making (Picard, 1997). Emotions also play a role as motivator that influences perception, cognition, coping, and creativity (Johnson, Rickel & Lester, 2000; Picard, 1997).

Considering these views, this research aims to investigate the effectiveness of 3D talking-head with facial expression, lip sync, audio, and text MALL in improving pronunciation learning among tertiary level learners.

1.2 Theoretical Framework

The theoretical framework of this study is grounded on Mayer's Cognitive Theory of Multimedia Learning. According to Mayer's cognitive theory of multimedia learning, human processes information through dual channels, namely the visual channel that processes visually represented materials and the verbal channel that processes audio and text materials (Mayer, 2001). Mayer (2001) stated that human understanding occurs when learners are able to mentally integrate visual and verbal representations of a subject matter, as both channels are activated simultaneously. Figure 1.3 outlines Mayer's cognitive theory of multimedia learning regarding how information is processed in human memory.

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This illustration actually draws on Paivio's (1986), Clark and Paivio (1991) dual coding theory, Baddeley's (1992) model of working memory, Sweller's (Chandler & Sweller, 1991; Sweller, Chandler, Tierney & Cooper, 1990) cognitive load theory, Wittrock's (1989) generative theory, and Mayer's (1996) SOI model of meaningful learning.

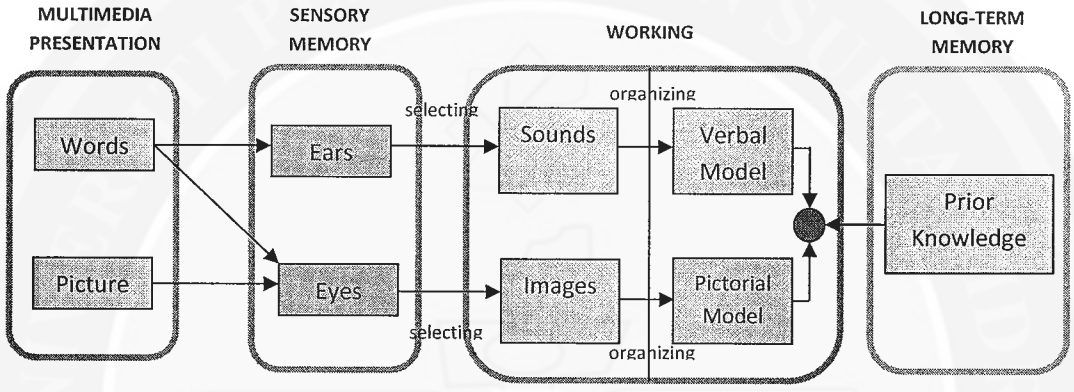


Figure 1.4. A framework for cognitive theory of multimedia learning drawn from Mayer (2001, p. 44)

There are three assumptions that support Mayer's (2001) cognitive theory of multimedia learning. The first assumption is that multimedia learning is a *dual channel activity*, consisting of a visual-pictorial channel and an auditory-verbal channel. For example, a 3D talking-head animation will be processed in the visual-pictorial channel and the pronounced word will be processed in the auditory-verbal channel. The second assumption is *limited capacity*, in which each channel in the human cognitive system has limited capacity for processing information.

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The third assumption is *active processing*, in which learners are involved in active processing in the channels, including media selection (words and pictures), organizing media into the verbal and pictorial mental models, and finally integrating them with preexisting knowledge which results in meaningful schema acquisition. This happens when corresponding verbal and pictorial representations are in working memory at the same time (Mayer, 2002). The issue of integrating visual and audio information in order to retain it in the long term memory is an important 3D talking-head learning condition. The application must be able to assist learners to integrate the visual form of the 3D talking-head with facial expressions and lip movement with the audio. Likewise, they are able to store knowledge acquired from both sensory memory (listening and watching the 3D talking- head) and working memory (integrating 3D talking-head and the pronounced word) in the long term memory and apply it precisely.

Mayer's modality principle was also applied in this research. According to the modality principle as suggested by Mayer (2001), students are better able to acquire knowledge when a multimedia message is spoken, rather than simply displayed as on-screen text. Moreover, when pictures and text are both visually presented, the visual channel will be overloaded, consequently leaving the verbal channel unused (Mayer, 2001). Therefore, if text is presented in audio form, it can be processed by the verbal channel, while the visual channel processes visual information (Mayer, 2001). However, the question arises as to why this principle applies for 3D talking-head linguistic learning aids. Text might be helpful in assisting learners in determining the syllable break for correct pronunciation. Further study is needed to address this issue.

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By adapting these theories and principles per the literature overview, the researcher proposes a conceptual framework of 3D talking-head mobile device application for the purpose of pronunciation learning, as depicted in Figure 1.5.

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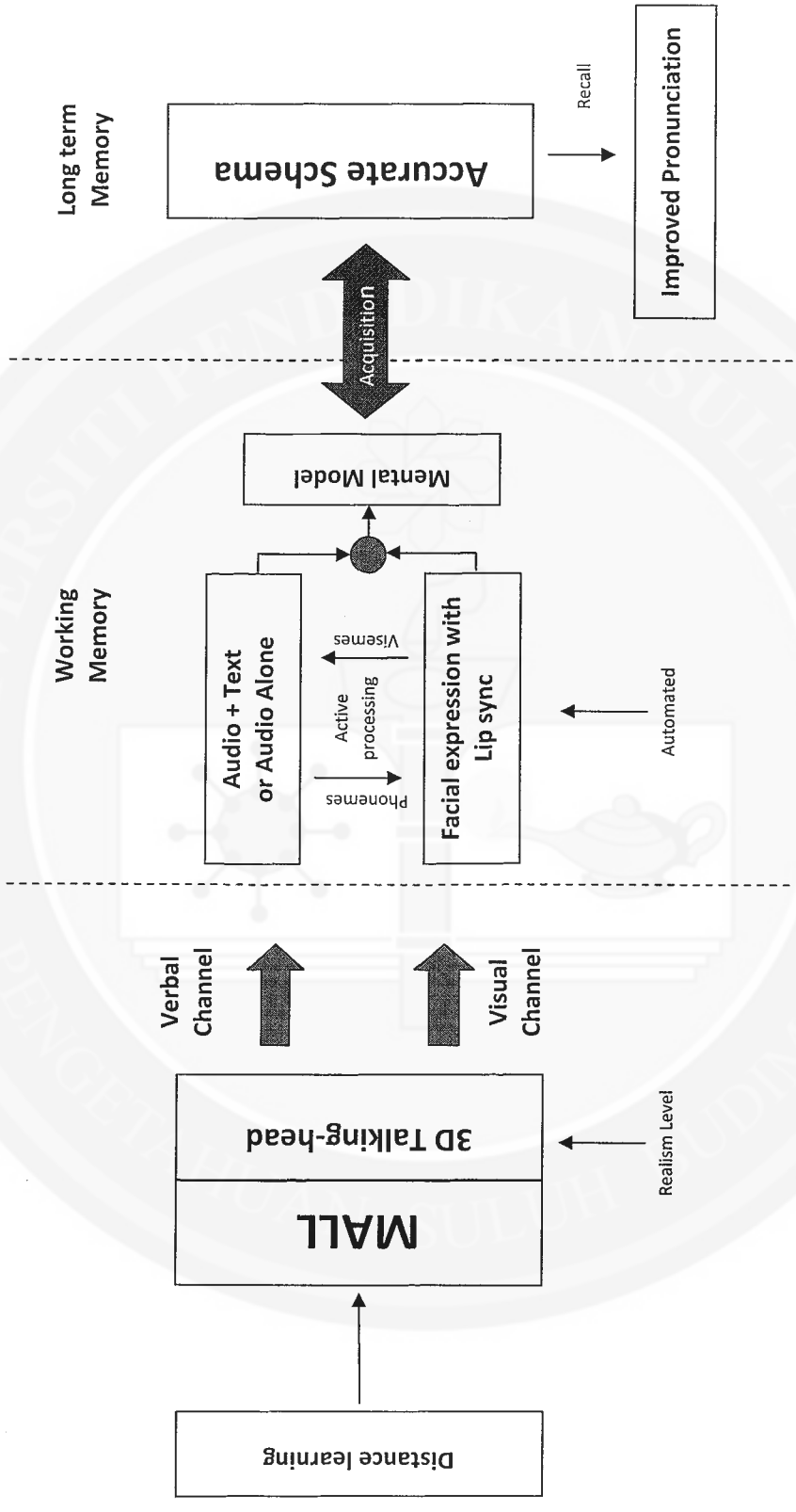


Figure 1.5. A conceptual framework for 3D talking-head mobile device application for pronunciation learning

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Based upon the conceptual framework developed, it is believed that the distance learning with MALL leads to an active, creative, and socially interactive process. Learners construct new ideas based on their past and current knowledge attained throughout the pronunciation practice. They are therefore able to comfortably learn at their own pace and develop a new way of learning pronunciation by watching, listening and pronouncing words by referring to the 3D talking-head on mobile devices. This approach also directs study in allowing the targeted learners to focus on their ability to learn without the guidance of a real teacher on their own learning pace, anytime and anywhere. In the mean time, the aspect of non-realistic yet proper modeled features of human like 3D talking-head also plays an important role in eliminating an uneasy feeling and promoting comfortable experience in learning.

When the learners use 3D talking-head as their pronunciation assistant, they perceive the practice in working memory structure via two channels, namely the visual channel and the verbal channel. Facial expressions with automated lip sync strategy of 3D talking-head animation will be processed by the visual channel, while the pronounced word and text will be concurrently processed by the verbal channel. By using both channels, the issue of limited capacity may be minimized. However, questions arise about the usage of text in the application. Even though text is categorized as verbal information, it is represented in a visual form. The viewers require extra effort to transform it from visual to verbal representation, so extra processing is needed in working memory. Nevertheless, excluding text in pronunciation learning may cause difficulties among learners in terms of identifying the syllable brakes for proper pronunciation. This study will identify a solution for this issue.

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Besides addressing limited capacity issue, dual-channel activation shows potential for promoting active processing in the working memory. When corresponding visual and verbal representations are simultaneously processed in working memory, reference to or activation of the verbal system by the visual system (or vice versa) will occur. The learner might at this point develop a more accurate mental model of the pronounced word. This will help the learner to process knowledge acquired from the sensory memory through listening and watching the 3D talking-head in working memory through integrating facial expression with lip sync (visemes), pronounced word (phonemes), and prior knowledge for adequate schema acquisition. Adequate schema acquisition is important for accurate schema formation to be stored on more-or-less permanent basis in the long term memory. As a result, when learners came across the same word in the future, they may have an improved pronunciation level of the respective word.

1.3 Problem Statement

In acquiring good English communication skills, pronunciation plays an important role in shaping language (Wei, 2006; Wong, 1993, Rajadurai, 2001; Breitkreutz et al., 2001; Derwing, 2003). In past studies, the main issue regarding mastering English as second language has been neglecting pronunciation (Gilakjani & Mohammad Reza, 2011).

This also happens in Malaysia. As stated by Pillai (2008), "More often than not, the teaching of pronunciation is largely ignored, or gets side-lined as teachers

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scramble to deal with all the other elements in the English language syllabus and to prepare students for examinations" (p.42).

In addition, there is not enough stress given to the teaching of pronunciation in the classroom (Nair et al, 2006; Pillai, 2008; Rajadurai, 2006). Moreover, a study involving twelve English as Second Language (ESL) instructors in Malaysia found that the target respondents felt that they did not have adequate time to teach pronunciation and that they did not know how to do so effectively (Nair et al, 2006). Another study was conducted by Pillai and Jayapalan (2011) with a total of 150 students, presenting 50 each from three classes in a secondary school in Klang Valley. The study indicated that most of the students indicated that they *sometimes* learnt pronunciation during their English lessons (Form 1 = 23%; Form 3 = 18%; and Form 5 = 23%). Again, this shows that there are inadequate time spend in teaching pronunciation.

An interview was carried out by the researcher as initial input of the study, in which the researcher interviewed a school teacher from Ipoh, Perak. The interviewed teacher was also an examiner of the *Sijil Pelajaran Malaysia (SPM's)* oral test. In the interview, the teacher stated that poor pronunciation is one of the reasons behind poor English communication skills among students. According to the teacher, pronunciation is one of the scoring criteria for school-based oral tests (Appendix A). This will also eventually effect the students' overall achievement in the subject. However, the teacher mentioned that there is no separate syllabus or class at the moment for pronunciation improvement. This is due to inadequate time during school hours to conduct pronunciation class; eventually, the English teachers have to give

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priority to the school curriculum in order to complete the syllabus on time before the exam.

The above becomes a major issue when these learners leave school and advance to the tertiary level, at which time English verbal communication is no longer part of their formal study and must be learned at their own pace. Eventually, due to the emergence of mobile learning, Mobile Assisted Language Learning may help in resolving this issue. However, there is a dearth of research in the area of teaching and learning pronunciation via mobile applications in Malaysia; this study is expected to fill this gap.

1.4 Research Objectives

The objectives of this research are as follows:

Development:

1. Development of 3D talking-head prototype with audio and text for MALL (MALL 1).
2. Development of 3D talking-head prototype with audio alone for MALL (MALL 2).
3. Development of audio and text alone prototype for MALL (MALL 3).

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Research:

1. To identify whether 3D talking-head with audio and text MALL (MALL 1) significantly contributes to retaining the correct pronunciation acquisition in comparison with 3D talking-head with audio alone MALL (MALL 2) and audio and text alone MALL (MALL 3).
2. To determine usability and the user satisfaction of the 3D talking-head within the audio and text MALL applications.

1.5 Research Questions

1. Does MALL 1 significantly contribute to retaining the correct pronunciation acquisition in comparison with MALL 2 and MALL 3?

1.6 Hypotheses

Ha1. MALL 1 significantly contributes to retaining the correct pronunciation acquisition in comparison with MALL 2 and MALL 3.

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1.7 Significance of the Study

This research contributes to English as second language acquisition in Malaysia generally, especially among tertiary level students. It will not only contribute to good communication skills generally but also produce graduates with good pronunciation skill. Hence, it can produce graduates without any Malaysian accent (Manglish), which most foreign employers and lecturers discourage.

Therefore, it will also indirectly contribute to the inclining of employability rate in both locally and internationally among Malaysian graduates, as English communication skills are one of the main factors influencing employability. This will also help undergraduates who intend to pursue their postgraduate studies in foreign countries, as English communication skills are an important criteria for good academic results.

In addition, this research also will provide an opportunity in tertiary education for a new approach to enhance the language learning process, rather than maintaining the status quo of mere static presentation. This will result in an interesting method of learning as it engages with a device which preferred by most of the youngsters nowadays, based on the survey conducted by the Malaysian Communications and Multimedia Commission on mobile phone users (2009).

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Moreover, it will provide the luxury of student learning at their own pace and time via mobile technology, which eventually will make language learning a lifelong process, even after they graduate.

This research also will demonstrate a new approach and new method in mobile learning in Malaysia since there has been little research done on MALL. Besides that, this will result in bringing Malaysian education up to the current world education trend, which is mobile learning. This research will demonstrate a 3D character animation method for creating a talking-head with realistic facial expression and automated lip synchronization.

At the same time, this will provide an opportunity to examine whether this application is suitable to run on an Android platform mobile device which eventually will pave a path to develop more 3D based educational mobile application in the future. On the other hand, this will also provide the opportunity for integrating the Multimedia element, namely 3D and mobile technology with education, in order to produce a conducive virtual learning environment.

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1.8 Limitations

This research is limited on few areas, mainly the device used to conduct the study, the respondents, and the mobile device operating system.

The respondents

This research is focused on the Malaysian tertiary level students, as these students will not have any formal study on verbal English communication skill in tertiary education. It is only focused on Malaysian tertiary level students generally, without considering any ethnic groups, since these will be considered in a future study.

The device used

The main limitation of the research would be the allocation of devices to test or experiment the applications developed, since it involves the budget to obtain the large number of mobile devices for the targeted respondent. The type of mobile device will be limited to a 7-inch tablet as the features included in the device will be appropriate for the study conducted.

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The mobile device operating system

The mobile device operating system will be limited to only Android platform, since it is believed to be platform friendly with the application developed and is compatible with most of the media and programming languages.

The content

The number of words inserted in the application will be limited only to 10 difficult to pronounce words or commonly mispronounced words. It is limited to 10 words as development of 3D models will take time. On the other hand, the storage of the mobile device also needs to be taken into consideration, since 3D models with audio might consume more space.

1.9 Definition of Terms

1. Tertiary level

   Tertiary level also referred to as third stage, third level, or post-secondary education, and is the educational level following the completion of a school providing a secondary education, such as a high school, secondary school, or university-preparatory school.

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2. MALL

   MALL refers to an approach to language learning which is assisted or enhanced through the use of a handheld mobile device

3. CALL

   CALL refers to computer-assisted language learning.

4. 3D Talking-head / Talking-head

   3D Talking-head or Talking-head refers to computer generated animated character, lifelike video character or just a person on a website that is able to talk and hold a conversation with human users.

5. MALL 1

   3D talking-head with audio and text MALL

6. MALL 2

   3D talking- head with audio-alone MALL

7. MALL 3

   Audio and text-alone MALL

8. Lip synchronization / Lip sync

   Lip synchronization or lip sync is a technical term for matching lip movements with sung or spoken vocals.

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9. Animation

   Animation refers to a simulation of movement created by displaying a series of pictures or frames.

10. Mobile phone

    Mobile phone refers to is a device that can make and receive telephone calls over a radio link whilst moving around a wide geographic area.

11. Android

    Android refers to an operating system for mobile devices such as mobile devices and tablet computers. It is developed by the Open Handset Alliance led by Google.

12. Mobile device

    Mobile device refers to is an electric device which its user can easily move.

13. CG

    CG is an acronym for a computer graphic which depicts the use of a computer to produce and manipulate pictorial images on a video screen, as in animation techniques or the production of audiovisual aids

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1.10 Conclusion

Animation has made a significant contribution in education industry in various subjects for the past few decades. It also has important contribution in second language acquisition based on some of the recent studies. This can be seen through the emergence of CALL and MALL which included Multimedia elements particularly animation as an aid in the existing system or application.

Animation, specifically 3D talking-heads, has been developed in the recent studies as virtual teacher in learning second language. However, there has been scarce research done on mobile device based applications. As has been demonstrated, mobile learning is becoming trendier in the educational field. This also includes language learning. Mobile assisted language learning shows growing bodies of development in assisting language learning.

All these approaches have been introduced to ease the process of second language acquisition. The main issue involved in acquiring a second language effectively is pronunciation, and it is one of the reasons learners do not acquire good verbal communication skills. This also happens in Malaysia, resulting in one of the major issues in the employability rate among graduates. Highlighting that, this research is important to identify the effects of various multimedia principles on 3D talking-head mobile device application in improving English pronunciation for effective communication.

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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter begins with a discussion on the involvement and types of animation in education, as well as specific use cases. It also describes previous research on animation in education and the theories involved. The last part of this section describes the use of animation in language learning.

The following section of the chapter reviews developments in Computer Assisted Language Learning (CALL) and animation, as well as the emergence of mobile learning to aid language learning. Development of animation in MALL and the overall development of language learning were also discussed in this section. This discussion helps in drawing the implications of integrating animation and mobile learning in improving language learning. Finally, a review on the importance of

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learning pronunciation for good communication is also presented. This is to further strengthen the reason of developing a 3D talking-head MALL application.

2.1 Animation in Education

Animation improves the learning process by creating an interesting learning environment. Animation has a potential role in improving the learning process, particularly in promoting profound understanding of the subject matter (Mayer & Moreno, 2002). Several series of empirical studies performed over the last decade have showed that animation plays numerous instructional roles, including attracting and directing attention, representing domain knowledge about movement, and explaining complex knowledge phenomena (Park, 1998; Park & Gittelman, 1992; Rieber, 1990). From this research it may be surmised that animation has potential benefits compared to static visuals. Animation has been used as a teaching aid in many subjects such as mathematics, science and chemistry in order to enhance the understanding of a subject matter (Aktas, Bulut, & Yüksel, 2011; Burke, Greenbowe, & Windschitl, 1998; Sanger, Phelps, &Fienhold, 2000). The types of animation used in learning technology would be normally 2D and 3D animation.

In comparing both 2D and 3D animation in enhancing teaching and learning, it can be said that 3D models and animation has greater influence in motivating the students and provides better understanding (Wangpipatwong & Chittrakarn, 2009; Chittaro & Ranon, 2007). However, this also depends on the content that will be used with the animation as well. The way in which an animation is constructed has been

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considered a limitation in promoting successful learning, apart from how it is perceived and conceptualized (Chan & Black, 2005). Individuals' internal visualization processes and their mental model development contribute to developing effective animation that aids learning. This involves the learners' limited working memory capacity and any perceptual and cognitive demands that animation require of them, particularly for beginners (Chan & Black, 2005).

2.2 Animation in Language Learning

Referring back to as animation for aiding education, animations have also been inserted as part of multimedia learning to aid language learning (Sundberg, 1998). Language learning has gone through many years of improvement, including technology-based methods, ever since the eighties. This includes the use of film, radio, television, language labs with audio/video tapes, computers, and interactive video (Cunningham, 1998). Traditionally, students who learn English as a second language had to depend only on texts and audio materials such as cassette tapes, records, and radio for learning and practice (Xiao & Jones, 1995). However, recently the use of film and video in learning English has provided a new way of acquiring it as a second language (Xiao & Jones, 1995). Unfortunately, has also led to a decrease in interest in learning due to lack of interactivity in the existing methods of acquiring English as a second language (Xiao & Jones, 1995). At this time, animation has evolved to become an aid in learning English as a second language or English as a foreign language.

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This has been demonstrated in few studies related to acquiring English as a second language. A study conducted by Lin, Chen & Dweyer (2006) examined the effects of static visuals and computer generated animations in facilitating immediate and delayed achievement in the English as a Foreign Language classroom. The study showed that computer generated animated visuals used in acquiring English as a foreign language have a more effective impact than static visuals when the instructional objectives were to produce lower level learning outcomes involving factual knowledge. Examples of such knowledge include memorization of vocabulary or application and simple grammar rules in sentence-making. Another study conducted by Choi and Clark (2006) on cognitive and affective benefits of an animated pedagogical agent for learning English as second language indicated that use of animated pedagogical agents can be both entertaining and engaging for learning English. On the other hand, the study also showed cognitive efficiency of multimedia systems. The study demonstrated that learners with low prior knowledge were able to produce higher learning scores at a given amount of mental effort when they interacted with an animated pedagogical agent compared to a system with simpler multimedia elements.

Looking into animated pedagogical agent in aiding language learning, pedagogical agents have recently gained increased interest in educational research (Atkinson, 2002; Baylor & Ruy, 2003; Moreno& Mayer, 2000). Pedagogical agents are animated characters designed to function in an educational setting for facilitating learning (Shaw, Johnson & Ganeshan, 1999). They are also known as talking-heads with speech, facial expressions, and gestures that implement pedagogical strategies (Graesser, Chipman, & King, 2008). 3D animated talking-heads are widely used for

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web services or as an agent to replace a real human (Lun, n.d). In addition, these talking-heads may appear as a virtual tutor or teacher in learners' computers and eventually contribute in various aspects of language learning process, from reading to pronunciation to conversation and practice (Busa, 2008). 3D talking-heads or virtual language tutors which simulate real human-like tutor in the computer has contributed to language learning, especially for conversational purpose and learning pronunciation. The use of 3D talking-heads also subsequently improved the learning process of a new language (Chen & Massaro, 2011).

Learning a new language is a significant challenge for all walks of life; therefore, animated virtual tutors show a potential approach to language learning (Massaro, 2006a). In addition, there are many individuals who have language disabilities, and these need additional instruction in language learning (Massaro, 2006a).However, these needs are not met due to lack of skilled teachers and professionals to give them individual attention (Massaro, 2006a). To solve these issues, they will find alternative ways to cope, such as using books or other alternative media. Unfortunately, these alternatives are not customized to a particular individual; this is where animated language tutor or animated talking-head have been introduced for aiding language learning (Massaro, 2006a). On the other hand, the face is an essential part of human body in conveying the correct message (Massaro, 2006b).

Visual information from the movements of the lips, tongue and jaws enhances lucidity of audio understanding in a noisy environment (Massaro, 2006b).Thus, visual

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speech information may play an important role in helping learners distinguish words, which would be difficult to do with audio alone (Jesse & Massaro, 2010).

Speech is also enriched by the facial expressions, emotions, and gestures produced by a speaker (Massaro, 1998). Likewise, another experiment was conducted by Liu, Massaro, Chen, Chan and Perfetti (2007), on the use visual speech for training Chinese pronunciation. For experimental purposes, 101 students of an introductory Chinese course at Carnegie Mellon University participated. The students used a web-based learning program. Each participant was randomly assigned to one of the three training conditions. Each training condition consisted of two sessions of training and two sessions of testing. In the first session, all participants received audio-only training by hearing the sound of a native Mandarin speaker (a female speaking a Beijing dialect) pronouncing 23 Mandarin syllables with the Pinyin spelling presented on the screen.

After this first session, participants immediately took the first testing session. After one week, participants logged back into the learning program to complete the second training session, in which participants were randomly assigned to one of the three different training conditions. In condition 1, the training method simply repeated the audio-only training in session 1.

Participants in the other two conditions had visible speech added to the same sounds that were presented in the first session. Those subjects in condition 2 learned from the sound and face of the same speaker, and those subjects in condition 3 learned

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from the same sounds, but now aligned with Bao, a modified version of Baldi a 3D talking-head modified to speak Mandarin. In the third training condition, Bao's visible articulators were shown. At the end of the second training session, participants did the second test. In both the first and second tests, their pronunciations of the 23 syllables were recorded without any time constraint. Two independent native Mandarin speakers blind coded the participants' pronunciation of the 23 syllables on initial onsets and final rimes, respectively, on a scale from 0 (incorrect), 1 (correct but not accurate) to 2 (accurate).The performance on initials and finals were separately analyzed by a logistic model, which modeled the probability of improvements of test 2 over test 1.

Table 2.1

Least square mean percentages of improvement after session 2 based on a logistic model (Liu, Massaro, Chen, Chan and Perfetti, 2007)

	Initials	Finals
Audio-only	53.1	34.2
Human face	54.5	39.6
Synthetic Baldi	51.5	46.4

Significant improvement of Baldi over audio-only was observed in teaching final pronunciations (Liu et al., 2007). Therefore, from the study Liu, et al. (2007)

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concluded that visual speech provides significant benefit for learners to improve their pronunciation. In conclusion, these principles all need to be considered in developing an animated talking-head as a personal tutor for an individual to learn at their own pace.

2.3 Animation and Cognition

Animations have been increasingly integrated in educational technologies since the early 1980s (Ainsworth, 2008). There are several reasons for developers and researchers to use animations in their instructional design; one of the reasons include the cognitive demands of a learning task (Tversky, Morrison, & Bétrancourt, 2002). In many of Mayer's studies in terms of connection between animation and cognition, it has been demonstrated that students learn deeply from animation and narration compared to narration alone (Ainsworth, 2008). According to Schnotz and Rasch (2005), there are two ways that animations may aid cognitive processing. The first is the enabling function of animation, in which animations can provide additional information which cannot be displayed in pictures; this allows for additional cognitive processing. The second is the facilitating function, in which animations are able to help learners build active mental models of situations with external support. This shows that animations make the cognitive processing easier.

In addition, the learner engages in three important cognitive processes (Mayer & Moreno, 1998). The first cognitive process is selecting incoming verbal

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information to give way to a text base input and applying incoming visual information to an image base input (Mayer & Moreno, 1998). The second cognitive process is organizing, where knowledge is applied to the word base input to create a verbally-based model of the system and apply it to the image base to create a visually-based model of the system (Mayer & Moreno, 1998). Finally, the third process is integrating, which occurs when the learner builds connections between related events in the verbally-based model and the visually-based model (Mayer & Moreno, 1998).

Consequently, this relates to Mayer's modality principle. To test the modality influence, Moreno and Mayer (1999) conducted two experiments involving an animation depicting the process of lightning. In experiment 1, students simultaneously viewed on-screen text presented near the animation or far from the animation, or simultaneously listened to a narration (Moreno & Mayer, 1999). In experiment 2, they simultaneously viewed on-screen text or listened to a narration, viewed on-screen text following or preceding the animation, or listened to a narration following or preceding the animation (Moreno & Mayer, 1999). Both experiments revealed a modality effect in which students learned better when verbal input was presented auditorily as speech rather than visually as text (Moreno & Mayer, 1999). However, it has recently been shown that under certain conditions, visual texts may be preferable (Stiller, Freitag, Zinnbauer & Freitag, 2009).

Instructional pacing appears to be one of the conditions that describes such effects (Stiller, Freitag, Zinnbauer & Freitag, 2009). Stiller, et al. (2009) investigated the effects of pacing and text modality on cognitive load and performance. The study demonstrated that learner-paced, visual text instruction was the most efficient (Stiller,

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et al., 2009). This condition can be also applied to the 3D talking-head with audio and text MALL. In order to pronounce accurately, a learner should know the word stress shown in syllable breaks.

To pronounce the stress pattern of a word clearly, the proper number of syllables needs to be produced (Pronunciation, 2011). To show this, the syllable break needs to be placed as text in the application.

2.4 Facial Expression and Lip Sync in 3D Talking-head Animation

In current usage of talking-head, facial expressions are also one of the concerns to make the language learning more efficient and robust (Wik & Hjalmarsson, 2009). Previous studies in the field of neuroscience, cognitive science, and psychology have shown that emotions have a significant role in attention, planning, reasoning, learning, memory, and decision making (Picard, 1997). Emotions also play a role as a motivator influencing perception, cognition, coping, and creativity (Johnson, Rickel & Lester, 2000; Picard, 1997). In teaching pronunciation, the use of non-verbal features such as facial expressions and gestures has become particularly important (Brown, 2007).

On the other hand, non-verbal communication tools such as tone of voice, body posture, facial expression, and gestures can help a teacher to make the classroom interesting and motivate students to engage actively in class activities (Sime, 2006). It also helps enhance students' learning capability and their ability to recall information

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(Allen, 2000; Lazaraton, 2004). This eventually retains the knowledge as perceived by the students when learning pronunciation.

In fact, in recent studies on learning pronunciation, new methods and methodological prediction has been introduced, such as full-frontal communicativity (Rodgers, 2001). Full-frontal communicativity is one of the 10 scenarios introduced by Rodgers (2001), which engages all aspects of human communicative capacities such as facial expression, gesture, tone and so forth to shape the teaching of second language in the 21st century (Rodgers, 2001). At the same time, lip synchronization is one of the main features of a talking-head (Lun, n.d). Since English is a language which depends upon airflow, lip shape, tongue position, teeth position and jaw movement (Baxter, 1993), the process of learning pronunciation may basically be practiced through watching lip-syncing activities (Sumby & Pollack, 1954; Benoıˆ & Le Goff, 1998).

2.5 Computer Assisted Language Learning

An upwelling technology-based training has occurred since the introduction of computers 50 years ago (Graesser, Chipman, & King, 2008).

Existing research has supported that students learn better from most of these advanced learning environments compared to classroom lecture, reading textbooks, and non-interactive control circumstances (Graesser, Chipman, & King, 2008). Likewise, Malik and Shabbir (2008) and Saba (2009) also emphasized on the

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effective usage of technology to fabricate new opportunities for independent learning as one of efforts to increase students' achievement. This situation also affected the way students acquire second language. The use of these new technologies and multimedia elements for language learning and teaching has become a method of acquiring a second language, and is known as computer-assisted language learning (CALL) (Gamper & Knapp, 2002).

Existing advances in ICT have changed the roles of language teachers and learners (Park & Son, 2009), requiring learners to be active participants in the learning process rather than passive recipients, since they control their own learning in a technology-enhanced learning environment (Brown, 1991). In a technology-enhanced environment, learners can manage their own learning process by collecting information and understanding it by themselves (Park & son, 2009). The classroom becomes more learner-centered, and learners are able to make their decisions and work independently on subject matter (Park & Son, 2009). Dunkel (1990), asserted the possibility of using computer technology as a tool could increase the language learners' self-esteem, vocational preparedness, language proficiency and overall academic skills. In fact, many literature reviews have asserted the benefits of CALL in acquiring second language.

This review includes the exploration of the application of certain technologies in specific language areas (Liu, Moore, Graham & Lee, 2002). Hypermedia technology, such as linking and interactive capabilities, has been discussed as a tool to enhance vocabulary learning (Liu, 1994) and reading comprehension (Hult, Kalaja, Lassila & Lehtisalo, 1990). Moreover, usage of video and audio is also considered as

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an advantage to support comprehension practice (Chun & Plass, 1997). On the other hand, multimedia technology in assisting CALL has also been assumed to provide true enriching contexts which are important in language learning (Kramsch & Andersen, 1999).

2.6 Animation in Computer Assisted Language Learning

Looking into multimedia technology in assisting CALL, animation has played an important role. The trend of CALL and Computer Assisted Pronunciation Training (CAPT) in aiding second language acquisition is carried out using embodied conversational agents or animated virtual talking-heads. This is due to their ability to create a virtual human-like tutor which is more beneficial compared to the desktop metaphor as an instructional interface (Wik & Hjalmarsson, 2009). Since CALL can be implemented outside of the classroom, animations and audio used in a CALL system have been proven to be important elements of effective English language learning tools. It is appropriate for combination with standard curriculums and appropriate design features to achieve what is the natural outcome of a traditional classroom (Alqudah & Abdulsalam, 2013).

On the other hand, users interacting with animated agents spend more time with the system, since they believe it performs better and they find the system interesting to interact with, compared to interacting with animated agents on a desktop interface (Walker et al., 1994; Koda & Maes, 1996; Lester & Stone, 1997; van Mulken & Andre, 1998). Moreover, speech is multimodal and communication

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normally is done not just verbally but also through facial expression (Wik & Hjalmarsson, 2009). This demonstrates that visual information supports speech perception (Sumby & Pollack, 1954).

It has been asserted that embodied conversational agents or virtual talking-heads are able to give feedback on articulations that a human tutor may find difficult express (Wik & Hjalmarsson, 2009). Virtual reality displays of the face that show the position and movement of intra-oral articulators together with a speech signal may improve the learner's acquisition and production of new language sounds, by demonstrating the relationships between speech sounds and the gestures (Engwall, 2008). However, at the moment CALL is moving slowly towards mobile assisted language learning, since mobile learning is the fast growing element in education technology.

2.7 Mobile Assisted Language Learning (MALL)

Mobile learning has been growing rapidly and aids the informal learning environment and also increases the learning time outside class room (Derakhshan & Khodabakhshzadeh, 2011). Pettit and Kukulska-Hulme (2007) assumed that early generations of mobile learning projects preferred to offer formally-designed activities which were carefully designed by educators and technologists, and by using emerging technologies that were not yet widely available or well-understood. However, currently many learners own mobile devices which enable them to easily engage in activities, which are motivated by their personal needs and conditions of use,

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including those activities which need to be done while travelling and on the move (Kukulska-Hulme, Traxler& Pettit, 2007; Pettit & Kukulska-Hulme, 2007). Mobile learning now has a large impact on secondary and tertiary learning process; many researchers have explored the techniques used and the devices used.

Mobile learning has also evolved in terms of medium of delivery from laptops to netbook and now to smart phones such as iPhones and Android phones. A research paper presented by Herrington, McKenzie, Pascoe, McConney, MacCallum, and Wright (2010), have concluded that introduction of the iPhone and iPod Touch to School of Education in Murdoch University caused them to become a medium of change to the habitual teaching and research of the school by using the new emerging technologies. Schools in South Asia are also beginning to develop this new technology to improve the standard and the method of learning, such as that implemented at Cempaka Schools which were the first schools in South Asia to receive the Apple Distinguished School status for innovative use of technology in the classroom in 2002 (Education on The Go, 2009). Rapid emergence of research and practices in mobile learning development shows that mobile technologies can effectively be used as learning and communication tools by a wide range of learners in a variety of settings (Kukulska-Hulme, 2010).

Mobile learning has given the luxury of learning anytime, anywhere, providing ubiquitous learning for any type of student (Godwin Jones, 2005; Kadyte, 2004; Kukulska-Hulme, 2005). At the same time, mobile learning is also one of the reasons behind facilitating lifelong learning (Valk, Rashid, & Elder, 2010). Mobiles can support great amount of learning that occurs in between everyday life's activities, as

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well as learning that occurs spontaneously in unprepared settings outside of the classroom or outside of the usual environment of home and office (Valk, Rashid, & Elder, 2010). They enable learning that occurs across time and place, as learners apply what they learn in one environment to developments in another (Sharples, Taylor & Vovoula, 2005; 2007). Mobile learning thus creates situations where education becomes learner-centered, in which the learner has greater responsibility for the learning process instead of being passively fed information by an instructor.

Colpaert (2004), observed that throughout the history of CALL, periods of professional development have been followed by periods of beginners' development in a new field. He wondered whether "the mobile hype will burst out as soon as tools become available allowing teachers and researchers to develop their own mobile applications and tools" (p.262). This hype that Colpaert (2004) referred to was the rise of Mobile Assisted Language Learning (MALL), which is now rapidly becoming a reality as these tools are now owned by teachers and learners (Motteram & Stanley, 2011).With mobile phones combined with current education, there is a potential to provide a rich learning environment for learners (Stockwell, 2010). In recent years, Mobile Assisted Language Learning (MALL) has appeared as a new teaching aid in the educational field (Chinnery, 2006). Many researchers believe only just in-class activities are not sufficient for effective language learning and that learners should be given the opportunities to learn a language beyond the classroom activities as well (Saran, Seferoglu & Cagiltay, 2009). Development of technology, particularly in mobile devices, actually has paved the path for educational improvement, especially in mobile language learning.

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Research and studies have been carried out to prove that mobile learning can enhance and ease the learning process for different groups of learners, especially in MALL (Idrus, 2011; Sood, 2010; Fotouhi-Ghazvini, Earnshaw, Haji-Esmaeili, 2009). The development of mobile and wireless technologies has opened up a huge array of possibilities in the domain of language teaching (Joseph & Uther, 2009). Several methods have been used in order to improve the language learning using mobile application, such as using multimedia messages in improving pronunciation (Saran, Seferoglu & Cagiltay, 2009).

2.8 Animation in Mobile Assisted Language Learning

Multimedia has made a significant contribution to MALL. In recent studies, researchers explored the usage of multimedia messages via mobile phones for improving language learners' pronunciation of words (Saran, Seferoglu & Cagiltay, 2009). In research done by Saran, Seferoglu and Cagiltay (2009), they concluded that from the comparison among three different modes of delivery which were web base, handouts and MMS, students in the MMS delivery mode groups performed better than handout and web groups. The elements used in the MMS delivery mode were 2D animated images. However, usages of animation, particularly 3D animation in assisting language learning, are mostly computer based such as 3D talking-head system. There has been research done on implementing 3D talking-head on mobile

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phones as voice interactive services, but there has been scarce research done on the use of 3D talking-heads in mobile devices in assisting language learning.

2.9 Effects of Proper Pronunciation towards Good Communication

As mentioned earlier, the integration of animation in CALL and MALL to aid second language acquisition is a new development in language learning over the years. However, the question arises on why are all these issues and development needs to be considered, especially in improving good communication skill through pronunciation. Good English communication starts with proper pronunciation (Saran, Seferoglu & Cagiltay, 2009). Correct pronunciation is essential for a listenerto understand the communication or conversation (Giba & Ribes, 2011). Improving pronunciation has a positive effect on learning a second language, which the learners can gain the skills needed for effective communication that will increase the overall communicative power (Gilakjani & Mohammad Reza, 2011). Morley (1998) also acknowledged that pronunciation plays an important role in overall communicative proficiency.

Learners, who start to learn English after their school years, will usually have severe difficulties in mastering lucid pronunciation and the difficulty increases with age (Gilakjani & Mohammad Reza, 2011). There are several factors that affect the acquisition of pronunciation, such as speaking a native language, which involves the accent effects the fluency in acquiring the language, the age of the learners, motivation the learners receive to learn, the opportunity for the learners to learn, the

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learners' attitude towards learning pronunciation, the time the learners have and many others (Gilakjani & Mohammad Reza, 2011).

Many learners who learn English as second language have difficulties with English pronunciation, even after many years of learning the language, which eventually might lead to difficulty in finding jobs (Gilakjani & Mohammad Reza, 2011). On the other hand, in numerous language programs the teaching of pronunciation is neglected, as many studies concluded that only a slight relationship exists when teaching pronunciation in the classroom to attain proficiency (Gilakjani, 2012).

This situation is worrying when it comes to tertiary level students who will face job searching challenges after their undergraduate studies. The standard of English among Malaysian youngsters is actually declining; the communication problem among school leavers, especially in English oral or written communication, is the biggest problem for employers. The standard of English among Malaysian youngsters is declining and this has been clearly documented (Azizan & Mun, 2011). "The communication problem among school leavers, especially in English either in oral communication or writing is the biggest grouse among employers", states the Malaysian Employee Federation (MEF) (Azizan & Mun, 2011).

In several surveys done by Ministry of Higher Education in 2008 as documented in 2005 World Bank report on Malaysia Firm Competitiveness, Investment Climate and Growth, among others, showed that graduates' employability rates are based on their English as their main weakness, whereby many cannot speak

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or write proper English (Azizan & Mun, 2011). MEF executive directors believe that this leads to difficulty in getting jobs in the private sector (Azizan & Mun, 2011).

Therefore, many efforts have been taken in order to assist the pronunciation skills development, such as online based pronunciation programs, Computer Assisted Language Learning (CALL), Mobile Assisted Language Learning (MALL), talking-head system, paid lip service and so forth.

2.10 Conclusion

Animation has made a significant contribution to the education industry among various subject matters for the past several decades. It also has made important contributions to second language acquisition based on some of the recent studies. This has been demonstrated through a number of multimedia learning theories. Animations, specifically 3D talking-heads, have been developed in the recent studies as a virtual teacher in for learning a second language. This can be seen through the emergence of CALL and MALL, including multimedia elements, particularly animation, as an aid in the existing system or application. Animation, specifically 3D talking-heads, has been developed in the recent studies as virtual teacher in learning second language. However, there has been little research done on mobile device-based applications. Mobile learning is becoming trendier in aiding the education field, which also includes language learning.

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Mobile assisted language learning shows growing bodies of development in assisting language learning. All these approaches have been introduced in order to assist in the process of second language acquisition. The issue involved in acquiring second language effectively is pronunciation; it is one of the reason learners do not acquire good verbal communication skill. This also happens in Malaysia, becoming a major issue in the employability rate among graduates.

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CHAPTER 3

DESIGN AND DEVELOPMENT

3.0 Introduction

In every instructional material design and development process, there should be an instructional design model referred as the development procedure guide. There are numbers of instructional design models can be used in order to practice a more systematic development process. Basically, there are four main phases that most of the models shares, which are analysis, design, development and evaluation (Boyle, 1997). All these procedures or phases are inherited from the ADDIE model since the 1950s (Irlbeck, Kays, Jones, & Sims, 2006). Adding to that, Kruse (2002) stated that there are more than 100 different instructional design models, but almost all are based on the ADDIE model.

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However, developers or students who use the model to develop instructional materials face difficulties in determining the tasks that need to execute in every phase (Ahmad Zamzuri, Laili Farhana & Syamsulaini, 2012). This is due to the architecture of the model being represented by words, and in order to understand it clearly, each phases need to be explained in detail (Ahmad Zamzuri, Laili Farhana & Syamsulaini, 2012). At the same time, this might also cause confusion, since the explanation of each phase varies from one author to another (Ahmad Zamzuri, Laili Farhana & Syamsulaini, 2012). Therefore, detailed design model namely DIDEA has been developed recently at Sultan Idris Education University in the Instructional Design Theory course (Ahmad Zamzuri, Laili Farhana & Syamsulaini, 2012). DIDEA is the acronym for the five phases which are Determine, Illustrate, Development, Execute and Analyze. Each phase contains the sub tasks which help in explaining the function of each phase better, which in contrast does not have in most of the existing instructional design models. As a result, DIDEA model was used in the mobile device application development for this study. In mean time, ADDIE model was also referred to further affirm the development process.

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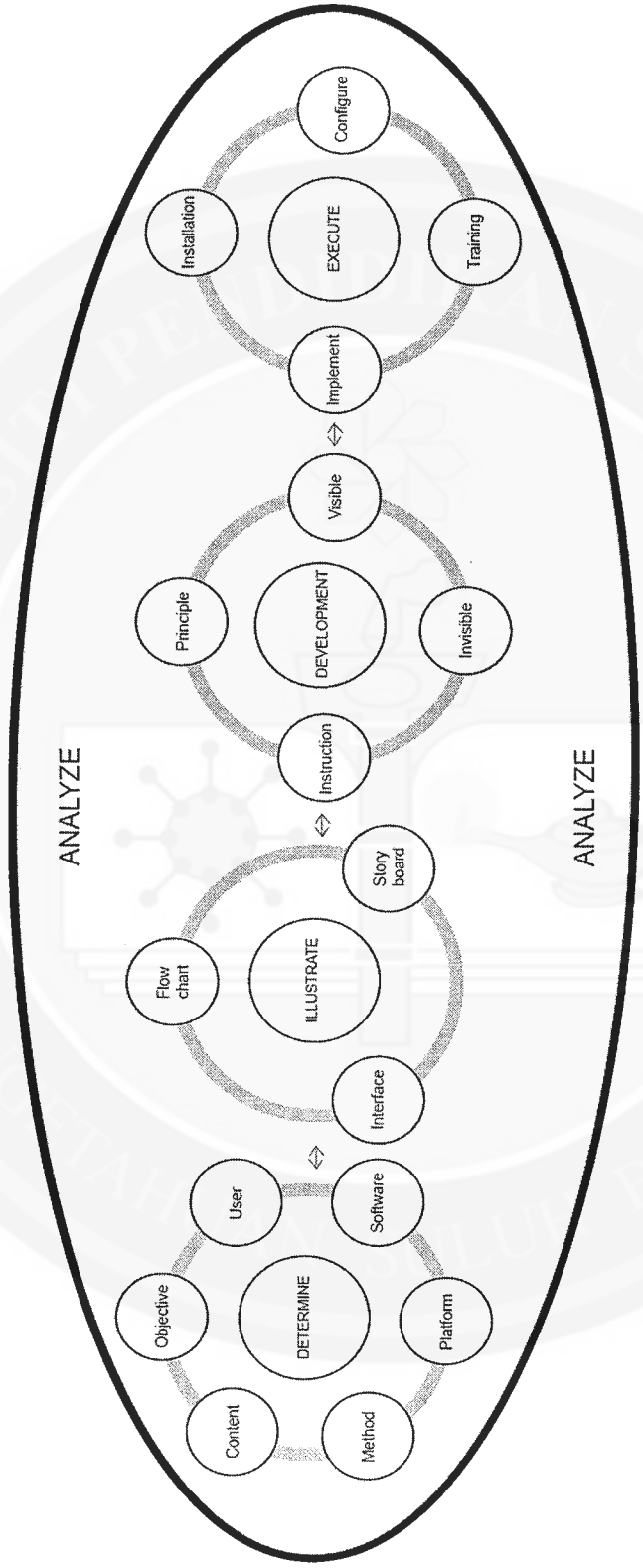


Figure 3.1. DIDEA model (Ahmad Zamzuri, Laili Farhana & Syamsulaini, 2012)

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3.1 Determine

In DIDEA model, Determine process is the main and first part in the procedure. In this process, there are six sub activities that need to be determined before proceeding to the next process.

3.1.1 Objective:

The objective to develop the MALL with 3D talking-head is to introduce an alternative method in assisting students to improve their English pronunciation skills, which eventually might improve their overall communication skills. This will also give them a new experience in learning through mobile devices with the virtual tutor assistance.

Main objective:

i) After 15 minutes of pronunciation practice of ten difficult to pronounce English words using the MALL, the students will be able to pronounce the practiced words more precisely.

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Sub objective:

i) To expose the students to the current method or trend of learning by using the mobile platform to enhance learning of the content in an interesting way.

ii) To change the overall students' perception of assuming that mobile devices as a mere entertainment and communication device to a more useful device.

3.1.2 User

The target users of this pronunciation practice application are tertiary level students. The tertiary level students are chosen due to English verbal communication skill is no longer part of their formal study, and they need to learn it at their own pace. Apart from that the next level after their tertiary studies, would be hunting for a job where good English communication skill is a crucial criterion that an employer will look for in the candidate.

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3.1.3 Content

In particular, to further affirm the research need which is to identify the words, test was conducted among 16 students in an English class. Students were given a list of 20 commonly mispronounced and difficult to pronounce words which were identified through online resources and discussion with English teachers (Appendix B & Appendix C). From the test, it was concluded that there were 15 students with poor pronunciation skills (Appendix D). From this test also, it was concluded that, out of 20 commonly mispronounced and difficult to pronounce words, only 10 words that most of the students could not pronounce well (Appendix E).

3.1.4 Method

Drills strategy was selected as a pedagogical approach for MALL. Drills process model, which was highlighted by Allessi & Trollip (2001) was used as a guideline. Based on this strategy, a word can be selected by the students, and upon selection, the screen on how to pronounce this word will be displayed. The students could practice by following the content displayed. This process can be repeated according to student's preferences. In this study, the maximum drill length decided was around 15 to 30 minutes to avoid students from getting bored (Allessi & Trollip, 2001).

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3.1.5 Platform

Mobile devices with Android 2.1 or higher were the preferred platform. For this study, 7 inch tablet was the choice.

This is due to learners who learnt extensively by using larger screen, learn better compared to learners who learnt using small screen (Maniar, Bennet & Gal, 2007). Furthermore, 7 inch tablet is an affordable mobile device, which might be a user preferable device in future. Adding to that, most of this cheap device runs on Android platform.

3.1.6 Software

The software used to develop the MALL applications were:

3.1.6.1 Autodesk 3ds Max:

It is 3D computer graphics software for creating 3D animations, models and images. The software was used to model the 3D talking-head and the morph movement of the model. This software was also used to render the model.

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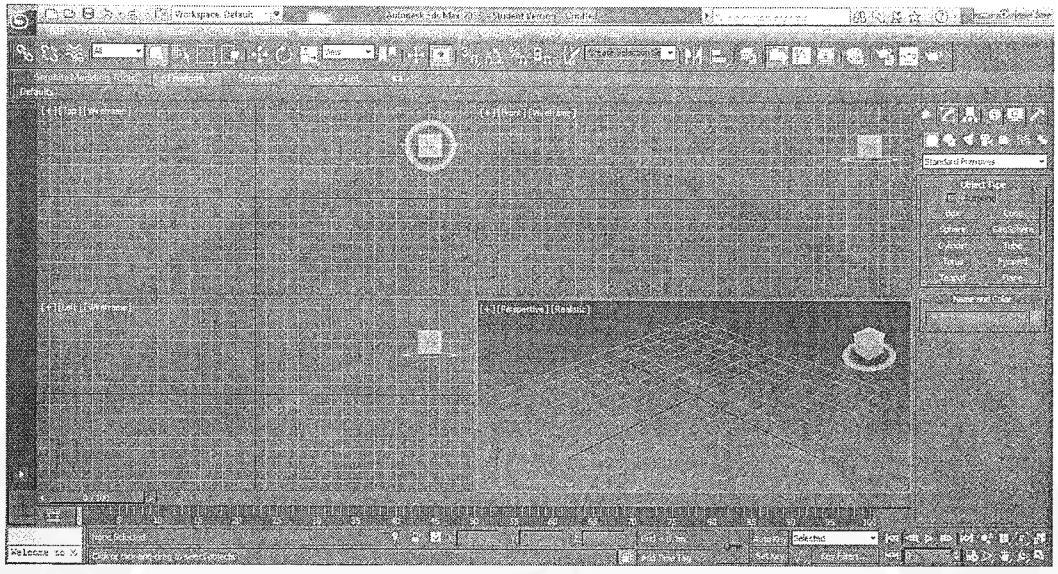


Figure 3.2. Autodesk 3Ds Max interface

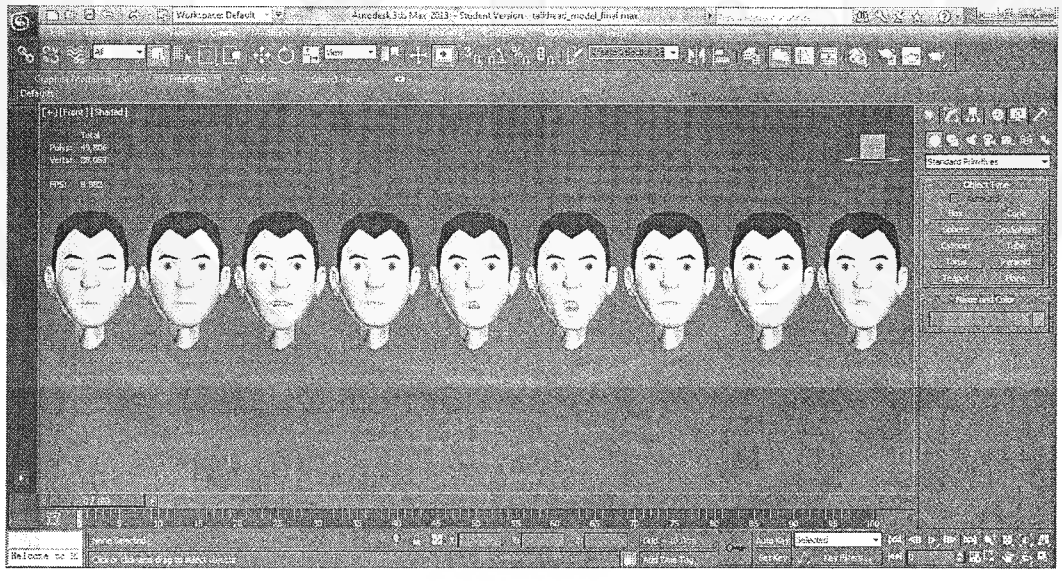


Figure 3.3. Morphing of different visemes in Autodesk 3Ds Max

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3.1.6.2 Unity 3D:

It is a cross-platform game engine with a built-in IDE developed by Unity Technologies. Unity is primarily used to create mobile and web games, but can also deploy games to console or the PC. As for this application development, it was used to create the mobile based application interface, to animate the lip sync and to code the program for android mobile platform. In order to complete the lip-sync morph from 3ds Max, a lip-sync tool for Unity namely Tagarela was used.

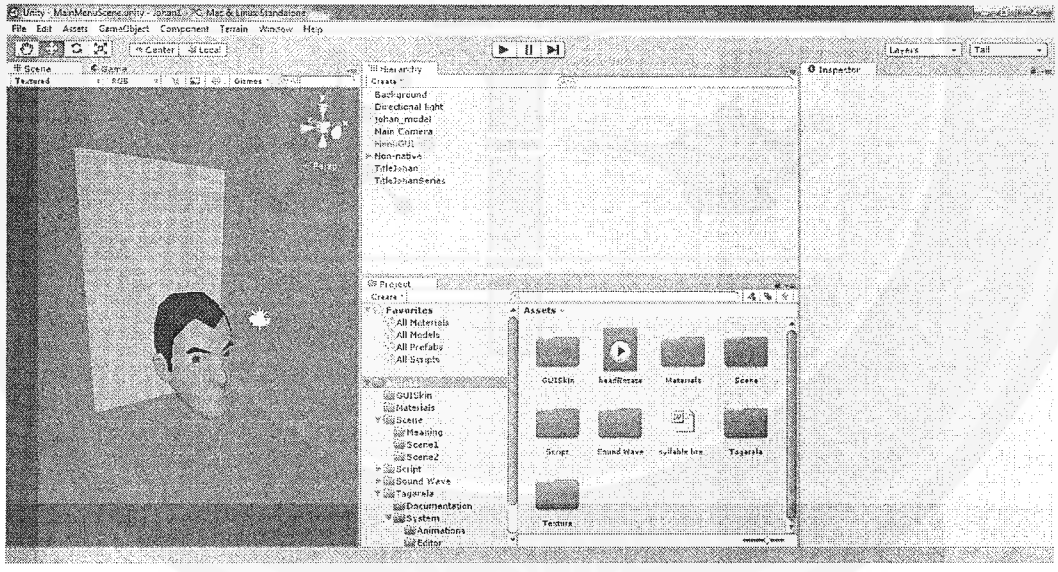


Figure 3.4. Unity 3D iInterface

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Unity 3D was also used to code the scripts for the prototype since it can support code written in C# and Javascript.

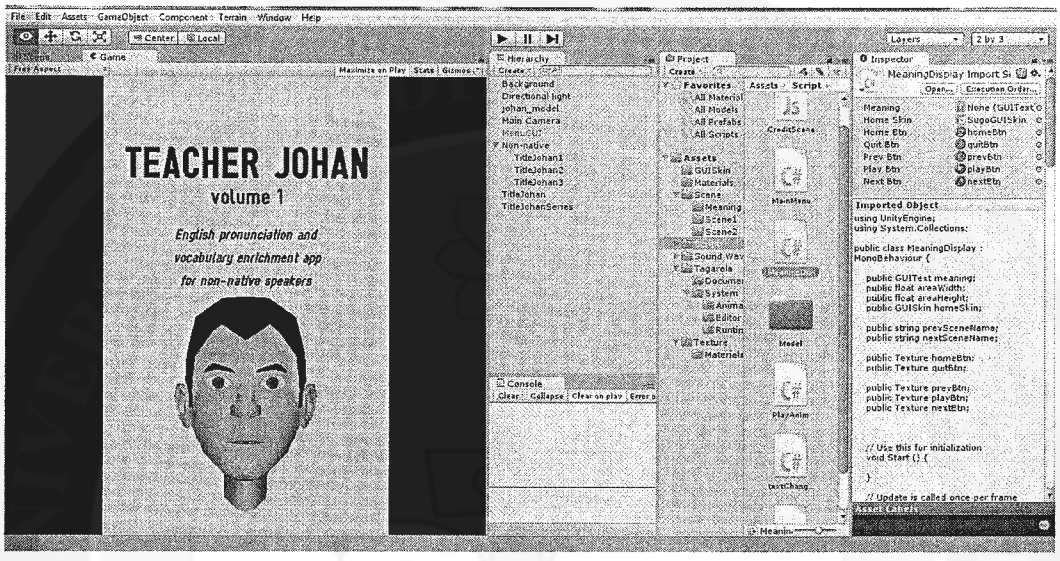


Figure 3.5. Unity 3D interface with sample code screen

3.1.6.3 Tagarela Lip Sync Tool for Unity:

Tagarela is a tool for adding lip sync and facial performances to 3D models easily, flexibly, and quickly. It was used to animate the lip sync and facial expression with the pronounced audio.

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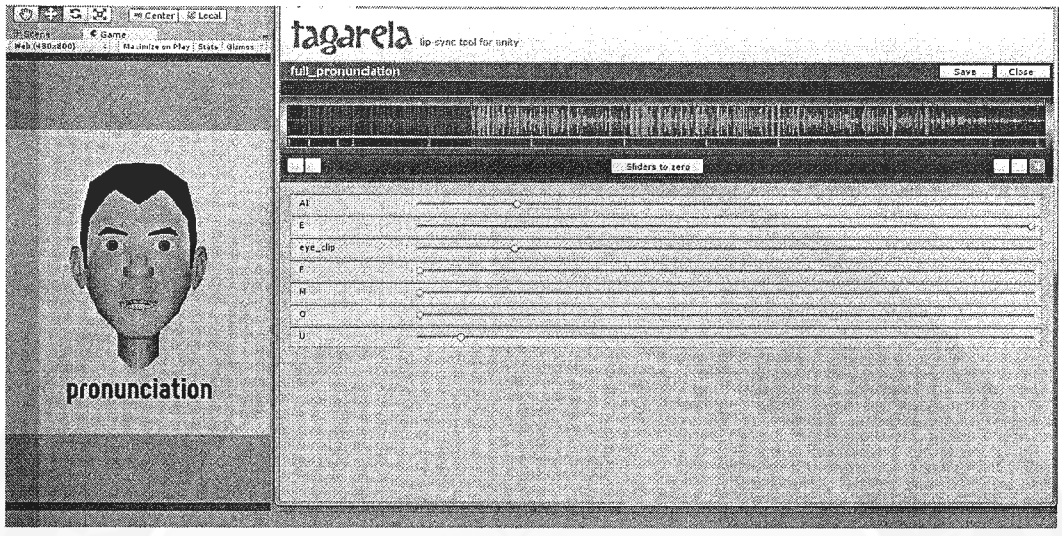


Figure 3.6. Tagarela lip sync tool for unity

3.1.6.4 Sound Forge 10.0:

This is sound editing software, which was used to record and edit the pronounced audio of the chosen commonly mispronounced words.

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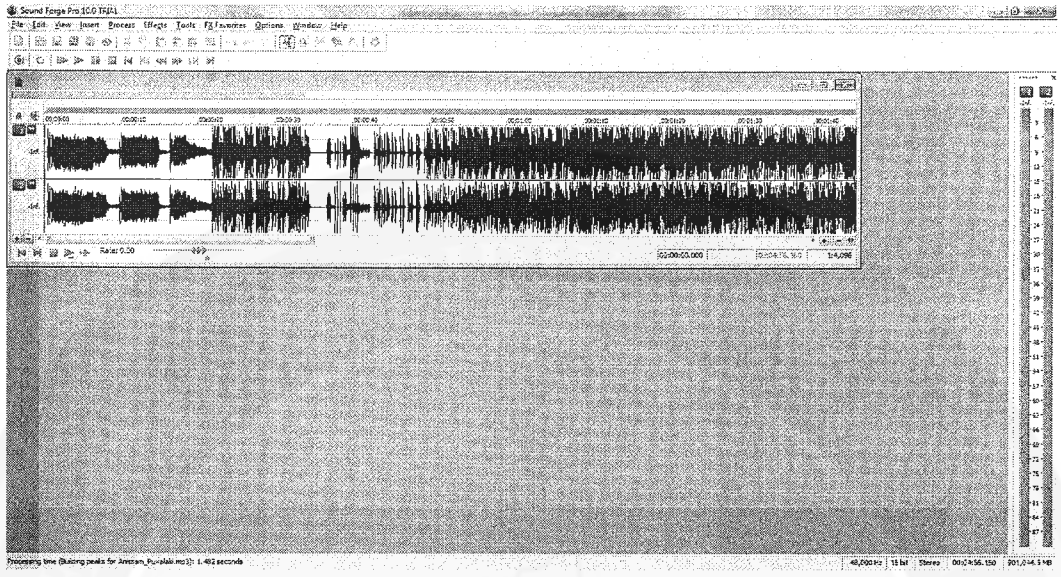


Figure 3.7. Sound Forge Pro 10.0 interface

3.1.6.5 Adobe Photoshop CS5

This is the photo-editing tool which was used to edit the texture of the model and also the buttons of the application.

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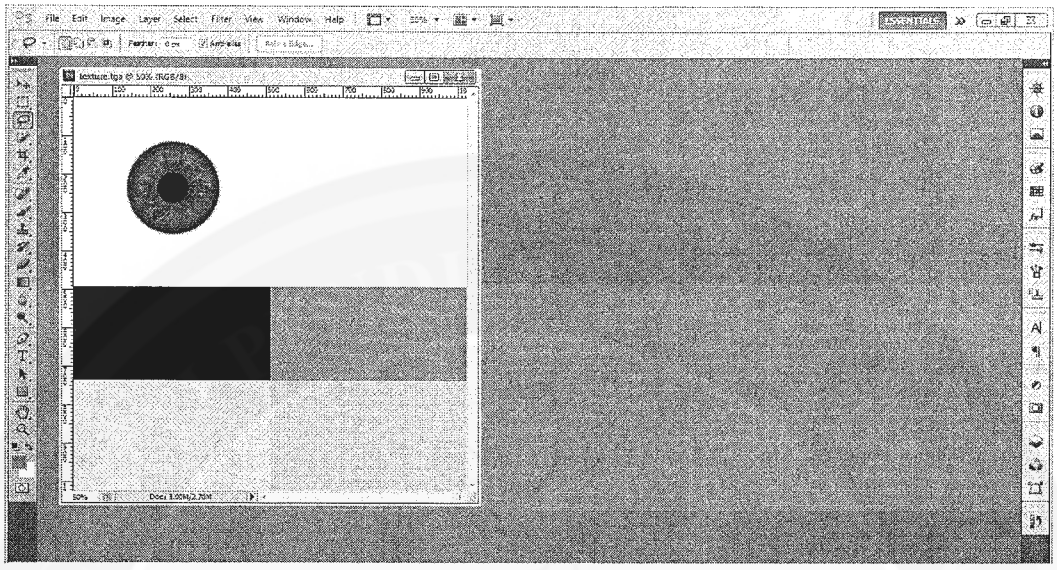


Figure 3.8. Adobe Photoshop CS5

3.2 Illustrate

The second part in DIDEA model was illustrating process. In this phase, the designs to be followed throughout the development process were shown in the visual form.

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3.2.1 Flow chart:

The prototype begins with the welcome screen. From there, students can select to navigate into the menu screen, which they can choose the words to begin their practices. When the students choose a word to practice, they will be introduced to a screen with the word's syllable break and 3D talking-head. Following that, the students can select the "next" button to navigate to the full pronunciation screen where they can practice with 3D talking-head. This process slightly changes for the other two prototypes based on the research objectives. For the prototype of the 3D talking-head with lip sync and audio, the screen starts with the welcome screen and from there students can select to navigate into the menu screen, which they can choose the words to begin their practice. This will navigate them to the full pronunciation screen where they can practice with 3D talking-head. No text assistance included in this prototype. For the prototype of audio and text only, the screen starts with the welcome screen and from there students can select to navigate into the menu screen, which they can choose the words to begin their practice. When the students choose a word to practice, they will be navigated to a screen with the word's syllable break. Following that, the students can select the "next" button to navigate to the full pronunciation screen, where they got to practice with audio alone. No 3D talking-head assistance included in this prototype.

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These prototypes used both hierarchical and linear navigational structure. Hierarchical navigational structure allows the students to return to the higher level of the navigation which is the menu screen to choose the word of their choice to practice (Rosenfeld & Morville, 1998). Non-linear navigational structure such as hierarchy also gives learner control in which; it increases effectiveness, efficiency, and motivates learners (Martin, 2008). Besides, other variables that influence the level of learner control are prior knowledge, student strategy and ability, learning progress, complexity of material and familiarity with the subject (Depover & Quintin, 1992; Hannafin, 1984; Milheim & Martin, 1991; Steinberg, 1989). Where else, linear navigational structure was also used in the prototype to let the students know that there are still screens left to view and also to let them know that they are able to go one step back to view the previous screen (Krug, 2000; Nielsen, 1999). The linear navigational structure was mainly used in content part, which was deemed appropriable for drills strategy.

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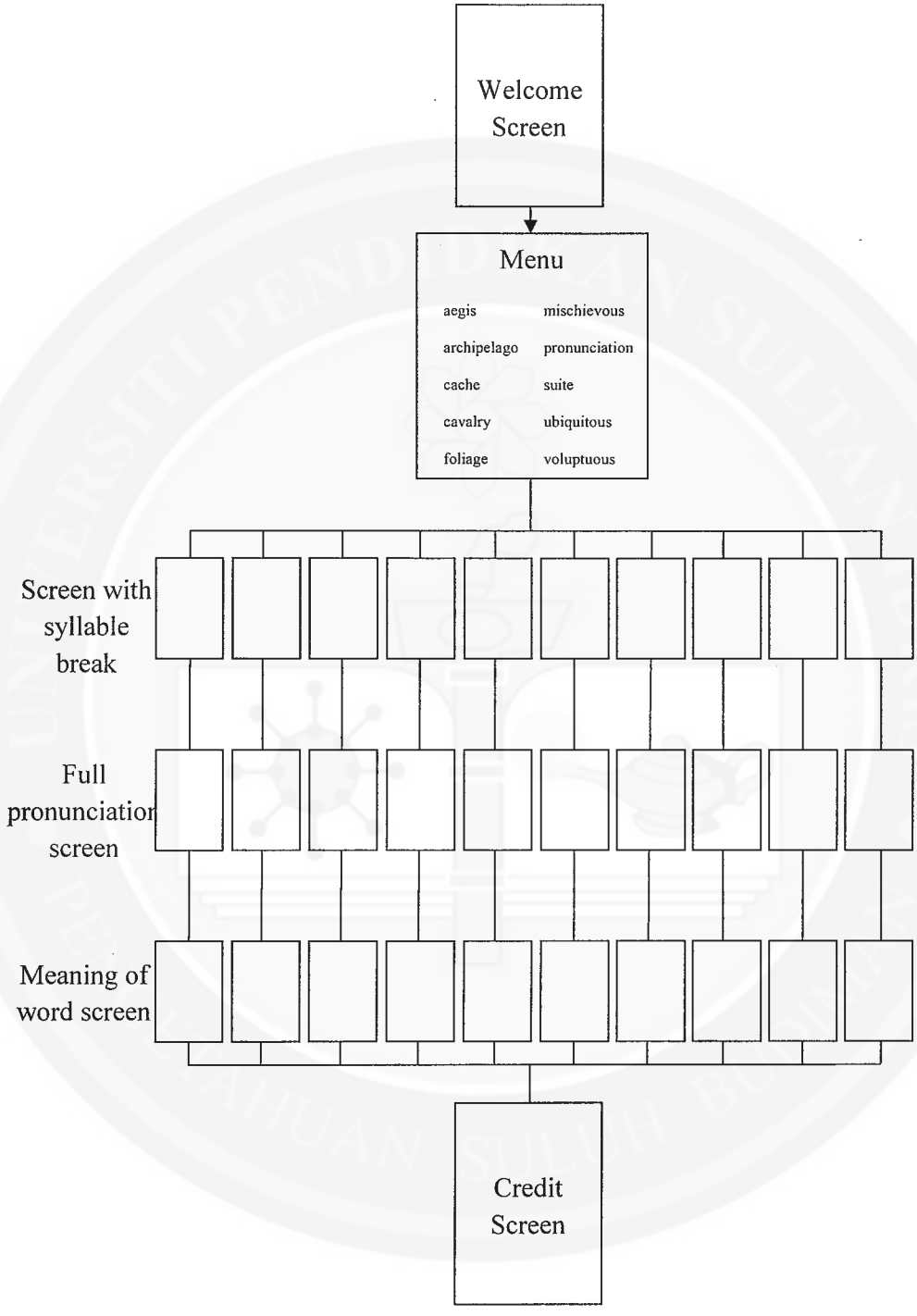


Figure 3.9. Flow Chart

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3.2.2 Story Board and Interface

The interface design for the MALL application will be simple and the usage of heavy graphics is less since considering the download time and the launching of the application. The text, graphic, video, audio and animation used in this application were mainly based on human computer interaction design principles. The application will start with a welcoming screen. The content of the welcoming screen would be the title of the application, and a button to continue to the next screen (Alessi & Trollip, 2001). In the following screen, there will be ten words option for the students to choose from for the pronunciation practice. There will be instructions on the top of the practice screen to inform the students to select the options. This will be implemented for all three types of prototype. In each prototype there will be a menu which is the list of the difficult to pronounce and commonly mispronounced words. When the students select the particular word, they will be navigated to the syllable break with 3D talking-head screen. When the students select the "play" button on this screen, the 3D talking-head will pronounce the word by following the syllable break. Apart from the play button, there will be also other navigational buttons on the screen such as, home, next, previous and exit button. The exit button will be displayed in every screen to allow the students to exit whenever they feel like stop using the application (Alessi & Trollip, 2001). Furthermore, application of the exit button suits well for the instruction with drills methodology (Alessi & Trollip, 2001).

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When the students select the "next" button, they will be directed to the full pronunciation practice screen. In this screen, the students can select the "play" button to repeat the 3D talking-head pronouncing the word again. Following that, in the full pronunciation screen, the students can select the "next" button to see the word's meaning or select the "home" button to go back to the menu screen, or select the "exit" button to see the credit screen and leave the application. This design is similar to the remaining two prototypes, which are the prototype of 3D talking-head with facial expression, lip sync and audio and the prototype of audio and text only. The only difference would be, in the practice screen of 3D talking-head with lip sync and audio, will not have the text and as for the prototype of audio and text only, the screen will only contains audio and text alone.

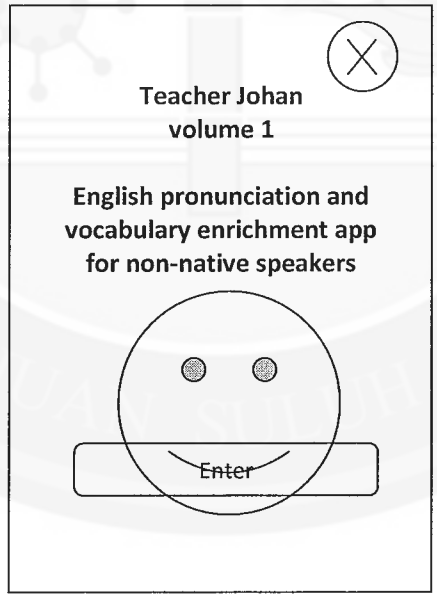


Figure 3.10. Welcome screen

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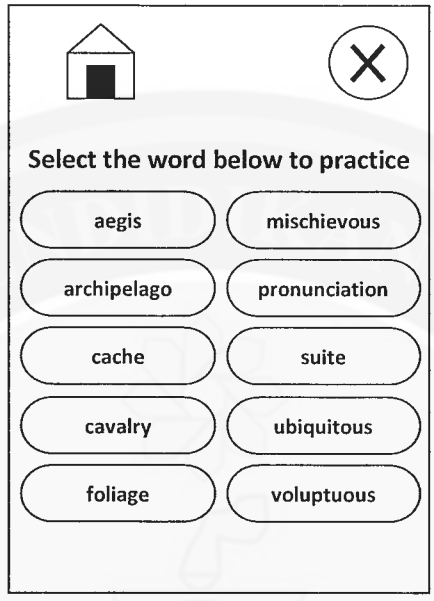


Figure 3.11. Menu screen of word selection for practice

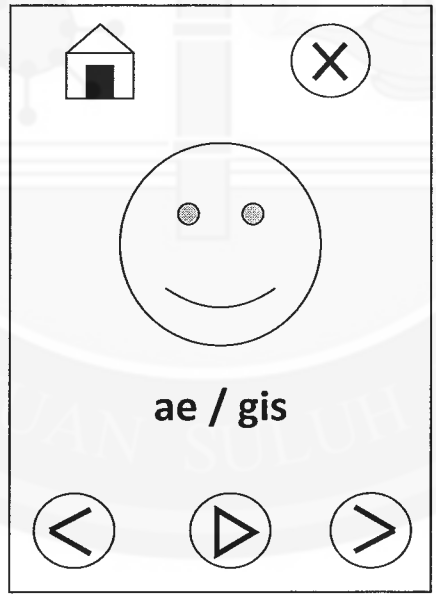


Figure 3.12. Syllable break screen

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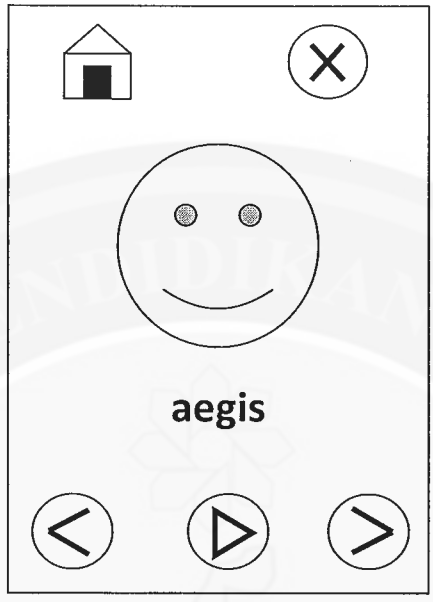


Figure 3.13: Full pronunciation practice screen

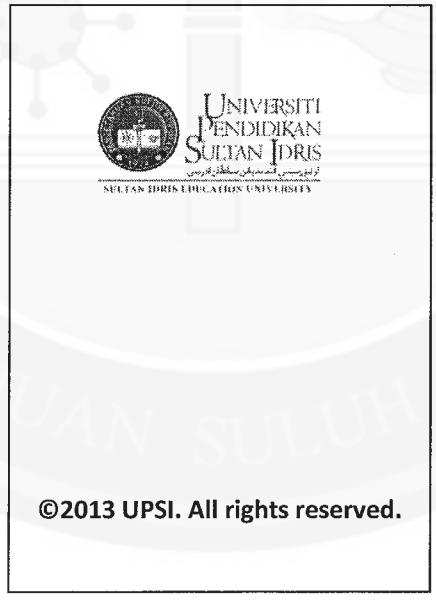


Figure 3.14. Credits screen

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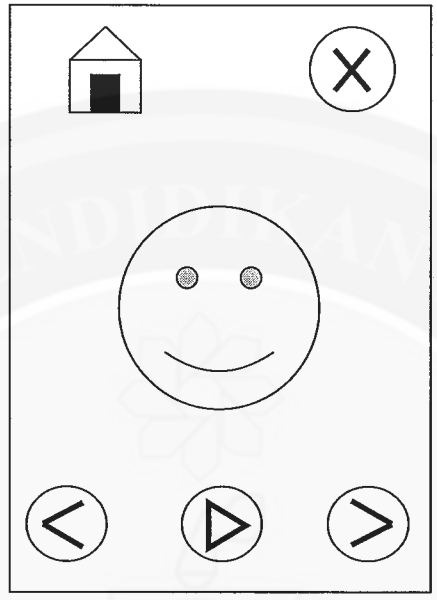


Figure 3.15. Full pronunciation practice screen without text

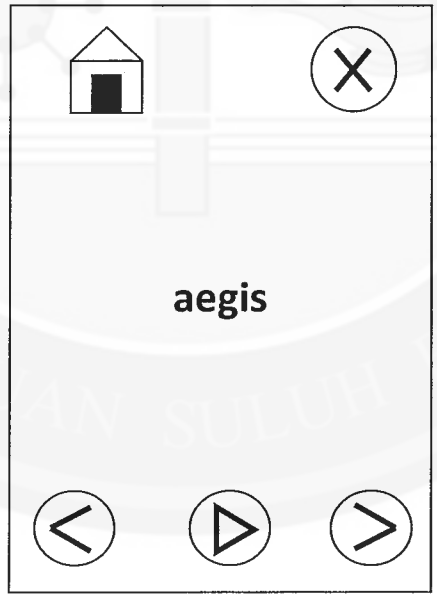


Figure 3.16. Practice screen with text and audio alone

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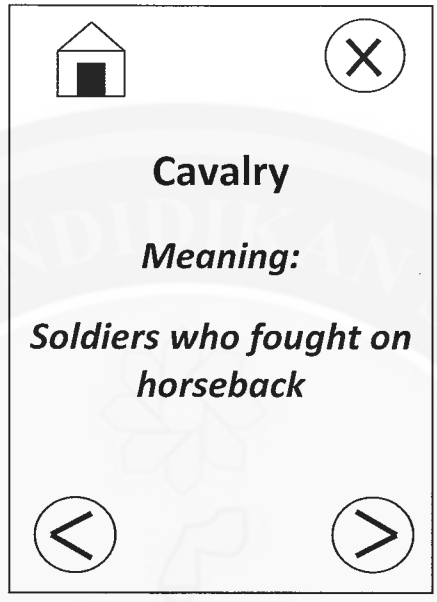


Figure 3.17. Screen with meaning

3.3 Development

The development of the application was based on the illustration and functional features of human computer interaction design principles. Below are the techniques and principles employed to develop the application:

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3.3.1 Principles

3.3.1.1 Text principle

The texts used in this application are less which is mostly applied for instructional purpose and also due to the limited screen size of a smartphone. The instructional text that should be read first placed at the top of each practice screens and main screen (Galitz, 2007). The colour used for the text is in contrast with the background for easy reading (Fenrich, 1997). The font choice for this application would be from san serif category which is Verdana. This font face was chosen due to good readability on screen display than the serif fonts which is more suitable for printed output (Huges, 1999; Peck, 2003). The font selection for each screen would be standard.

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Figure 3.18. Sample screen with instruction text

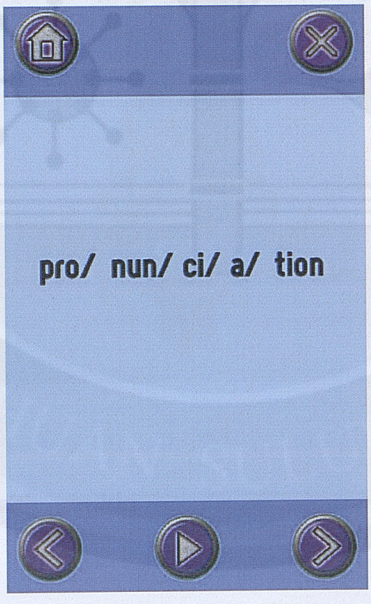


Figure 3.19. Sample Screen with syllable break text

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3.3.1.2 Graphic principle

The graphic used for this application is for the background and as a decorative purpose at the welcoming screen (Figure 3.20). The background image used is very simple to ensure clear visual of the animated video. The decorative graphic used at the background is moderate since this application is an instructional material (Khayrazad Kari, 2012).

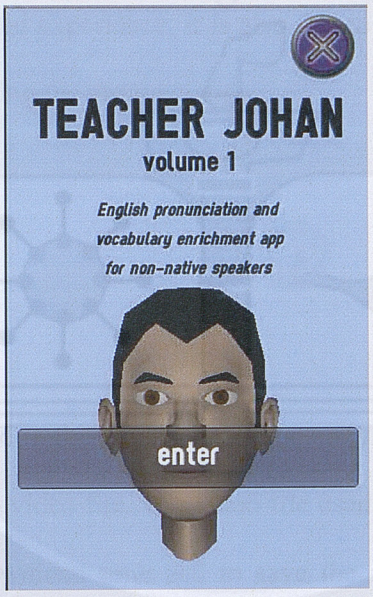


Figure 3.20. Sample screen with graphic

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3.3.1.3 Audio principle

The amount of audio used in the application is only for the purpose of pronouncing word. It was ensured that the audio is clear to enable students to listen the pronounced word effectively. Moreover, audio also gives a multilingual support to teach the students to pronounce (Fenrich, 1997). The voice used for pronouncing, was Malaysian English linguistic expert's voice. This is to ensure that the students feel comfortable and familiar with a more localized experience. It is also due to avoid any foreign accent and slang influencing the pronunciation.

3.3.1.4 Video principle

The video used in this application is actually the animation file which was converted into video file. The video file used will be smaller in size due to reduce the download time and to save the memory usage of the mobile device. At the same time, smaller video size also will save the limited storage space in the mobile device. The video length was limited to twenty to thirty seconds to make it fast pace, which is suitable for drills purpose. Fast paced drills appeal to the students' sense of achievement and enhance

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fluency compared to slow paced drills draws complaints from students that the drill is slow (Alessi & Trollip, 2001).

3.3.1.5 Animation principle

Animation will be one of the main concerns of the application since it was used to identify the effectiveness in MALL condition. The animation element used was the 3D talking-head with facial expression and lip sync. Besides that, it is also used as an instructional purpose (Fenrich, 1997). The instructional purpose would be to show the students how to pronounce a word via the lip movement and the facial expression supported with audio. The face of the 3D talking-head model is more to non-realism face since non-realism appearance has its own advantages.

According to Ruttkay & Noot (2000), below are the advantages of a non-realism character design:

i. Expressions can be exaggerated using non-realistic features
ii. There is much freedom in designing relatively the human face resemblance

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iii. It has some creative touch, which makes them more likable by the user compared to the real human face.

iv. If the face appearance trying not to be real the user does not have high expectations towards its realism performance as they would compare to the real human being face appearance.

v. Cost saving since it does not require special technology equipment to model and to animate.



Figure 3.21. Sample screen with animation

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3.3.1.6 Colour principle

Usage of too many colours would normally make the interface look distracting (Fenrich, 1997). The background image used for this application is light blue which basically has high contrast with the dark text (Fenrich, 1997). Light blue has been chosen as the background colour, since it is categorized as cool colour which gives the calm and relaxing feel to the students (Kallem, 2012). This will also enable the students to learn the content comfortably. Besides that, there was no colour used as video's background, in order to make it as the focus point. The colours used also were consistent throughout the whole application which enables the students to locate the information easily (Fenrich, 1997).

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Figure 3.22. Sample screen for colour usage

3.3.2 Visible

The visible functionality of the application would be the menu buttons which are used to select a word to pronounce, to go to the main screen with practice options and to view the credits screen. Buttons with label are used rather than just hypertext since it will be easier for touch selection on the touch screen base mobile device. The user friendliness of the application and the effectiveness of the user interface depend on the students' interaction during the practice period and also the user friendliness of the device used.

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3.3.3 Invisible

The invisible functionality of the application would be the global control buttons used without text on it. The developer believes that the symbol used on the button is globally understood and globally used symbols such as home, next, previous and exit symbol. In another word, it contains unambiguous picture indicating clearly its purpose (Alessi & Trollip, 2001). Apart from that the layout of the application is also composed in a consistent manner whereby, home and exit buttons are placed on top of the content where else play, next and previous buttons are placed at the bottom of the content to avoid confusing the learners (Alessi & Trollip, 2001). As an overall layout composition, the developer believes to produce a quality and user friendly interface to the users.

3.3.4 Instruction

The instruction in the application is clearly stated on each of the navigational screen. Labeled buttons are available for the students to select easily (Figure 3.18). The text used on the buttons is readable and easy to understand (Alessi & Trollip, 2001). An introduction class was held by the developer among the students and the linguistic tutor to give a brief understanding on how the application works prior to studies.

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3.4 Execution

This phase was to deploy and test the prototype of the 3D talking-head mobile device application. This phase was carried out to make sure all the necessary function works well. There are several important process need to be done before the application can be used successfully.

3.4.1 Installing

The linguistic tutors and the students were provided with the device with the application installed in it for the testing purpose. If the application is not installed in their respective devices, they need to get the application from the developer and install it in their device, since the application is yet to be published in the Android market. The installation process is similar to any Android apps.

3.4.2 Configuring

There were no specific configurations need to be done on the application. The app can be used by just installing it in any compatible devices. It is actually ready to be used. The students and the tutors just need to launch the application from the

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application list in the device. Upon launching of the application, the tutor and students can follow the visible and invisible instructions on the screen to practice.

3.4.3 Training

The linguistic tutor plays the role of moderator in assisting the students during the in class practice. The tutor is also responsible in ensuring the students who participate in the practice, use the application actively. The tutor will also explain the objective of the practice, how to use and when to use. The delivery will be completely using the mobile device and mostly will be self-learning, since it will be guided by the 3D talking-head.

3.4.4 Implementation

The prototype was test-run and implemented on several students and lecturers throughout the development process. The prototype was also analyzed in terms of the content and the design. Two linguistic experts examined and validated the content of the prototype and two instructional design experts examined and validated the overall design and presentation of the content. Usability and user

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satisfaction test was also implemented at the final stage of the development before the effectiveness test.

3.5 Analyze

Analyzing activities was done throughout the development process and stages as reported in previous phases. The analyzing process was not only limited in terms of physical appearance and the usage of the application but also includes the overall performance, mainly the effectiveness of the 3D talking-head with facial expression practice. The effectiveness test will be reported in following chapters.

3.5.1 Information

The informational data for analyzing purpose were gathered through reading, observation, interview and from the experts' advice as reported in previous phases.

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3.5.2 Effectiveness

Effectiveness of the teaching and learning process was measured through the oral test. The effectiveness studies will be reported in the following chapters. As for the usability and user satisfaction, test was conducted once the design and development processes were wholly completed. The usability and user satisfaction questionnaire, which was adapted from Post-Study System Usability Questionnaire (PSSUQ), was used to obtain feedback from the participants. The questionnaire developed was a modified version of the Post-Study System Usability Questionnaire (PSSUQ).

The questionnaire consists of 21 items, which were divided into seven categories namely design/layout, functionality, ease of use, learnability, satisfaction, outcome/future use and errors/system reliability (Appendix F). The questionnaire's item are 7-point scales with 1 for strongly agree, followed by next numbers in sequence with the end point 7 for strongly disagree.

The study participants were 105 Bachelor Degree in Design students, whose ages ranged from 19 to 21. The study was performed in the lecture hall that lasted for 30 minutes. The basic function of the prototype was explained by the instructor before the students were allowed to explore the application via 7 inch tablet at their own pace. The participants explored the application for about 15

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minutes and they were allowed to ask question and discuss throughout the session. The session ended with participants answering the questionnaire. Basically, Cronbach Alpha of usability and user satisfaction questionnaire was .97 indicating that overall the scales had acceptable reliability (Appendix G).

Design/Layout: Overall in design and layout aspects, the learners liked the interface of the application (M=3.18, SD=1.34), organization of the information presented was clear (M=3.14, SD=1.38), and the interface was pleasant to use (M=3.38, SD=1.35).

Functionality: The application has all the functions and capabilities that the learners expected (M=3.38, SD=1.47), the information retrieved from the application was effective in helping them to complete related tasks (M=3.22, SD=1.45), and the learners agree that all the features in the application functions well (M=3.19, SD=1.61).

Ease of use: The learner agree that the application was simple to use (M=2.70, SD=1.58), the information needed was easy to find (M=3.05, SD= 1.50), the information provided was clear (M=2.93, SD=1.53), and overall, the application was easy to use (M=2.70, SD=1.50).

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Learnability: The learners agree that it was easy to learn to use the application (M=2.86, SD= 1.52). They found that, there was not too much information to read before able to use the application (M=3.01, SD=1.54). They also agree that the information provided by the application was easy to understand (M=2.95, SD=1.44).

Satisfaction: In general, the learners felt comfortable using the application (M=2.97, SD=1.57). They also enjoyed exploring the application (M=3.00, SD=1.39), and overall they were satisfied with the application (M=3.00, SD=1.56).

Outcome/Future Use: The learners agree that they could become productive quickly using the application (M=3.06, SD= 1.47). They were convinced that the application could improve their pronunciation skill (M=3.08, SD=1.63), and based on their current experience using the application, they would use it regularly (M=3.12, SD= 1.47).

Errors/System reliability: The learners agree that whenever they made mistake using the application, they could recover easily and quickly (M=3.09, SD=1.422). They agree that the application gave error messages that clearly told them how to solve the problem (M=3.33, SD=1.65).

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Overall outcome of the questionnaire clearly indicates the learners' satisfaction of Teacher Johan Android App.

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CHAPTER 4

RESEARCH METHODOLOGY

4.0 Introduction

For this research purpose, a 3D talking-head MALL application entitled Teacher Johan with three different multimedia presentation strategies were developed. This chapter describes in detail the methodology of study that covers the research design, participants, test instruments and the method of data collection and analysis.

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4.1 Research Design

This quasi experimental study investigated the effects of three different multimedia presentation strategies of 3D talking-head MALL on the learning achievement of students with low English pronunciation skills. Independent variable is the multimedia presentation strategies of 3D talking-head MALL, whilst the dependent variable is the post-test performance. Basically, the research design is three groups pre-test post-test approach, which all the three groups are experimental group. In detail, group one was assigned with the first strategy which is 3D talking-head with audio and on-screen text, group two was assigned with the second strategy which is 3D talking-head with audio alone and group three was assigned with the third strategy which is audio and on-screen text only app. The study was conducted separately for all the groups in the controlled lab environment.

Brief explanations were given about the features of the app to ensure the smoothness of students' exploration throughout the learning process. Prior to the study, the students were required to undergo the pre-test to determine their pre-existing pronunciation skills of the selected words. Students in each group were given 15 minutes of learning time which was deemed suitable based on the literature and observation done during the development phase. Each student was provided with one 7 inch tablet for the mobile learning purpose. Post-test was conducted immediately upon completion of the learning process. The same instructor conducted the study session of all the groups.

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No verbal guide from the instructor happens throughout the learning process. In summary, the research framework is depicted in the Figure 1.4 as follows.

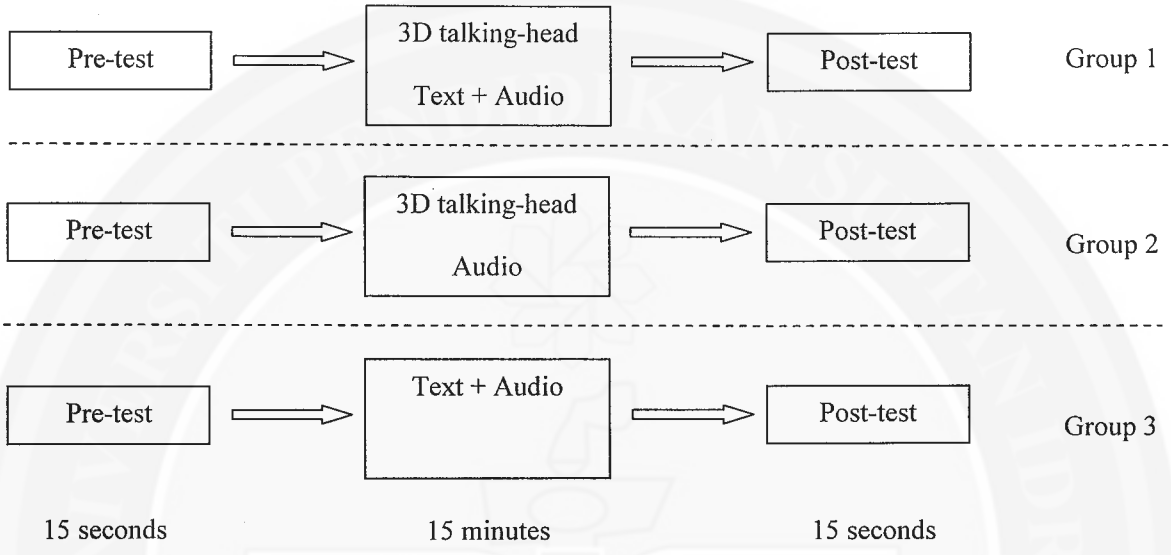


Figure 4.1. Research framework

4.2 Participants

The research participants were 60 college students, whose age ranged from 18 to 20, enrolled in the Diploma in Multimedia Application program and undergoing similar Essential English Communication course. 60 students with pronunciation difficulty were identified through the oral test done prior to the study, which was conducted by a specifically designated linguistic tutor. These sixty students were then divided into three groups with 20 students each with balanced proportions of gender in each group. Random stratified sampling technique was used to group them equally.

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Random stratified sampling technique has been conducted by splitting the population into strata, which is by gender equally. Each group was divided with 10 male students and 10 female students.

4.3 Test Instrument

Pre-test and post-test were used on the three groups that undergo the three different multimedia presentation strategies respectively. Pre-test and post-test were oral test that only measure the pronunciation performance of the selected words. The tests required students to read the word list given loudly within 15 seconds. Since it consumed time to assess all the three groups immediately, which contains sixty students in total, the test was videotaped and later given to the examiners to assess. By videotaping, also ensures the examiners have ample time to evaluate the students' performance precisely, whereby, they could replay the video accordingly. Three English lecturers who are expert in linguistic were appointed to assess the students' performance to ensure the reliability of the result. The examiners assessed the students' performance based on the oral test score sheet (Table 4.1) and schema (Table 4.2), which was adapted from existing Malaysian Education Certificate oral assessment score sheet. The score sheet and schema was also validated by two English linguistic lecturers. The average grade from the three examiners was used as the final score of the students. Meanwhile Table 4.3 explains in detail on duration taken for each process.

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Table 4.1

Oral test score sheet

Name: _____

IC No: _____

Group:_____

Type of practice attained:_____

Assessment: Test 1	**Score**
Word 1	1 2 3 4 5 6
Word 2	1 2 3 4 5 6
Word 3	1 2 3 4 5 6
Word 4	1 2 3 4 5 6
Word 5	1 2 3 4 5 6
Word 6	1 2 3 4 5 6
Word 7	1 2 3 4 5 6
Word 8	1 2 3 4 5 6
Word 9	1 2 3 4 5 6
Word 10	1 2 3 4 5 6
Total score	

Examiner Name: _____

Signature: _____

Student's Signature

Date: _____

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Table 4.2

Criteria for score achievement

Score		Construct	Criteria /Description
Excellent	6	Pronounce fluently using correct and acceptable pronunciation	Excellent, correct and clear pronunciation with good articulation, intonation, word stress and rhythm
Good	4-5	Pronounce clearly using correct and acceptable pronunciation	Correct pronunciation most of the time. Ability to articulate clearly using proper/correct/acceptable word stress/ rhythm and intonation
Satisfactory	3	Pronounce clearly using correct and acceptable pronunciation	Effort made to articulate clearly, with number of words wrongly pronounced which do not distort meaning. Generally satisfactory word stress, rhythm and intonation but may occasionally suffer.
Weak	2	Pronounce clearly using correct and acceptable pronunciation	Frequent errors in pronunciation, word stress and intonation but meaning fairly clear/comes through/ is not distorted/ may be distorted.
Very weak	1	Pronounce clearly using correct and acceptable pronunciation	Attempts to articulate clearly but marred by poor pronunciation, intonation, word stress and rhythm

Note. Adapted from existing Malaysian Education Certificate school based oral scoring criteria

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Table 4.3

Duration for testing process

Activities (in temporal order)	**Duration (in minutes)**
Pre-testing	0.15 (for each student)
Familiarizing with MALL	5
Learning / Training	15
Post-testing	0.15

4.4 Data Analysis

Overall, the scores obtained was analyzed statistically with one-way analysis of covariance (ANCOVA) with the pre-test scores as covariate were used to identify if there is any significance difference in the post-test scores among students in the 3D talking-head with audio and text MALL in comparison with the 3D talking- head with audio alone MALL and audio and text alone MALL in retaining the correct pronunciation acquisition. ANCOVA can be used when we have a two-group pre-test and post-test design, with the pre-test scores are treated as a covariate to control for pre-existing differences between the groups (Pallant, 2007; Coakes & Steed, 2007). This makes ANCOVA very useful in situations when we have quite small number of sample sizes and only small or medium effect sizes (Pallant, 2007).

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CHAPTER 5

RESULTS

5.0 Introduction

This chapter discusses the results of the study on the effects of various modality principles on the 3D talking-head MALL on pronunciation learning among tertiary level students.

Independent variable of this study is the 3D talking-head MALL with three different presentation strategy. The dependent variable is post-test scores administered following completion of the learning process.

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The data obtained through this study has answered the research question which was:

1. Does 3D talking-head with audio and text MALL has significant contribution in retaining the correct pronunciation acquisition in comparison with 3D talking- head with audio alone MALL and audio and text alone MALL?

The analyzed data was then discussed based on the alternative hypothesis of the study as follows:

Ha1. 3D Talking-head with audio and text MALL has significant contribution in retaining the correct pronunciation acquisition in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL.

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5.1 Data Analysis

The tables below display the raw scores and the differences between the pre- test and post-test scores of each student for all three types of MALL.

Table 5.1

Raw scores of each student for MALL 1

MALL 1 : 3D HEAD + AUDIO + TEXT								
Student	Pre-Test				Post-Test			
	Examiner 1	Examiner 2	Examiner 3	Min	Examiner 1	Examiner 2	Examiner 3	Min
1	21	20	18	19.67	34	36	35	35.00
2	22	21	18	20.33	41	40	38	39.67
3	27	25	23	25.00	40	41	37	39.33
4	26	25	23	24.67	42	47	34	41.00
5	22	21	18	20.33	40	41	36	39.00
6	20	26	27	24.33	39	38	34	37.00
7	21	23	18	20.67	43	40	36	39.67
8	24	26	23	24.33	42	43	39	41.33
9	26	27	24	25.67	40	41	39	40.00
10	24	29	28	27.00	43	40	36	39.67
11	19	25	20	21.33	30	36	36	34.00
12	36	33	36	35.00	48	50	49	49.00
13	26	25	25	25.33	39	40	37	38.67
14	15	24	25	21.33	43	48	45	45.33
15	24	26	26	25.33	40	39	38	39.00
16	24	26	28	26.00	43	45	46	44.67
17	18	24	19	20.33	39	36	33	36.00
18	16	18	19	17.67	43	46	40	43.00
19	24	26	22	24.00	51	49	50	50.00
20	15	18	16	16.33	44	48	45	45.67

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Table 5.2

Raw scores of each student for MALL 2

MALL 2 : 3D HEAD + AUDIO								
Student	Pre-Test				Post-Test			
	Examiner 1	Examiner 2	Examiner 3	Min	Examiner 1	Examiner 2	Examiner 3	Min
1	18	20	16	18.00	33	35	27	31.67
2	13	19	12	14.67	37	36	39	37.33
3	20	21	17	19.33	33	34	34	33.67
4	24	25	23	24.00	42	40	38	40.00
5	18	20	16	18.00	39	38	37	38.00
6	22	23	24	23.00	45	42	40	42.33
7	25	24	25	24.67	43	44	39	42.00
8	22	22	20	21.33	41	40	37	39.33
9	19	20	20	19.67	26	30	24	26.67
10	19	18	17	18.00	30	32	32	31.33
11	25	23	23	23.67	38	38	35	37.00
12	26	23	22	23.67	31	34	32	32.33
13	21	23	19	21.00	34	33	38	35.00
14	28	25	24	25.67	29	30	26	28.33
15	22	24	22	22.67	36	33	31	33.33
16	29	27	26	27.33	43	44	46	44.33
17	26	24	22	24.00	41	46	43	43.33
18	29	27	26	27.33	32	30	30	30.67
19	29	27	23	26.33	46	43	42	43.67
20	19	17	16	17.33	38	34	36	36.00

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Table 5.3

Raw scores of each student for MALL 3

MALL 3: AUDIO + TEXT								
Student	Pre-Test				Post-Test			
	Examiner 1	Examiner 2	Examiner 3	Min	Examiner 1	Examiner 2	Examiner 3	Min
1	21	23	22	22.00	30	33	39	34.00
2	18	21	22	20.33	36	34	35	35.00
3	22	20	19	20.33	37	35	32	34.67
4	24	24	22	23.33	39	37	37	37.67
5	25	24	23	24.00	42	40	38	40.00
6	24	25	20	23.00	42	39	39	40.00
7	16	21	17	18.00	36	34	36	35.33
8	24	23	26	24.33	38	38	36	37.33
9	29	29	34	30.67	46	48	49	47.67
10	26	25	22	24.33	41	42	39	40.67
11	22	21	19	20.67	30	33	33	32.00
12	28	28	25	27.00	30	31	33	31.33
13	29	25	25	26.33	41	44	42	42.33
14	22	20	18	20.00	41	40	36	39.00
15	20	22	18	20.00	35	35	34	34.67
16	21	23	20	21.33	34	32	33	33.00
17	27	25	27	26.33	35	37	39	37.00
18	27	24	21	24.00	34	33	35	34.00
19	32	30	28	30.00	42	40	39	40.33
20	24	25	23	24.00	37	35	32	34.67

The data obtained was analyzed through scientific method by using SPSS software. One-way analysis of covariance (ANCOVA) with the pre-test scores as covariate was used to identify if there is any significance difference in the post-test scores among students in the 3D talking-head with audio and text MALL in comparison with the 3D talking- head with audio alone MALL and audio and text alone MALL in retaining the correct pronunciation acquisition. The hypothesis was tested at 0.05 significance level.

Prior to the ANCOVA test, the homogeneity of regression assumption must be met. Therefore the homogeneity of regression was tested to ensure that there is no significant interaction between the pre-test and the groups.

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From the test (Table 5.4), the interaction was not statistically significant, $F(2,54)=0.46$, $p>0.05$. Therefore, the assumption was not violated and the ANCOVA test can be performed. However, to further affirm the findings, the relationship between the covariate and the dependent variable was checked graphically using scatterplots.

Table 5.4

Tests between-subjects effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	411.36[a]	5	82.27	4.39	.00
Intercept	1044.01	1	1044.01	55.66	.00
Group	36.11	2	18.056	.96	.39
Pre	168.33	1	168.33	8.98	.00
Group * Pre	17.22	2	8.61	.46	.63
Error	1012.82	54	18.76		
Total	88368.44	60			
Corrected Total	1424.18	59			

Note. R Squared = .289 (Adjusted R Squared = .22)

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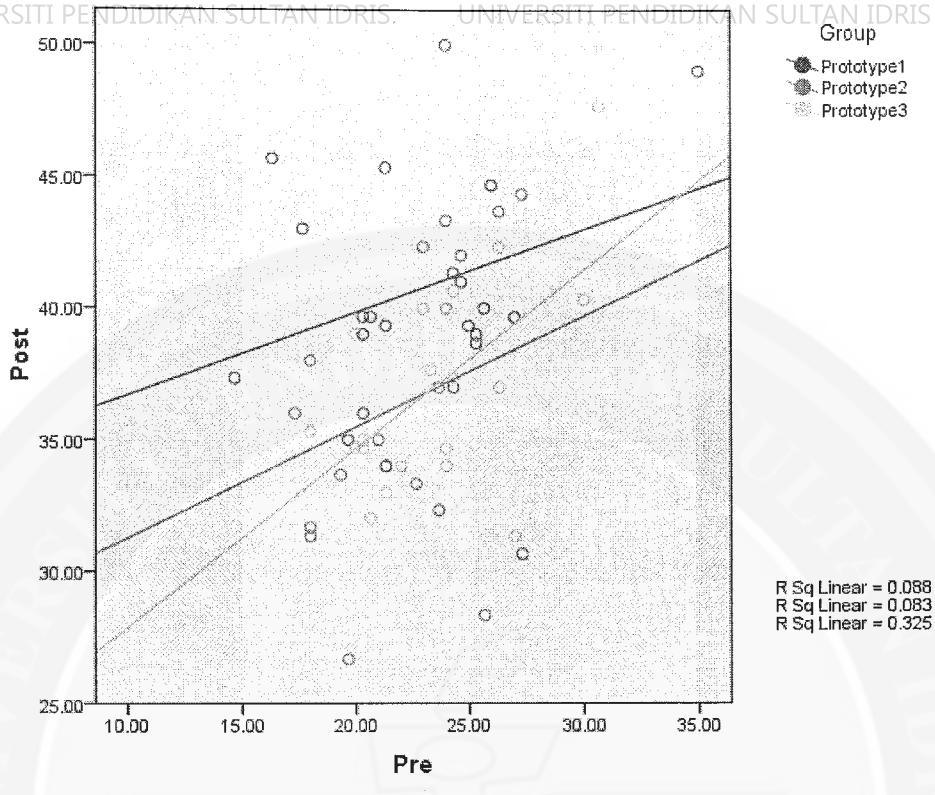


Figure 5.1. Linear relationships between the dependent variable and the covariate

From the graph (Figure 5.1), there appears to be linear relationship. The slopes of the regression lines are roughly parallel, whereby the relationship between the covariate and the dependent variable is similar for all the groups. This is important because ANCOVA assumes that the overall relationship between dependent variable and the covariate is true for each of the three groups. Furthermore, the previous test of homogeneity of regression confirmed that the assumption was not violated, this is confirmed here by the fact that the slopes are almost parallel. The R squared values indicate how strong the relationship is between the dependent variable and the covariate.

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Following the homogeneity of regression test, the ANCOVA test was performed. From the one-way ANCOVA test, Levene's test for homogeneity of variances was not significant ($p>0.05$) (Table 5.5), and therefore the data do not violate the assumption of equality of error variances. This indicates the population variances for each group were approximately equal.

Table 5.5

Levenes's test of equality of error variances

Dependent Variable:Post

F	df1	df2	Sig.
2.555	2	57	.087

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups. Design: Intercept + Pre + Group

Since all the assumptions were not violated, ANCOVA analysis was proceeded to explore the differences between the treatment groups. The output (Table 5.6) shows that the covariate is significantly related to the dependent variables, $F(1,56)=8.51$, $p<0.05$, partial eta squared=0.13. Therefore the effects of the covariate must be statistically removed.

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Table 5.6

Tests between-subjects effects for 3D talking-head with audio and text MALL, 3D talking-head with audio alone MALL and audio and text alone MALL

Dependent Variable:Post

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	394.14[a]	3	131.38	7.14	.00	.28
Intercept	1114.99	1	1114.99	60.62	.00	.52
Pre	156.50	1	156.50	8.51	.01	.13
Group	207.72	2	103.86	5.65	.01	.17
Error	1030.04	56	18.39			
Total	88368.44	60				
Corrected Total	1424.18	59				

Note. R Squared = .28 (Adjusted R Squared = .24)

To examine if there is any significant difference in retaining the correct pronunciation in the 3D talking-head with audio and text MALL, 3D talking-head with audio alone MALL and audio and text alone MALL application, one-way ANCOVA test was employed on the post-test results.

After adjusting for pre-test scores, there was significant difference on post-test achievement of 3D talking-head with audio and text MALL in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL application, $F(2,56)=5.65$, $p<0.05$, partial eta squared=0.17, with large effect size according Cohen's 1998 guidelines (Pallant,2007) as shown in Table 5.6.

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Finally, the adjusted mean scores indicate that students in the 3D Talking-head with audio and text MALL application obtained a better mean score (M=40.70, SE=0.96) than students in the 3D talking-head with audio alone MALL application (M=36.73, SE=0.97) and audio and text alone MALL application (M=36.77, SE=0.96) as shown in Table 5.7.

Table 5.7

Descriptive statistic for 3D talking-head with audio and text MALL, 3D talking-head with audio alone MALL and audio and text alone MALL

Dependent Variable:Post-test

			95% Confidence Interval	
Group	Mean	Std. Error	Lower Bound	Upper Bound
3D Talking-head with audio and text MALL	40.70[a]	.96	38.78	42.63
3D talking-head with audio alone MALL	36.73[a]	.97	34.79	38.67
audio and text alone MALL	36.77[a]	.96	34.83	38.70

Note. Covariates appearing in the model are evaluated at the following values: Pre = 22.91.

The results obtained indicate that overall, 3D Talking-head with audio and text MALL application has significant contribution in retaining the correct pronunciation acquisition in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL, and therefore the alternative hypothesis is accepted.

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5.2 Conclusion

A one-way ANCOVA was conducted in order to examine whether 3D talking-head with audio and text MALL has significant contribution in retaining the correct pronunciation acquisition in comparison with 3D talking- head with audio alone MALL and audio and text alone MALL. The independent variable was the 3D talking-head with three different presentation strategy and the dependent variable was the post-test scores administered following completion of the learning process. Scores of pre-test administered prior to the commencement of the learning process were used as the covariate.

Table 5.8

Summary tests between-subjects effects

Source	df	Ms	F	Sig.	Partial Eta Squared
Pre	1	156.50	8.51	.01	.13
Group	2	103.86	5.65	.01	.17
Error	56	18.39			

Note. R Squared .28 (Adjusted R Squared =.24)

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Table 5.9

Summary of descriptive statistic

		Unadjusted		*Adjusted*	
Mode	*N*	*M*	*SD*	*M*	*SE*
3D Talking-head with audio and text MALL	20	40.85	4.30	40.70	.96
3D talking-head with audio alone MALL	20	36.32	5.29	36.73	.97
Audio and text alone MALL	20	37.03	4.00	36.77	.96

Note. Covariates appearing in the model are evaluated at the following values: Pre = 22.91

Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances and homogeneity of regression slopes. From one-way ANCOVA test, Levene's test for homogeneity of variances was not significant ($p>0.05$), and therefore the data do not violate the assumption of equality of error variances. After adjusting for pre-test scores, there was significant difference on post-test achievement of 3D talking-head with audio and text MALL in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL application, $F(2,56)=5.65$, $p<0.05$, partial eta squared=0.17, with large effect size according Cohen's 1998 guidelines (Pallant, 2007) as shown in Table 5.5. The adjusted mean scores indicate that students in the 3D talking-head with audio and text MALL application obtained a better mean score ($M=40.70$, $SE=0.96$) than students in the 3D talking-head with audio alone MALL application ($M=36.73$, $SE=0.97$) and audio and text alone MALL application ($M=36.77$, $SE=0.96$) as shown in Table 5.9. This clearly suggests that 3D talking-head with

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audio and text MALL application has significant contribution in retaining the correct pronunciation acquisition in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL.

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CHAPTER 6

DISCUSSION AND CONCLUSION

6.0 Introduction

This research examined the effectiveness of various modality effects on 3D talking-head MALL, specifically pronunciation learning among tertiary level students. The study was conducted by comparing three prototypes which are 3D talking-head with audio and text MALL, 3D talking-head with audio alone MALL and audio and text alone MALL. Discussions of the research findings focused on the significant contribution of 3D talking-head with audio and text MALL in retaining the correct pronunciation acquisition in comparison with a 3D talking-head with audio alone MALL, and audio and text alone MALL. Further discussion is related to the implications of the study, recommendations for future study and conclusions of the study.

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6.1 Discussion of Findings

The study was conducted to answer the following research question:

1. Does 3D talking-head with audio and text MALL have significant contribution to retaining the correct pronunciation acquisition in comparison with 3D talking- head with audio alone MALL, and audio and text alone MALL?

Animation plays potential role in improving human learning process, particularly in promoting a more profound understanding of the subject matter (Mayer & Moreno, 2002). In line with this argument, an animated pedagogical agent such as 3D talking-head or virtual language tutor, which simulates real human like tutor in the computer, has been created for aiding language learning. The use of 3D talking-heads also subsequently improved the learning process of a new language or second language (Chen & Massaro, 2011). Even though there are dozens of audio and text based talking dictionaries available online, the inclusion of animated pedagogical agent seems beneficial for pronunciation learning, especially for non-natives learning difficult-to-pronounce English words. English is a language which depends upon airflow, lip shape, tongue position, teeth position, and jaw movement (Baxter, 1993), and may be practiced through watching lip-syncing activities (Sumby & Pollack, 1954; Benoıˆ & Le Goff, 1998). In addition, facial expressions are also among the concerns to make the language learning more efficient and robust (Wik & Hjalmarsson, 2009).

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These features, which could be incorporated in the 3D talking-head, might contribute to effective pronunciation learning among non-native speakers. This research's findings further affirm the argument. Findings showed that students in the 3D talking-head with audio and text MALL learning condition, outperformed students in the 3D talking-head with audio MALL, and audio and text alone MALL.

The belief that speech and language science and technology evolved under the assumption that speech is a solely auditory event appears not totally true (Massaro, Liu, Chen & Perfetti, 2006). Multiple sources of information to identify and interpret the language input undoubtedly promote better pronunciation learning. It may be concluded that 3D talking-head with audio and text MALL, which combines visual information in the form of 3D talking-head and verbal information in the form of audio and on-screen text, promotes better pronunciation learning. The value of the 3D talking-head is mostly dependent on depicting lip-syncing activities. Visual information from the movements of the lips enhances lucidity of audio understanding, specifically in a noisy environment (Massaro, 2006b). A 3D talking-head as a pedagogical agent could also increase the motivation and confidence level of the students in acquiring the correct pronunciation, since it acts as a virtual tutor. From observations throughout the study, students in the 3D talking-head with audio and text MALL seemed more excited in exploring the application than in the other two strategies. This might also have influenced the outcome of the study. Therefore, further study examining the motivation and confidence level aspects and its effects on pronunciation learning is vital.

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Meanwhile, the importance of listening in language learning and its role in helping the learner overcome barriers has long been acknowledged. Likewise, in this study audio plays an important role in teaching the students to pronounce. When students are exposed to visual information and audio together, they are able to integrate them with the preexisting knowledge, resulting in meaningful schema acquisition. This happens when corresponding verbal and pictorial representations are in working memory at the same time (Mayer, 2002). However, in learning pronunciation apart from 3D talking-heads as visual information, visual text or on-screen text also plays an important role. To pronounce the stress pattern of a word clearly, the proper number of syllables must be produced (Pronunciation, 2011). In order to show this, the syllable break was placed as text in the application. From the observation and the result obtained, it was proven that on-screen text has caused a significant difference in the score achieved by students.

On the other hand, the finding of this research seems not in favor with Moreno and Mayer's (1999) modality principle. Moreno and Mayer (1999) concluded that students learned better when verbal input is presented auditorily as speech, rather than visually as text. However, based on the study conducted, this principle is not true for pronunciation learning. A combination of audio and on-screen text could offer significant contribution in retaining the correct pronunciation acquisition. Thus, it may be concluded that 3D talking-head with audio and text MALL promotes better pronunciation learning than the other two prototypes. This is due to the application combining visual information from the movements of the lips, which enhances the fluency of the audio understanding, audio which helps integrate visual with verbal information, and on-screen text or visual text, which helps the students to pronounce

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clearly. Even though, 3D talking-head with audio and text MALL application has proven to play an important role in helping learners distinguish how to pronounce difference words, question arises whether the same retention rate can be achieved among students when examining words in context comparing words in isolation? This is due to, students are only practicing to pronounce the word in isolation in this study. Thus, this study suggests a potential future study should be in comparing words in context besides words in isolation in retaining the correct pronunciation acquisition.

Surprisingly, students in the 3D talking-head with audio MALL, and audio and text alone MALL learning conditions obtained a similar mean score. As previously discussed, both of these applications are actually lacking one of the elements crucial for effective pronunciation learning. Therefore, both of these applications performed with a similar outcome in retaining the correct pronunciation acquisition with the help of either audio or on-screen text. This again affirms that combining 3D talking-head with audio and on-screen text would give a better retention rate for acquiring the correct pronunciation. Therefore, this statement supports the research findings of both studies by Liu, et al. (2007) on importance of visual speech in learning pronunciation, as well as and Stiller, et al. (2009) research findings on importance of text presented visually in learning pronunciation.

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6.2 Implications of Findings

The research findings shows that a 3D talking-head with audio and text MALL has significant contribution in retaining the correct pronunciation acquisition. However, comparing the mean score of the remaining two prototype showed that audio and text alone MALL demonstrated only a slightly higher score without a significant difference. This shows that both applications are lacking in including one of the elements, which would be 3D talking-head with audio MALL application does not include the on-screen text, where else, audio and text alone MALL does not have the 3D talking-head. Combining all these elements which are 3D talking-head, audio and on-screen text, would undoubtedly make a significant contribution to learning a new language, especially in learning how to pronounce difficult words by non-native speakers.

6.3 Conceptual Framework

As discussed earlier, this research theoretical framework is grounded on Mayer's Cognitive Theory of Multimedia Learning and Mayer's Modality Principle. However, from the research it has been demonstrate that modality principle is not applicable for this study. Based upon the conceptual framework developed, it is believed that that the distance learning with MALL leads to an active, creative, and socially interactive process. Learners thus construct new ideas based on their past and current knowledge attained throughout the pronunciation practice. They are therefore able to comfortably

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learn at their own pace and develop a new way of learning pronunciation by watching, listening, and pronouncing words referring to the 3D talking-head on mobile devices. This approach also directs study by allowing the targeted learners to focus on their ability to learn without the guidance of a real teacher and at their own learning pace, anytime and anywhere. The aspect of non-realistic yet proper modeled features of human like 3D talking-heads also plays important role in eliminating creepy feeling and promotes comfortable experience in learning. Further study looking on this aspect would be interesting.

When learners utilize a 3D talking-head as their pronunciation assistant, they perceive the practice in working memory structure via two channels, namely the visual channel and verbal channel. Facial expressions with automated lip sync strategy of 3D talking-head animation will be processed in visual channel, while the pronounced word and text will concurrently be processed in verbal channel. By utilizing both channels, the issue of limited capacity could be minimized. However, question arises on the usage of text in the application. Even if text is categorized as verbal information, it is represented in visual form. The viewers need extra effort in transforming it from visual representation to verbal, whereby extra processing is needed in the working memory. Nevertheless, excluding text in pronunciation learning might cause difficulties among learners in identifying the syllable breaks for proper pronunciation. Thus, this study identified a solution for this issue. Two of the prototypes developed used on-screen text in displaying the syllable break and these prototypes obtained a higher min score in comparison with the prototype which was developed with 3D talking-head and audio alone.

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Therefore, this research finding is not in line with Moreno and Massaro (1999), which stated that students learned better when verbal input is presented auditorily as speech, rather than visually as text.

Besides addressing limited capacity issue, dual-channel activation has shown potential in promoting active processing in the working memory. When corresponding visual and verbal representation are processed simultaneously in the working memory, referential or activation of verbal system by visual system (or vice versa) will occur. The learner at this point might develop a more accurate mental model of the pronounced word. This will help the learner process the knowledge acquired from the sensory memory through listening and watching the 3D talking-head in the working memory through integrating facial expression with lip-sync (visemes), pronounced word (phonemes) and prior knowledge for adequate schema acquisition. Adequate schema acquisition is important for accurate schema formation to be stored on a more-or-less permanent basis in the long term memory. In the future, when learners come across the same word, they will have improved pronunciation level of the respective word. Figure 6.1 depicts the conclusive conceptual framework based on the outcome of the study.

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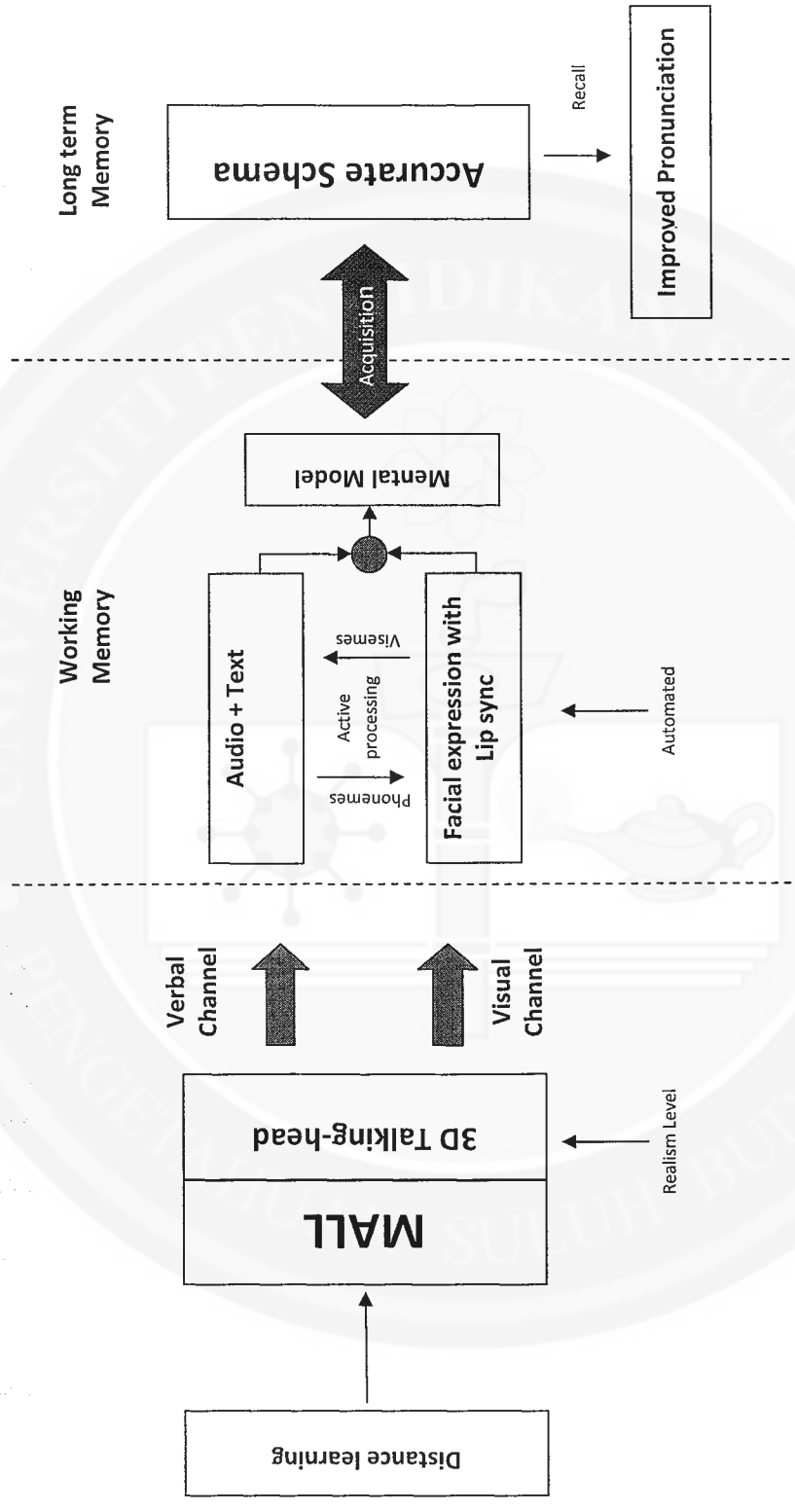


Figure 6.1. A conceptual framework for 3D talking-head mobile device application for pronunciation learning

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6.4 Contribution of the Study

Many non-native speakers facing difficulty in using English as second language due to poor pronunciation skills (Fraser, 2000). The standard of English among Malaysian youngsters is actually declining; the communication skills among school leavers is viewed poorly by employers. This also happens among undergraduates. The initial findings for the research need revealed that poor pronunciation exists among tertiary level students. However, these students do not have any formal study to learn pronunciation during the tertiary level. Therefore, CALL and MALL has been developed to fill this gap. At the same time, there has been scarce research done on the use of 3D talking-heads as pronunciation learning aid in MALL; this research has filled the gap.

6.4.1 Contribution to multimedia designers

This research has given a clearer view of designing for a mobile based educational application. Thus, this research also has identified the proper integration of the multimedia elements in order to enhance teaching and learning. On the other hand, it also gave an opportunity in integrating Multimedia element which is 3D animation and mobile technology with education, in order to produce conducive learning environment virtually. This can be seen from the observation done during the study where the students were excited to use the 3D talking-head application. It also shown that the students feel

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motivated and confident when given the chance to learn repetitively through the drill methodology. This research is considered among the first research using 3D talking-heads with audio and text MALL and will eventually contribute to educational instructional development in Malaysia.

Research findings also revealed and proved that modality principle is not applicable for pronunciation learning, since on-screen text was effective in teaching the students on how to pronounce base on the syllable break. Likewise, it supports the argument of Pronunciation (2011) where, to pronounce the stress pattern of a word clearly, the right number of syllables needs to be produced. Furthermore this research also supports the findings of Stiller, et al. (2009), who concluded that under certain conditions, visual texts may be preferable in reducing mental effort and promoting performance. Therefore, the term or principle proposed from this research is the multi-modality principle, since the application with on-screen text, audio and 3D animation have significant contribution in promoting correct pronunciation acquisition.

6.4.2 Contribution to teaching practitioners

This research will also give an opportunity to tertiary education to identify new approaches to enhance the language learning process, other than mere static presentation of the subject. These results in creating an interesting way of learning, since it engages

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with a device preferred by most of the youngsters nowadays, based on a survey conducted by the Malaysian Communications and Multimedia Commission on mobile phone users (2009). Moreover, it provides the luxury of learning at their own pace and time via mobile technology, which eventually makes the language learning a lifelong learning process even after they graduate. For this reason, to guide the teaching practitioners, a manual on how to coach students to utilize the mobile devices for their self-learning using the application will be produced.

6.4.3 Contribution to the body of knowledge.

The research highlighted the relevant multimedia principles that are cognitively affective in helping students to use mobile pronunciation learning applications. Also, the conceptual framework developed for this research will be useful for the future mobile-based educational application development and mobile-based multimedia application development.

6.5 Suggestions for Future Study

This study examined the effectiveness of modality principle on 3D talking-head linguistic learning aid on pronunciation among tertiary level students. The research findings

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revealed a significant contribution of 3D talking-head with audio and text MALL in retaining the correct pronunciation acquisition, in comparison with 3D talking-head with audio alone MALL and audio and text alone MALL. Three types of prototype which are 3D talking-head with audio and text MALL, 3D talking-head with audio alone MALL and audio and text alone MALL was developed and tested for this research. It focused only on tertiary level students. The following are suggestions for further research:

i. Further research is needed on facial realism, in order to examine its effects on pronunciation learning.

ii. Further research is needed on student motivation and confidence level using 3D talking-heads.

iii. Further research is needed to examine words in context comparing words in isolation need to determine the retention rate among students using the word in real life.

iv. Research based on gender needs to be carried out as there might be differences in retention rate of acquiring the correct pronunciation.

v. Research based on race need to be done as different race might have different pronunciation acquisition rates due to their mother tongue. This will ensure that applications suit all races.

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vi. Research base on different states also need to be done since different states have different ethnic group or different way of speaking their mother tongue language, which eventually influences the way they speak or pronounce English words.

6.6 Conclusion

From the findings obtained, it may be concluded that overall 3D talking-head with audio and text MALL has a significant contribution to retaining correct pronunciation acquisition. Based on the min score, apart from 3D talking-head with audio and text MALL which had the highest score, audio and text alone MALL had a slightly higher score than 3D talking-head with audio alone MALL. This demonstrated that on-screen text has contributed in aiding pronunciation learning. In conclusion, it may be said that on-screen text is preferable in learning pronunciation and that the modality principle is not applicable to this situation. At the same time, a combination of 3D talking-head, audio, and text is effective in aiding pronunciation learning.

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APPENDIX A

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
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30200 JALAN LAHAT,
IPOH, PERAK

STUDENT ACHIEVEMENT RECORD

NAME : _____ I/C NUMBER : _____

Year	200				200				200					
Form	1				2				3					
Assessment	1	2	3	4	1	2	3	4	1	2	3	4		
Model														
Activity														
Date														
Construct	Grade				HG	Grade				HG	Grade				HG	Average
Grammar and vocabulary																
Pronunciation and intonation																
Fluency and rhythm																
Ethics and mannerism																
Teacher's Name																
Signature																
Student's Signature																

MODEL INDICATOR
MODEL 1 ~ Individual
MODEL 2 ~ Individual - Listener
MODEL 3 ~ Individual - Stimulator
MODEL 4 ~ Pair
MODEL 5 ~ Group

UNIVERSITI PENDIDIKAN SULTAN IDRIS



KRITERIA PENSKORAN UJIAN LISAN BERASASKAN SEKOLAH

BAHASA MELAYU

BAHASA INGGERIS

Sek. Men. Methodist (ACS)
DITERIMA
-6 JAN 2005
30200 IPOH

UNIVERSITI PENDIDIKAN SULTAN IDRIS

CRITERIA FOR ASSESSMENT – ULBS (ENGLISH)

	Score	Construct	Criteria/Description
Excellent	6	1. Converse on a topic effectively with appropriate responses	• Excellent understanding of the topic demonstrated by the ability to interact/hold a discussion and conversation effectively • Ability to field/handle questions confidently • Ability to catch and maintain audience-interest throughout presentation • Relevant and appropriate answers/responses given
		2. Speak fluently using correct and acceptable pronunciation	• Very fluent and clear speech with effective use of pauses • Excellent, correct and clear pronunciation with good articulation, intonation, word stress and rhythm
		3. Speak coherently	• Very smooth flow of well-organised ideas presented through the use of discourse markers and linkers effectively
		4. Speak the language using a wide range of appropriate vocabulary within context	• Excellent use of language to fulfill task with clarity using a variety of language functions in context • Excellent use of language in terms of extensive vocabulary, interesting expressions used appropriately and effectively
		5. Speak using correct grammar	• Excellent use of language in terms of sentence structure and grammatically correct sentences to convey intended meaning effectively

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Good	4-5	1. Converse on a topic effectively with appropriate responses	• Good understanding of topic demonstrated by the ability to interact/hold a discussion/hold a conversation effectively • Ability to field/handle questions with some confidence • Ability to catch and maintain audience-interest most of the time • Mostly relevant and appropriate responses
		2. Speak fluently using correct and acceptable pronunciation	• Fluent and clear speech with good use of pauses • Correct pronunciation most of the time with occasional lapses • Ability to articulate clearly using proper/correct/acceptable word stress/ rhythm and intonation
		3. Speak coherently	• Smooth flow of organised ideas presented through the use of appropriate discourse markers and linkers
		4. Speak the language using a wide range of appropriate vocabulary within context	• Correct and effective use of language to fulfill task with clarity using a variety of language functions in context • Good range of vocabulary with some interesting expressions • Accurate and clear language used most of the time with some slips that do not disrupt meaning
		5. Speak using correct grammar	• Good use of language in terms of sentence structure and grammatically correct sentences to convey intended meaning effectively

UNIVERSITI PENDIDIKAN SULTAN IDRIS

Satisfactory	3	1. Converse on a topic effectively with appropriate responses	• Adequate understanding of topic but with limited ability to sustain a conversation • Some relevant and appropriate responses
		2. Speak fluently using correct and acceptable pronunciation.	• Fairly fluent and clear speech with frequent and long pauses • Effort made to articulate clearly, but presentation marked by a number of words wrongly pronounced which do not distort meaning • Generally satisfactory word stress, rhythm and intonation but may occasionally falter
		3. Speak coherently	• Flow of ideas is interrupted by use of inappropriate discourse markers and linkers
		4. Speak the language using a wide range of appropriate vocabulary within context	• Satisfactory use of language and task is partially fulfilled • Ability to perform some language functions in context with very few interesting expression • Fair range of vocabulary and meaning is generally understood • Some evidence of inappropriately used of vocabulary
		5. Speak using correct grammar	• Satisfactory use of language with some errors but meaning is mostly clear

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Weak	2	1. Converse on a topic effectively with appropriate responses	• Limited understanding of the topic discussed demonstrated by inability to interact/hold a discussion/hold a conversation • Inability to arouse interest of audience • Very few relevant and appropriate responses
		2. Speak fluently using correct and acceptable pronunciation	• Fluency is interrupted by consistent halting and long pauses • Frequent errors in pronunciation, word stress and intonation but meaning is fairly clear/comes through/is not distorted/may be distorted
		3. Speak coherently	• Minimal or no flow of ideas
		4. Speak the language using a wide range of appropriate vocabulary within context	• Minimal use of language and task is barely fulfilled • Able to perform only limited language functions in context • Limited range of vocabulary • Frequent use of inappropriate vocabulary which distort meaning
		5. Speak using correct grammar	• Consistent grammatical errors which disrupt meaning
Very Weak	1	1. Converse on a topic effectively with appropriate responses	• Hardly any understanding of topic • Hardly able to interact / hold a discussion / hold a conversation • Unable to respond at all
		2. Speak fluently using correct and acceptable pronunciation	• Minimal or no utterance • Attempts to articulate clearly but marred by poor pronunciation, intonation, word stress and rhythm
		3. Speak coherently	• Very minimal or no flow of ideas
		4. Speak the language using a wide range of appropriate vocabulary within context	• Hardly any use of language and task is not fulfilled • Unable to perform any language functions in context • Very limited vocabulary – unable to make sense of vocabulary
		5. Speak using correct grammar	• Excessive grammatical errors • Meaning is totally distorted

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APPENDIX B

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List of web URL for commonly mispronounced and difficult to pronounce words

1. Maddox, M. (n.d.). *50 incorrect pronunciations that you should avoid.* Retrieved November 1, 2012 from http://www.dailywritingtips.com/50-incorrect-pronunciations-that-you-should-avoid/

2. *100 most often mispronounced words and phrases in English.* (n.d.). Retrieved November 1, 2012 from http://grammar.yourdictionary.com/style-and-usage/mispron.html

3. Benwell, T. (2010). *25 Difficult words to pronounce.* Retrieved November 1, 2012 from http://edition.englishclub.com/esl-magazine/pronunciation-25-words/

4. Deterding, D. (n.d.). *Commonly mispronounced words*. Retrieved November 1, 2012 from http://videoweb.nie.edu.sg/phonetic/words-ipa/index.htm

5. McCarthy, C. (2009). *10 Commonly mispronounced words*. Retrieved November 1, 2012 from http://www.ecenglish.com/learnenglish/lessons/10-commonly-mispronounced-words

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APPENDIX C

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
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Table 1

20 commonly mispronounced and difficult to pronounce words

No	Words
1	aegis
2	archipelago
3	arctic
4	asterisk
5	accessory
6	cache
7	cavalry
8	chaos
9	forte
10	foliage
11	Mischievous
12	precipitation
13	pronunciation
14	sherbet
15	ubiquitous
16	suite
17	supremacist
18	verbiage
19	voluptuous
20	yolk

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APPENDIX D

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Table 2

Formative pronunciation test

No	Name	Words	Able to pronounce	
			Yes	No
1	STUDENT 1	aegis		/
		archipelago		/
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos	/	
		forte		/
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation		/
		sherbet		/
		ubiquitous		/
		suite		/
		supremacist		/
		verbiage		/
		voluptuous	/	
		yolk	/	
2	STUDENT 2	aegis	/	
		archipelago	/	
		arctic	/	
		asterisk		/
		accessory	/	
		cache		/
		cavalry		/
		chaos	/	
		forte	/	
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage	/	
		voluptuous	/	
		yolk	/	

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3	**STUDENT 3**	aegis	/	
		archipelago	/	
		arctic		/
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos		/
		forte		/
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation		/
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist		/
		verbiage	/	
		voluptuous	/	
		yolk	/	
4	**STUDENT 4**	aegis		/
		archipelago	/	
		arctic		/
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos	/	
		forte		/
		foliage	/	
		Mischievous		/
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage	/	
		voluptuous	/	
		yolk	/	

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5	**STUDENT 5**	aegis	/	
		archipelago		/
		arctic	/	
		asterisk		/
		accessory	/	
		cache		/
		cavalry	/	
		chaos		/
		forte	/	
		foliage		/
		Mischievous	/	
		precipitation	/	
		pronunciation		/
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage		/
		voluptuous	/	
		yolk	/	
6	**STUDENT 6**	aegis	/	
		archipelago		/
		arctic	/	
		asterisk		/
		accessory	/	
		cache		/
		cavalry	/	
		chaos	/	
		forte	/	
		foliage	/	
		Mischievous		/
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage	/	
		voluptuous		/
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

7	STUDENT 7	aegis		/
		archipelago	/	
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos	/	
		forte		/
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist		/
		verbiage	/	
		voluptuous		/
		yolk	/	
8	STUDENT 8	aegis		/
		archipelago		/
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry	/	
		chaos	/	
		forte		/
		foliage	/	
		Mischievous		/
		precipitation	/	
		pronunciation		/
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage		/
		voluptuous		/
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

9	**STUDENT 9**	aegis		/
		archipelago	/	
		arctic	/	
		asterisk		/
		accessory	/	
		cache		/
		cavalry	/	
		chaos	/	
		forte		/
		foliage	/	
		Mischievous		/
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite	/	
		supremacist	/	
		verbiage	/	
		voluptuous		/
		yolk	/	
10	**STUDENT 10**	aegis		/
		archipelago	/	
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry	/	
		chaos		/
		forte	/	
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation	/	
		sherbet	/	
		ubiquitous		/
		suite		/
		supremacist		/
		verbiage	/	
		voluptuous		/
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

11	**STUDENT 11**	aegis		/
		archipelago	/	
		arctic	/	
		asterisk		/
		accessory	/	
		cache	/	
		cavalry	/	
		chaos	/	
		forte	/	
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation		/
		sherbet		/
		ubiquitous		/
		suite		/
		supremacist		/
		verbiage		/
		voluptuous		/
		yolk	/	
12	**STUDENT 12**	aegis		/
		archipelago	/	
		arctic	/	
		asterisk		/
		accessory	/	
		cache		/
		cavalry	/	
		chaos		/
		forte	/	
		foliage	/	
		Mischievous		/
		precipitation		/
		pronunciation	/	
		sherbet		/
		ubiquitous		/
		suite		/
		supremacist	/	
		verbiage	/	
		voluptuous		/
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

13	**STUDENT 13**	aegis		/
		archipelago		/
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry	/	
		chaos		/
		forte	/	
		foliage	/	
		Mischievous	/	
		precipitation		/
		pronunciation		/
		sherbet	/	
		ubiquitous		/
		suite		/
		supremacist	/	
		verbiage	/	
		voluptuous		/
		yolk	/	
14	**STUDENT 14**	aegis		/
		archipelago		/
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos		/
		forte	/	
		foliage		/
		Mischievous	/	
		precipitation		/
		pronunciation		/
		sherbet	/	
		ubiquitous		/
		suite		/
		supremacist	/	
		verbiage		/
		voluptuous	/	
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

15	**STUDENT 15**	aegis		/
		archipelago		/
		arctic	/	
		asterisk	/	
		accessory	/	
		cache		/
		cavalry		/
		chaos		/
		forte	/	
		foliage	/	
		Mischievous	/	
		precipitation	/	
		pronunciation		/
		sherbet		/
		ubiquitous		/
		suite		/
		supremacist	/	
		verbiage	/	
		voluptuous		/
		yolk	/	

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
ORIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

APPENDIX E

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Table 3

10 commonly mispronounced and difficult to pronounce words

No	Words
1	aegis
2	archipelago
3	cache
4	cavalry
5	foliage
6	Mischievous
7	pronunciation
8	ubiquitous
9	suite
10	voluptuous

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

APPENDIX F

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Usability and User Satisfaction Questionnaire (adapted from PSSUQ)

Name :

Age :

Gender : **Male / Female**

Items	**Strongly agree**						**Strongly disagree**
Design / Layout							
I liked using the interface of the app	1	2	3	4	5	6	7
The organization of information presented by the app was clear	1	2	3	4	5	6	7
The interface of this app was pleasant to use	1	2	3	4	5	6	7
Functionality							
This app has all the functions and capabilities that I expect to have	1	2	3	4	5	6	7
The information retrieved from the app was effective in helping me to complete the tasks	1	2	3	4	5	6	7
All the features in the app functions well	1	2	3	4	5	6	7
Ease of use							
It was simple to use the app	1	2	3	4	5	6	7
It was easy to find the information I needed	1	2	3	4	5	6	7
The information provided in the app was clear	1	2	3	4	5	6	7
Overall, this app was easy to use	1	2	3	4	5	6	7
Learnability							
It was easy to learn by using the app	1	2	3	4	5	6	7
There wasn't too much information to read before I can use the app	1	2	3	4	5	6	7
The information provided by the app was easy to understand	1	2	3	4	5	6	7
Satisfaction							
I felt comfortable using the app	1	2	3	4	5	6	7
I enjoyed exploring the app	1	2	3	4	5	6	7
Overall, I am satisfied with this app	1	2	3	4	5	6	7
Outcome / Future use							
I believe I could become productive quickly using this app	1	2	3	4	5	6	7
The app was able to convince me on improving my pronunciation skills	1	2	3	4	5	6	7
From my current experience with using the app, I think I would use it regularly	1	2	3	4	5	6	7
Errors / System Reliability							
Whenever I made a mistake using the app, I could recover easily and quickly	1	2	3	4	5	6	7
The app gave error messages that clearly told me how to fix the problem	1	2	3	4	5	6	7

Comments / Suggestions

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
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UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

APPENDIX G

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKA
DRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PEN

UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Table 4

Design

Item	N	Minimum	Maximum	Mean	Std. Deviation
I liked using the interface of the app	105	1	7	3.18	1.343
The Organization of Information presented by the app was clear	105	1	7	3.14	1.383
The Interface of this app was pleasant to use	105	1	7	3.38	1.354
Mean				3.23	1.16

Table 5

Functionality

Item	N	Minimum	Maximum	Mean	Std. Deviation
This app has all the functions and capabilities that I expect to have	105	1	7	3.38	1.470
The information retrieved from the app was effective in helping me to complete the tasks	105	1	6	3.22	1.448
All the features in the app functions well	105	1	6	3.19	1.606
Mean				3.26	1.34

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UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Table 6

Ease To Use

Item	N	Minimum	Maximum	Mean	Std. Deviation
It was simple to use the application	105	1	7	2.70	1.575
It was easy to find the information i needed	105	1	7	3.05	1.502
The information provided in the app was clear	105	1	7	2.93	1.533
Overall, this app was easy to use	105	1	7	2.70	1.500
Mean				2.84	1.39

Table 7

Learnability

Item	N	Minimum	Maximum	Mean	Std. Deviation
It was easy to learn by using the app	105	1	7	2.86	1.515
There wasn't too much information to read before i can use the app	105	1	7	3.01	1.535
The information provided by the app was easy to understand	105	1	7	2.95	1.444
Mean				2.94	1.30

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UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDID
N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Table 8

Satisfaction

Item	N	Minimum	Maximum	Mean	Std. Deviation
I felt comfortable using the app	105	1	7	2.97	1.566
I enjoyed exploring the app	105	1	7	3.00	1.387
Overall I am satisfied with the app	105	1	7	3.00	1.550
Mean				2.99	1.35

Table 9

Outcome

Item	N	Minimum	Maximum	Mean	Std. Deviation
I believe i could become productive quickly using the app	105	1	7	3.06	1.466
The app was able to convince me on improving my pronunciation skill	105	1	7	3.08	1.633
From my current experience with using the app. i think i would use it regularly	105	1	7	3.12	1.472
Mean				3.08	1.40

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N IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI PENDIDIKAN SULTAN IDRIS UNIVERSITI F

Table 10

Errors/ system realibility

Item	N	Minimum	Maximum	Mean	Std. Deviation
Whenever I made a mistake using the app, I could recover easily and quickly	105	1	7	3.09	1.422
The app gave error massages the clearly told me how to fix the problem	105	1	7	3.33	1.651
Mean				3.21	1.43

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Table 11

Gender

Gender	Frequency	Percent
Lelaki	43	41.0
Wanita	62	59.0
Total	105	100.0

Table 12

Realibility (alpha cronbach's alpha)

Cronbach's Alpha	N of Items
.970	21

Table 13

KMO and Bartlett's test overall

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	2107.412
	Sig.	.000

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