A MULTIMEDIA APPLICATION IN LEARNING ENGLISH THROUGH LYRICS

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A project report submitted in partial fulfilment of the requirements for the award of Bachelor of Science (Hons.) Software Engineering

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

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ABSTRACT

This report details the processes and steps taken to produce a multimedia application which aims to address some shortcomings in a number of aspects, such as in classroom learning, English language learners and the English language proficiency levels among them, the Malaysian secondary school syllabi, and the lack in similar existing systems. Solutions to these problems include: help users learn English grammar and vocabulary skills in a convenient and creative approach; promote self-directed learning (SDL) process; include at least 25% of academic words in Academic Word List (AWL).

The objectives above were achieved by designing and developing an Android mobile learning-based multimedia application that adopts prototyping-based methodology whose stages have been slightly modified to suit the nature of the project more appropriately.

Towards the later phase of the project, the finalized product was tested by the author, and also a group of participants who are representatives of the real users. The application has been fine-tuned after the verification and validation stage. Besides, the feedback from the testing participants was collected and analysed.

It is believed that the product is able to contribute in numerous ways: provide a non-traditional way of learning English language; consolidate users' English language foundation; act as a supplement tool during classroom learning; encourage self-directed learning (SDL) process among the users.

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LIST OF SYMBOLS / ABBREVIATIONS

ACTFL   American Council on the Teaching of Foreign Languages

AWL   Academic Word List

CDD   Compatibility Definition Document

CEFR   Common European Framework of Reference for Languages

ELPL   English Language Proficiency Level

IDE   Integrated Development Environment

IELTS   International English Language Testing System

ILR   Interagency Language Roundtable

JDK   Java Development Kit

MUET   Malaysian University English Test

OPI   Oral Proficiency Interview

OS   Operating System

RAD   Rapid Application Development

SDL   Self-directed Learning

TOEFL   Test of English as a Foreign Language

WBS   Work Breakdown Structure

WORA   Write Once, Run Anywhere

XML   Extensible Markup Language

XP   Extreme Programming

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CHAPTER 1

INTRODUCTION

This chapter provides some background for the Final Year Project, defines the problem statement and objectives, and states the scope that the project outcome will encompass, all of which will help determine the direction and sources of inspiration for the project.

1.1   Background

1.1.1   Classroom Learning

Classroom learning is usually well-organized. It is compulsory for learners to be present in class in order to obtain the study experience. Learners who have a hard time to focus may find the learning process distracting (Kokemuller, n.d.). Besides, it is basically not viable for one teacher to give each student the one-on-one attention or instruction that may be necessary (Michael, 2009).

An extremely typical characteristic of classroom style learning is the teacher-dominated interaction. The teaching is intensely teacher-centered, where teachers serve as the source of knowledge while learners server as passive receivers. The traditional approach of education is claimed to work as "jug and mug" – the knowledge being poured from one vessel into an empty one (Boumova, 2008).

1.1.2   Learning of English Language

Learning of English can only take place at a limited number of occasions, such as classrooms, as previously mentioned, or tuition classes (both formally), and conversations with family members and friends (informally). The inadequate opportunity of learning and practicing English may cause second language learners to have restricted improvement over time, due to the fact that outcome of multi-competence is evident only when there is considerable exposure or practice in a second language (Cook, 1992).

1.1.3   English Language Proficiency Levels (ELPLs) among Secondary and Tertiary Education Institutions

English language proficiency levels (ELPLs) among second language learners vary greatly, especially in Malaysia, with some being able to assimilate and put English to good use, even to the extent of achieving mastery in it, while the rest at the end of the English proficiency spectrum tend to have a hard time throughout the learning process, so much so that their basic grammar skills are inadequate.(Nallaya, 2010). The gap of education standards is particularly obvious between urban and rural areas, eventually facing challenges of employment of graduates (Shukry, 2014).

1.2   Problem Statement

1. The problem with classroom learning

During classroom learning, students often lack one-on-one attention or instruction from a teacher because there are dozens of students in a single class. Thus, students who have difficulty focusing their attention may find the learning process distracting. Besides, the use of textbooks in classrooms is deemed insufficient to amply cater for the learning of a language, especially

due to the complex dynamic of the language acquisition process. During the course of education, creativity and imagination may be inhibited by the rigid structure of the textbook. Other than that, students may not necessarily enjoy the materials included in textbook, and they will quickly lose interest, therefore leading to association with boredom in English lessons (Lawrence, 2011).

2. **The problem that students face when learning English language**

Students can only learn English at a limited number of occasions, such as in classrooms. They are often short of guidance and instructions when they try to learn it themselves, and there are not many evaluations available to help assess whether they apply the proper self-learning approach or not. This inadequacy may also cause students to have restricted improvement over time, since the proficiency level of a second language is only evident when there is considerable exposure or practice in it (Cook, 1992).

3. **Low ELPLs among students**

Many secondary students have relatively low ELPLs, which is evident since statistics showed that, in 2011, only 28% of candidates of SPM English paper acquired a minimum credit against Cambridge 1119 standards (Dhillon, 2013). The lack of fluency in English language has even resulted in tertiary education graduates failing to secure an employment.

4. **Malaysian secondary school syllabi do not cater for the learning of academic words in Academic Word List (AWL)**

A study showed strong evidence that Malaysian secondary school syllabi include less than 20% of AWL in the teaching materials (Manan, Ali and Shansudin, 2013). Consequently, students' understandability will be greatly affected when they engage in interpreting academic texts, such as textbooks, articles, conference papers, essays, proposals, reports and reviews.

5. **The lack in similar existing systems**

Currently, all of the examined applications / websites have insufficient features. This means that each of them only contain some of the features that the proposed application will encompass. A number of websites, mobile applications and coursewares available on market provide lyrics gap filling exercises, or display lyrics on-screen (some with parallel translation), although all with certain disadvantages, such as lack of assessment, limited scope and depth, and disorganized content structure.

1.3   Objectives

The main goal of the project is the design and develop a learning based mobile application that will achieve the following objectives:

1. **To help users learn English grammar and vocabulary skills in a convenient and creative approach**

   The Final Year Project will produce a multimedia application which will be able to help users learn English grammar and vocabulary. The learning process will be convenient in the sense that they can learn the lessons anywhere as long as they have their mobile devices with them. Other than that, incorporating music into the language learning process will make users feel intrigued and interested to find out what it is about.

2. **To promote self-directed learning (SDL) process**

   The application will be designed to suit personal use, thus, users are able to learn English lessons, which are available within the application, at their own pace. Furthermore, they can utilize the application with minimal need to seek guidance and instructions from someone else, such as teachers and parents. Likewise, users are not limited to utilize the application on campus only.

3. **To include at least 25% of academic words in Academic Word List (AWL)**

Users should be familiar with the academic words since they appear frequently appear in academic texts, to which the tertiary education learners are regularly exposed. AWL contains a total of 570 academic words. The application will contain at least 25% of it, which is 143 words. Explanations and examples will be provided for academic words which only appear occasionally, and are deemed difficult for users to understand.

See **Appendix D** for a full list of academic words in AWL.

1.4 Scope

1.4.1 User Scope

The learning based mobile application is specifically targeted towards students who are currently enrolled in secondary schools or tertiary learning institutions in Malaysia, regardless of their ages. The inclusion of students of both secondary and tertiary levels is due to the fact that the English language syllabus of secondary schools possesses a high level of influence on tertiary education, especially since university or college students are regularly exposed to academic texts (Manan, Ali and Shansudin, 2013) such as textbooks, articles, conference papers, essays, proposals, reports and reviews. Therefore, the English language proficiency levels of students should be enhanced so that they can improve their comprehension when dealing with various sorts of academic texts during their tertiary education.

Furthermore, the application is catered to students who study English as a second language (ESL). This means that the targeted students have their own native languages, e.g. Mandarin, Malay and Tamil, and they use or learn English since it is a compulsory language subject in Malaysian primary and secondary schools, other

than the fact that English language is one of the most widely used languages around the world (Top 100 Languages by Population, n.d.). Also, English is an active second language in many areas of Malaysia society.

1.4.2   Content Scope

Since the project mainly focuses on improving users' grammar and vocabulary skills, a menu list within the application comprises a number of lessons which are named according to the grammar topics to be taught. Certain lessons might be nested with a list of even more specialized lessons. Due to the time constraint of the Final Year Project, only preliminary grammar lessons such as tenses, modals, articles, and prepositions will be included in the system. These lessons are considered essential for every English language learner because by knowing them, an English language learner at the beginning level of his / her learning stage will be able to construct simple and correct English sentences.

For the vocabulary, lyrics will include at least 25% (143 words) of the academic words in Academic Word List (AWL). This is due to the fact that academic words are a set of specialized vocabulary that appears frequently in academic texts, such as textbooks, articles, conference papers, essays, proposals, reports and reviews, which are more specialized and complex. However, a study from Amerrudin et al showed strong evidence that Malaysian secondary school syllabi include less than 20% of AWL in the books (Manan, Ali and Shansudin, 2013). Yet, these syllabi possess a high level of influence on tertiary education, especially since university or college students are regularly exposed to academic texts. Explanations and examples will be provided for academic words which only appear occasionally, and are deemed difficult for users to understand.

1.4.3 Song Selection Criteria

The selection of tracks for inclusion in the application is based on the following criteria. (See **Section 2.3** for the review on this topic)

1. **Contemporary popular songs**

   Songs which are of popular genres such as Pop, Hip-hop, Blues, Rock, Electronic and Country are taken into account for inclusion in the application. Contemporary songs which are current and recent should be the ones released within five years so that the application can appeal to the target audience.

   Besides, Billboard charts are also referenced since they serve as a guide in the English popular music industry by tracking and tabulating the popularity of songs and albums on a weekly basis, regardless of genre.

2. **Language level-appropriate lyrics**

   Although annotations and interpretation will be provided for certain parts of the lyrics, the lyrical depth should be suitable to the language levels of users to permit easy understanding of the meaning of songs. Also, they must be heard obviously and stand out from the background musical instruments, and sung at a moderate tempo.

3. **Repetition in lyrics**

   A song's chorus section is usually where repetition is noticed. This part is regarded as lyrical hook since it makes the song memorable and catchy to the users, hence "catching" their ears.

4. **Songs with non-negative messages**

   English songs with negative or non-constructive themes such as those with partying, drinking, suicides, or even sexually suggestive lyrics should not be

incorporated into the lesson content of the system. More preferably, if possible, the songs should carry an uplifting tone with aspiring theme which is able to inspire users and instill optimistic thoughts onto them.

1.4.4   Media Elements

The use of multiple media elements within the application makes it a multimedia application. Media elements that will be used in the application include the following.

1. **Text**

   - Lyrics, which are shown on the screen in parallel with the playback progress of songs.
   - Content of lessons, assessment sessions, annotations and interpretation of lyrics, basic information of songs.

2. **Audio**

   - Songs, when users double click on a song to play after they have selected a lesson.

3. **Pictures**

   - *Cover art*[1] of songs, if available, will be displayed on the application interface.

Animation and video will not be utilized, since for now, the project only aims to allow users to learn English through the song lyrics while listening to the music.

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[1] *Cover art*: The artwork or photograph created for a music album or a song.

1.4.5   Modules Covered

1. Main menu
   - Help
   - Credits
2. Lesson and song selection
3. Lesson content
4. Song playback
   - Display of cover art, song name, artist, album
   - Audio navigation (play, pause, fast forward, rewind, repeat)
   - Lyrics
   - Explanations for highlighted words or phrases

5. Quiz
   - Q & A
   - Results

1.4.6 Conceptual Model

Design and Development of a Multimedia Application for Learning English through Lyrics

Objectives
- To help users learn English grammar and vocabulary skills in a convenient and creative approach
- To promote SDL process
- To include at least 25% of words in AWL

Target User
- Secondary & tertiary education students
- ESL learners

Interactivity & Navigation
- Learner-centered environment
- Response through application

Teaching Strategies
- Grammar lessons
- Lyrics with explanations
- Vocabulary explanations
- Quizzes

Media Elements
- Text
- Audio
- Picture

Main Learning Modules
- Main menu
- Lesson & song selection
- Lesson content
- Song playback
- Quiz

Learning Theories
- Cognitive flexibility theory
- Elaboration theory
- Multimedia learning theory

Figure 1.1: Conceptual Model of "Design & Development of a Multimedia Application for Learning English through Lyrics"

1.4.7   Functional Requirements

- Allow users to select the lessons
- Allow users to select the songs available within a lesson
- Play songs immediately after users tap on them
- Display lyrics during song playback
- Play, Pause, Fast Forward, Rewind, and Repeat buttons are available during song playback
- Display lesson content (explanations and / or examples)
- Display exercise for users to answer
- Display the user score for the exercise
- Provide help at Home Page to let users know how to use the system
- Provide background information at Credits
- Display cover art during song playback
- Display correct and wrong answers in different styles using colours and / or symbols after users submit their answers for the exercise

1.4.8   Non-functional Requirements

- The audio should have the quality of at least 128 kbps.
- The system should be easy to learn and use.
- The graphical user interface should be consistent and clean
- The font styles, sizes, and alignments must be consistent
- The users should be able to always know where they are when navigating the system
- The system should not take more than 2 seconds to have some response or displays to the users

CHAPTER 2

LITERATURE REVIEW

2.1   English Language Assessment Methods

The following 3 language assessment methods (CEFR, ACTFL, and ILR) are considered since they are frameworks that assess a person's language proficiency level, and they are applicable to all languages. Meanwhile, some other popular assessment methods such as Test of English as a Foreign Language (TOEFL) and Cambridge English Language Assessment are not taken into account because they are more oriented towards assessments of ELPL only. Therefore, the incapability of these 2 English language tests to cater to other languages limits the future development of the project.

2.1.1   Common European Framework of Reference for Languages (CEFR)

CEFR is a language framework that defines what learners of foreign languages is capable of at different stages of learning, and is for appraising outcomes in an internationally comparable style. It was developed by International Working Party and Smaller Authoring Group after a suggestion during an Intergovernmental Symposium held by Swiss Federal Authorities. Since Europe is a multi-ethnic, multi-language and multi-national continent, a common framework for languages was in need to develop the acknowledgement of qualifications and assist teachers to collaborate, ultimately bringing progressed communication and cooperation among language teachers across Europe.

Due to the concrete description and understandably distinct capability framework for language skills, CEFR not only has great influence on the language education of Europe, but is also increasingly used by other countries as a reference instrument for proficiency levels of many different languages (Council of Europe, n.d.).

Furthermore, many well-known language proficiency assessments such as TOEFL, Test of English for International Communication (TOIEC), Test Deutsch als Fremdsprache (TestDaF), and Cambridge Main Suite have provided studies to show their mapping relations with CEFR (Tannenbaum & Wylie, 2006; Kecker & Eckes, 2007; Khalifa & Ffrench, 2008).

All this information indicates that CEFR has gained widespread acceptance around the globe, and it asserts a certain degree of influence on language proficiency assessments.
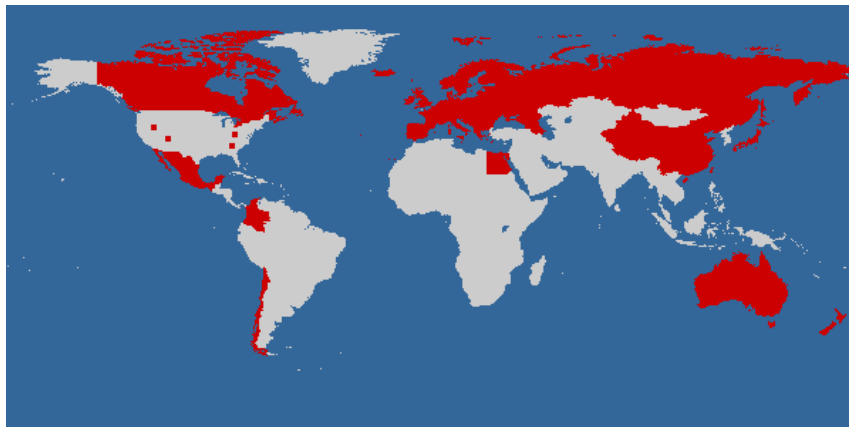
Figure 2.2: A map indicating the Influence of CEFR across the Globe
(Global English Test, n.d.)

Even so, CEFR is not without its disadvantages. For example, CEFR fails to provide any specific guidance as to the topics that might be more or less suitable at any level of language ability or define text difficulty in term of text length, content, lexical, and syntactic complexity (Weir, 2005: 292). Besides, Alderson et al. (2004: 13) state that complications take place in interpreting CEFR due to the fact that it

"does not contain any guidance, even at a general level, of what might be simple in terms of structure, lexis, or any other linguistic level".

Table 2.1: CEFR Levels

(Council of Europe, 2001)

Level group name	Level	Level name
Proficient user	C2	Mastery
	C1	Effective operational proficiency
Independent user	B2	Vantage
	B1	Threshold
Basic user	A2	Waystage
	A1	Breakthrough

See **Appendix A** for more detailed information about the CEFR Levels and their respective criteria.

2.1.2 American Council on the Teaching of Foreign Languages (ACTFL) Proficiency Guidelines

ACTFL Proficiency Guidelines focuses on the development and growth of the education of all languages at all stages of instruction (American Council on the Teaching of Foreign Languages, n.d. a). They describe the ability of a learner to use a language practically in real life, instead of the plain knowledge of the learner. According to Swender (2012), the guidelines are derived from Interagency Language Roundtable (ILR), which is another language assessment method that is reviewed later at **Subsection 2.1.3**.

The growth of ACTFL Guidelines has brought about high positive influence which has contributions in research and education. For instance, these guidelines are instrumental in the studies of the test validity and examinations of certain tasks on *Oral Proficiency Interview (OPI)*[2] (Kenyon and Tschirner, 2000; Kasper and Ross, 2007), and studies of the discourse created by OPIs and associated assessments (Lazaraton, 1997; Ross, 1992, 2007). Interestingly, through these studies, it is found that there is a strong correlationship between ACTFL guidelines and OPIs.

Yet, ACTFL Guidelines have received criticisms over its validity, or the lack thereof. Fulcher (1996) opines that "intuitive judgements" are the foundation for the construction of the entire guidelines, instead of using formal collection of documentation and analysis of "empirical evidence". Other than that, numerous studies which analysed the performance of learners using the guidelines (Thompson, 1995; Henry, 1996) fail to show that there is support in writing and listening skills for the level hierarchy which ACTFL theorizes. Also, there is concern on the definition of proficiency levels since the ACTFL Guidelines basically assess the language proficiency level of a non-native speaker the same way as how a native speaker would be assessed (Breiner-Sanders et al., 1999).

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[2] *Oral Proficiency Interview (OPI)*: A standardized, global assessment of functional speaking ability
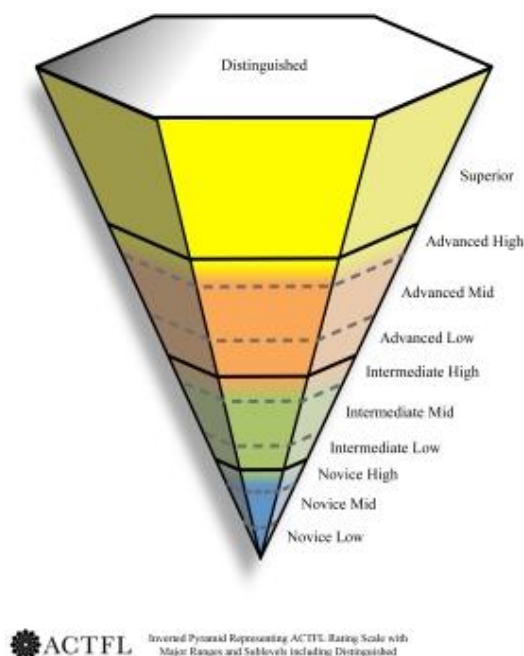
Figure 2.2: ACTFL Rating Scale

(American Council on the Teaching of Foreign Languages, n.d. b)

See **Appendix B** for more detailed information about the ACTFL Levels and their respective criteria.

To facilitate the reading process, below are the abbreviations which are used to describe ACTFL levels.

Table 2.2: ACTFL Levels Abbreviations

	Low (L)	Mid (M)	High (H)
Novice (N)	NL	NM	NH
Intermediate (I)	IL	IM	IH
Advanced (A)	AL	AM	AH
Superior (S)	-		
Distinguished (D)	-		

2.1.3   Interagency Language Roundtable (ILR) Scale

ILR is an unfunded federal organization which consists of numerous United States Federal Government agencies. Its aim is to coordinate as well as share information on foreign language events at the federal level. It serves as a path for different federal agencies that participate to keep updated on the contemporary approaches and technology related to the education, application, and further relevant matters of language (Interagency Language Roundtable, n.d. a).

According to the official website of ILR, ILR scale is a standard scale developed by ILR to evaluate the language proficiency. It describes a person's communication ability in a particular language. There are altogether 11 possible grades (See **Table 2.3**), and different grades may be assigned to an individual based on his / her skills on speaking, writing, reading, listening and many more skills (Interagency Language Roundtable, n.d. a).

Nonetheless, ILR is not based on any specific language learning theory. Omaggio-Hadley (1993: 13) states that the emergence of ILR is the consequence of the "perceived needs of practitioners in both government and academic settings" who wished to change the learning process of languages. Moreover, ILR is frequently criticized for "using the norm of educated native speaker as the ultimate criterion for mastery". (Vandergrift, 2006: 54) Vandergrift (2006) further explains that effectiveness of ILR is insufficient for schools and education institutions where language subjects seldom develop the skills of language learners to the level of "educated native speaker". Thus, the flexibility and openness of the language assessment method is reduced, making it not comprehensive enough for other authorities to integrate or connect their frameworks to it.

Table 2.3: ILR Levels

(Interagency Language Roundtable, n.d. b)

ILR Level	Level Name
0	No proficiency
0+	Memorized proficiency
1	Elementary proficiency
1+	Elementary proficiency, plus
2	Limited working proficiency
2+	Limited working proficiency, plus
3	General professional proficiency
3+	General professional proficiency, plus
4	Advanced professional proficiency
4+	Advanced professional proficiency, plus
5	Functionally native proficiency

See **Appendix C** for more detailed information about the ILR Levels and their respective criteria

2.1.4　A Summary of the Reviewed English Language Assessment Methods

Table 2.4: A summary of the Strengths and Weaknesses of the Reviewed English Language Assessment Methods

(Vandergrift, 2006)

Criterion	CEFR	ACTFL	ILR
Theoretically grounded		✓	✓
Empirically validated		✗	✗
Face validity		✓	✓
Transparent and user-friendly	✓	✗	
Context-free / Content relevant			
Comprehensive			✗
Flexible and open		✓	
Sufficiently discriminating of levels at lower end of framework	✗		

2.1.5　Implication of the Study

The literature review of the three English language assessment methods allowed the author to understand how English language is formally evaluated, and the pros and cons of each assessment method. Therefore, the general idea of how to provide appropriate lesson content and assessment for the system has been gained, and will be kept in mind when implementing the materials.

2.2   Learning Methods

For the following 4 learning methods, many different authors have delivered a wide range of different definitions. So, a more generally acceptable and applicable meaning for each learning method is presented after reviewing the work of others. At the end of this section (See **Section 2.2.5**), the learning methods utilized for the Final Year Project are stated.

2.2.1   Self-Directed Learning (SDL)

Self-directed learning (abbreviated as SDL) (or autodictaticism) may seem self-explanatory, and most people would likely make the assumption that they understand what it means and represents. Yet, rather than having a constant, acknowledged definition, the term has always been interpreted in numerous ways by several individuals. Brookfield (1984) mentions that such a learning concept was first brought up as early as 1926. The definition of SDL not only differs with different authors, but also over time with the same author(s) (Brockett and Hiemstra, 1991). Candy (1988) found that a minimum of 30 separate terms are interchangeably used with SDL, while Gerstner (1992) discovered 20 terms. Knowles (1975) provides a general definition of SDL as the following.

> "In its broadest meaning, "self-directed learning" describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." (Knowles, 1975: 18)

The topic on whether SDL is an individual process or is associated with others is debatable. It has been referred to as a person's ability to learn independently or alone (Knowles, 1975: 17; Adekanmbi, 1990: 181; Brockett and Hiemstra, 1991: 24). On the other hand, some hold the opinion that SDL involves contact with others

and should not be a solitarily isolated activity (Boud, 1981: 25; Adeola, 2006; Garrison, 1992: 146).

In short, it can be summarized that SDL heavily involves learning on one's own, with or without seeking guidance and instructions from others when needed.

Many authors have stated the benefits of SDL. For example, more awareness on the responsibility of rendering meaningful learning process is more easily demonstrated by learners who adopt SDL approach (Garrison, 1997). With appropriate preparation and application, SDL is able to inspire learners to foster their individual rules and leadership patterns (Morrow et al., 1993). It also increases the effectiveness and social being-ness of the learners (Guthrie et al., 1996). Furthermore, these learners tend to be "motivated and persistent, independent, self-disciplined, self-confident, and goal-oriented" (Taylor, 1995: 3). Not only that, those who practice SDL are not bound by the type of information or knowledge they wish to learn. For instance, a study on the learning of "novel perceptual categories" by Markant and Gureckis (2010) noticed that when compared to participants who did not apply SDL, self-directed learners or participants achieved higher performance level due to their freedom and liberty to refer to different exemplars. The study's analysis deduced that SDL process allows them to absorb information in a more rapid way by saving time from reading redundant materials.

Anyhow, SDL has also been opposed by a number of authors. As observed by Atkinson (1972), self-directed learners are not certainly effective in the process of decision making. This observation was further proven by the fact that, during the learning process, the selection of new information is regularly based on the learners' biases (Shov and Sherman, 1986; Wason, 1960), such as when choosing between 2 different types of information to learn, in which one confirms their current beliefs, while the other one does not.

Thus, SDL process should be applied discretely, and self-directed learners are not encouraged to solely rely on single-sided information which is one-dimensional. From time to time, they should seek guidance from those with more experience or

expertise on subject matter related to what they are learning to. This is to ensure that they do not deviate from the correct knowledge or information.

2.2.2   Distance Learning

Distance learning, or distance education, has been expressed by several authors using different definitions. Moore (1990) identifies distance learning as the distribution of study materials in print and electronic form. The distribution of materials involves a tutor and a learner who are at different locations, and probably even during different times. According to Dede (1996), such a learning method utilizes both "emerging media and associated experiences" in order to foster learning chances. The term is also used to emphasize on place and time, which are the limitations linked with distance (Guilar and Loring, 2008). It later went on to outline several learning methods, including E-learning (See **Subsection 2.2.3**), and many others such as online learning web-based learning, and virtual learning (Conrad, 2006).

Therefore, it can be summarized that distance learning is the supply of knowledge to those who are physically distant from the source of provision, using a wide range of materials.

Distance learning makes it possible for those who are not able to attend typical classroom lessons to have the chance to undergo education, such as those with disabilities, those living in rural areas with very limited education opportunities, or those with distance or time constraints (McNaughton, 2001). This view is supported by Raymond (2000) who states that some people who hope to enroll into tertiary education institutions may have responsibilities on work or family.

2.2.3   E-Learning

E-learning, as defined by Nichols (2003), is only accessible using web-based technological tools. However, Benson et al. (2002) are not in favor of this view, stating that besides the study content and materials which are distributed through CD-ROM or the web, e-learning also incorporates audio, video, satellite broadcast and interactive TV. Characterized by its use of technology, not only is e-learning procedural, throughout the process of constructing knowledge, it demonstrates how a person's experience transforms into his / her knowledge as well (Tavangarian et al., 2004). In addition, some other authors consider a certain degree of interactivity to be incorporated so that the learning experience can accurately be described using the definition (Ellis, 2004; Triacca et al., 2004). Even with so many definitions provided by several authors, the specification of the types of technology to be used still remains ambiguous. Only some vague idea or reference is implied, such as distance learning, web-based learning and online learning (Dringus and Cohen, 2005; Khan, 2001; Triacca et al., 2004).

The meaning of e-learning, in all aspects, can be summed up by saying that it involves the use of some technological tools in the learning process.

In e-learning, the average learning duration is lowered to 40 to 60 per cent. (Hall, 1997) It provides better integration for students, especially those who are taking part-time classes at higher education (Ahmad, 2010). Not only that, Dalsgaards (2006) mentions that e-learning facilitates the chemistry between teachers and students since their relationships are brought closer and their interaction becomes more rapid. He also states that, with the help of technological tools, learners are motivated to solve problems independently.

2.2.4   M-Learning

M-learning (or mobile learning), as expressed by Chia et al. (2011), is any activity in which a learner's productivity is increased when "consuming, interacting with, or creating information mediated through" a mobile device which has stable connectivity. Another definition of such a learning method is the learning that takes place when a learner utilizes mobile technologies (O'Malley, C. et al., 2003). Crompton (2013) describes it as the learning process which involves mobile devices in many contexts via social and content interactions.

In summation, M-learning can be regarded as the process of learning through the use of mobile devices.

M-learning provides an on-going learning process, which can occur at many different places (Saye and Brush, 2002). This statement is supported by Crescente and Lee (2011), who explain that mobile devices let people learn without being limited by time and place. Ally (2009) thinks that it has the potential of accessing those who live in rural areas where schools, teachers, or libraries are lacking. Other than that, text, pictures, audio, and video files can be downloaded onto or uploaded from the device (Elias, 2011), which increases the choices of "multimedia content delivery and creation". Elias (2011) also mentions that the portability of mobile devices also simplifies the sharing of information. M-learning also enables one-to-one learning process with accordance to the learner's education background (Kim, Mims and Holmes, 2006).

2.2.5   Implication of the Study

After reviewing the above four learning methods, the concepts and styles of all learning methods will be applied to the Final Year Project.

The project application, which will be a learning based mobile application, clearly employs M-learning, since users use the app on a mobile platform only. E-learning and distance learning are also involved because M-learning is essentially a form of E-learning distance education which allows its learners to use mobile devices for education purposes wherever and whenever.

Moreover, since the users only learn through the mobile app, they rarely seek help from others during the learning process. Hence, SDL exists within the context as well.

2.3 **Song and Lyrics Selection**

2.3.1 **Song Properties and Lyrical Content**

Songs which are of popular genres such as Pop, Hip-hop, Blues, Rock, Electronic and Country are considered because they generally have the following characteristics.

- appeal to a universal audience, instead of to a specific sub-culture or ideology (Frith, Straw and Street, 2001)
- tend to reflect current trends instead of "progressive developments" (Warner, 2003)
- consistent and noticeable rhythmic element, a mainstream style and a simple traditional structure (Everett, 1999)
- focus on melodies and catchy hooks, and a chorus that contrasts melodically, rhythmically and harmonically with the verse (Shepherd, 2003)
- simple beat and melodies with limited harmonic accompaniment (Kramarz, 2007)

A study by Beasley and Chuang (2008) established that lyrics with appropriate language level, repetition, and positive message also have strong impact on the learners' level of learning outcome.

Thus, these criteria are considered during the selection of English songs to be included in the proposed system.

2.3.2   English Informal Contractions

According to Roberts R. et al. (2005), a contraction, in grammar, is an abbreviated form of the "written and spoken forms of a word, syllable, or word group", produced by exclusion of internal letters, or sounds specifically.

As widely known, English formal contractions such as I'm, (I am), he's (he is), we'd (we had / we would), they'll (they will) are taught since primary education, and they are used when speaking and when writing in casual situations. Meanwhile, English informal contractions, which are not taught during class in Malaysia, are also often used in casual daily conversations, particularly in English speaking countries such as America and British. Thus, these contractions are also applied in many song lyrics.

To facilitate understanding of the meaning of song lyrics, a list of informal contractions (See **Table 2.5**) is compiled through the use of dictionaries, careful personal observation, and consultation with Dr. Swagata Sinha Roy, an assistant professor at Universiti Tunku Abdul Rahman (UTAR) whose expertise lies in the field of language literature, and has related work on teaching English language through music and films.

Table 2.4: English Informal Contractions

Formal form	Informal form	Examples	
		Formal	**Informal**
Want to / Want a	Wanna	I want to go home.	I wanna go home.
		I want a cup of coffee.	I wanna cup of coffee.
Have got a / Have to / Got to	Gotta	I have got a pen.	I've gotta pen.
		I have got to go now. / I've got to go now.	I gotta go now.
Going to	Gonna	I am not going to tell you.	I'm not gonna tell you.
Out of	Outta	He appeared out of nowhere.	He appeared outta nowhere.
Am not, is not, are not, has not, have not, do not, does not, did not	Ain't	I ain't sure.	I am not sure.
		You are not my boss.	You ain't my boss.
		She has not finished yet.	She ain't finished yet.
		We are not taking anything for granted.	We ain't taking nothing for granted.
I am going to	Imma	I am going to sleep for a while.	Imma rest for a while.
You	Ya	I want to tell you something.	I wanna tell ya something.
Them	'em	The results make them happy.	The results make 'em happy.
What are you	Whatcha	What are you going to do?	Whatchagonna do?
Give me	Gimme	Can you give me a hand?	Can you gimme a hand?
Let me	Lemme	Let me know if you are interested.	Lemme know if you're interested.
Kind of	Kinda	The class was kind of boring.	The class was kinda boring.
Come on	C'mon	Come on, we are leaving.	C'mon, we're leaving.

2.4   Similar Existing Systems

2.4.1   LearnEnglish Audio & Video

Instead of just a single end-product, LearnEnglish Audio & Video is one of the many mobile applications in a series named LearnEnglish (http://learnenglish.britishcouncil.org/en/apps) developed by British Council, a British organization specializing in international educational and cultural opportunities. The series of applications, LearnEnglish, is compatible across a wide range of platforms, including Apple iOS, Google Android, and Windows Phone. Different applications are suitable for different age groups, thus children, teenagers, and even adults can find the applications that fit them. Due to the fact that LearnEnglish contains an array of applications, each application is able to focus on a specific topic or aspect, and for a specific age group or proficiency level. However, some of them are not free of charge, and users must pay a purchase fee in order to download and install them in their devices. As a result, this may deter learners from using these paid applications.

One of the LearnEnglish applications, **LearnEnglish Audio & Video**, is similar to the proposed application of this project. Thus, detailed description and review is provided for the application.

LearnEnglish Audio & Video contains *podcasts*[3] and videos which are also available on the LearnEnglish website, and also audio script that users can navigate to jump to a particular section or listen again. Dialogues are shown on the screen when characters in the videos are having conversation. The following are the features available in the application.

---

[3] *Podcast*: A digital audio file made available on the Internet for downloading to a computer or portable media player, typically available as a series, new installments of which can be received by subscribers automatically. (Oxford Dictionaries, n.d.)

- **Built-in glossary**, which provides explanation of certain words.

- **Comprehension exercises**, which tests how much users understand about particular episodes.

- **Pitch control**, which slows down the audio if users find it too fast to keep up with.

- **Landscape video mode**, which changes the screen orientation of a user's device during video playback.
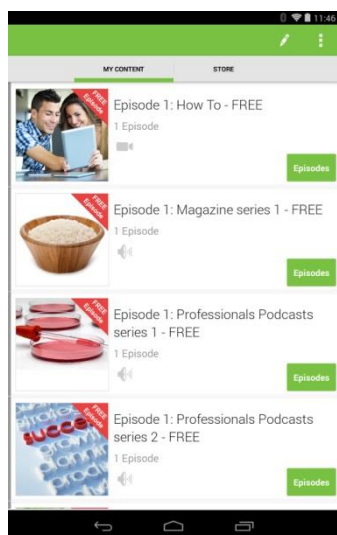
Figure 2.3: List of Episodes   **Figure 2.4: Video Brief Description**

Figure 2.5: Video Playback with Dialogues
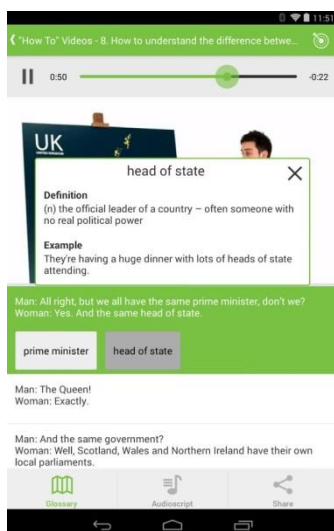
Figure 2.6: Built-in Glossary

Figure 2.7: Exercise

Figure 2.8: Video Landscape Mode

Users have great ease using LearnEnglish Audio & Video because users are able to exercise a high degree of navigation during playback of audio and video by jumping from one section of an audio or a video to another, and skipping backward or forward from one episode to another. The video and audio files are of high quality. Therefore, users can listen to the pronunciation of each word in the dialogues unambiguously with clear and smooth graphics of videos. The features which are similar to the ones in the proposed application include built-in glossary and exercises after each lesson. Meanwhile, LearnEnglish Audio & Video includes teaching materials mostly from daily conversation, whereas the proposed application of the Final Year Project incorporates song lyrics as the teaching medium. In addition, the application is deemed better than the proposed application in the sense that it not

only plays audio, but also video. Nonetheless, the project is explicitly focused on learning through song lyrics, which is why video is a less significant media element for it.

2.4.2 Genius

Genius (http://genius.com/) is an online knowledge base which lets users provide annotations and interpretation of articles such as song lyrics, new stories, primary source documents, poetry, and other forms of text. Certain lines of an article on the website are highlighted in grey, which are clickable. When these lines are clicked, detailed descriptions such as the explanation, background information and inspiration behind the words pop up as annotations, sometimes accompanied with images to better illustrate the meaning.
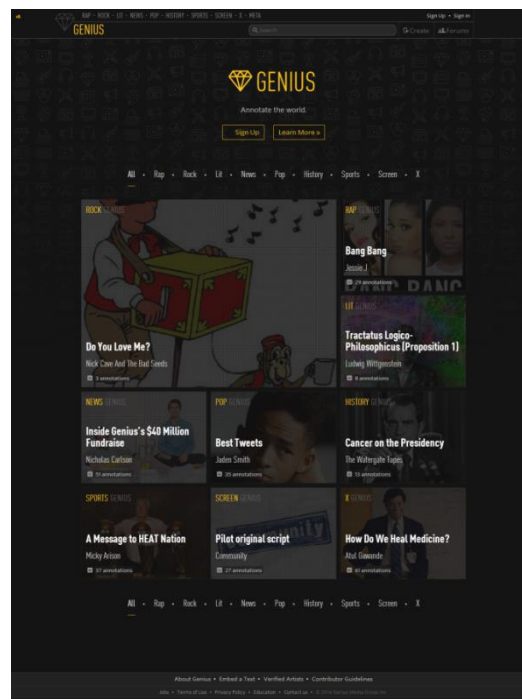
Figure 2.9: Genius Main Page

Figure 2.10: Song Lyrics with Annotations and Interpretations

The website is similar to the proposed application in the way that it shows annotations and interpretation of certain lines of lyrics, and it also provides some detailed descriptions where suitable and possible. However, Genius does not provide any sort of English language grammar lessons and vocabulary teaching material.

In addition, there is an iPhone version of Genius available on iTunes. The only difference between the web version and the mobile app version is that the latter has the extra functionality of a simple music player that allows users to listen to songs at the same time.

2.4.3 Learn to Speak English ESL

The website (http://www.learn-to-speak-english-esl.com/learn-english-free-lessons.html) contains 131 songs, all of which are available through embedded YouTube videos. These songs are presented in the form of lyric videos, which also contain some explanations and pictures as illustration.

Figure 2.11: A list of Songs with Corresponding Lessons

Figure 2.12: Video Playback

But, the amount of text (other than the lyrics) and pictures shown on the screen may often lead to information overload, and also confusion as to which part of information on-screen users should focus on.

Other than that, although each song has a work sheet or an exercise in the form of Microsoft Word document available for download, no assessment of users' language level on a particular lesson is given. Most of the songs off the website were released at least a decade and a half ago, with the latest release being Believe by Cher in 1998. Hence, the website might not appeal to most secondary and tertiary education learners since they are teenagers or young adults who frequently listen to pop songs of 2000s and 2010s.

2.4.4   ESOL Courses - Free English Lessons Online

The website (http://www.esolcourses.com/topics/learn-english-with-songs.html) provides free interactive listening lessons, reading exercises, quizzes, and games for users to practice their English. All of these are divided into multiple levels, different language components, and even specific contexts. Levels include beginner, elementary, and pre-intermediate. Language components unarguably consist of reading, listening, writing, and speaking, while grammar and vocabulary lessons are also available. Meanwhile, specific contexts include English for work, and Life in the U.K. Several games and quizzes are also found on the website. For the purpose of the project, only "Song Quizzes" section is reviewed since it is the most relevant category of all on ESOL Courses.
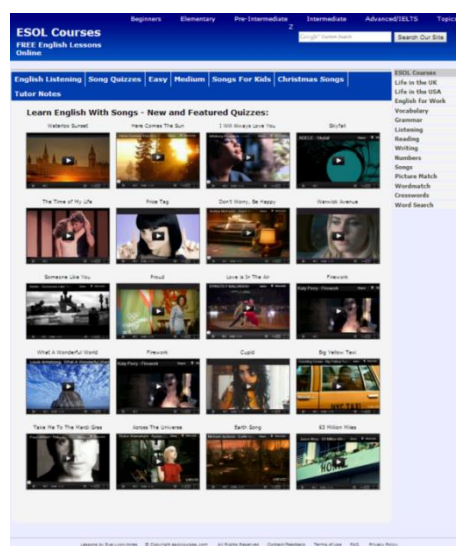
Figure 2.13 ESOL Courses Main Page

Figure 2.14: Video Playback, followed by Gap Filling Exercise

The "Song Quizzes" section contains 20 songs in a matrix form, showing the song names and a thumbnail of respective music videos. Other than these 20 songs on the main page of the section, the tabs on navigation bar allows users to select songs according to easy or medium level, and the tabs also contain songs for children and Christmas songs as well. Each of the songs applies one of the 3 basic types of exercise:

- **Phrase matching**, which allows users to pair 2 groups of words / phrases together following the exact lyrics

- **Multiple-choice questions**, which allows users to choose the correct word(s) among 3 or 4 options for certain lines of the lyrics, usually 9 lines, i.e. 9 questions

- **Gap filling**, which allows users to type in the correct words on the blank spaces in between the lyrics. After completing the exercise, users may check if their answers are correct, and the score will be shown. Only incorrect answers will be removed and reset, prompting users to try answering again.

What is good about the song quizzes of the website is that it offers a variety of exercises and a wide range of song choices, which do not easily let users feel bored and rigid. Nonetheless, the exercises are limited in terms of the scope and depth of language. This is due to the fact that they only require the memory skills of users to remember the lyrics and then answer the questions correctly, without much flexible utilization of language knowledge and skills. The exercises have neither any form of organized teaching lessons, nor proper assessment to evaluate users' language levels after each exercise.

2.4.5 Japanese Online Song-based Courseware

Users are able to learn Japanese language through the use of the courseware (http://conference.pixel-online.net/ICT4LL2012/common/download/Paper_pdf/176-QIL19-FP-Shinzato-ICT2012.pdf), which, similar to the proposed application, utilizes music as the teaching medium. The courseware is composed of 8 units, with generally 2 songs included in each.

Figure 2.15: Table of Contents

Figure 2.16: Unit Page

Figure 2.17: Song Introduction Page

The lyrics annotations and grammar exercises of the courseware is similar to the features to be included in the proposed application. Other than these 2 capabilities, the Japanese courseware also incorporates tasks that act as instructions to assist users in using and learning from it. The 5 tasks (including the same ones as the proposed application) are as follows.

- **Lyrics annotations**
- **Grammar exercises**
- **Listening task**, where users attend to the listening-related tasks, making them to listen carefully to the audio multiple times
- **Discussion and writing**, where questions are provided to prompt in--class discussion and further self-driver research about the song and related topics
- **Listening suggestions**, which encourages users to listen to other songs by the same artists or related songs for comparison

The obvious difference between the Japanese courseware and the proposed application of the Final Year Project is that the former teaches users to learn Japanese language through music, whereas the latter allows users to learn English language. Besides, the proposed application will entirely be in English, while the Japanese courseware is bilingual, using Japanese as well as English throughout itself. Moreover, the courseware also integrates culturally and historically relevant topics and songs to make users aware of Japanese culture and history, which are not taken into account for the proposed application.

2.5　　　　Evaluation of Development Methodologies

3 systems development methodologies are evaluated in order to select the one that best describes how the project is being and will be carried out. **Prototyping**, **waterfall development**, and **extreme programming** are reviewed in this section. To ensure consistent use of terminology, definition, and delivery approach, the evaluation is based solely on the book **Systems Analysis and Design with UML version 2.0: an Object-Oriented Approach** (2012) by Alan Dennis, Barbara Haley Wixom, and David Tegardan.

2.5.1　　　Prototyping from Rapid Application Development (RAD)
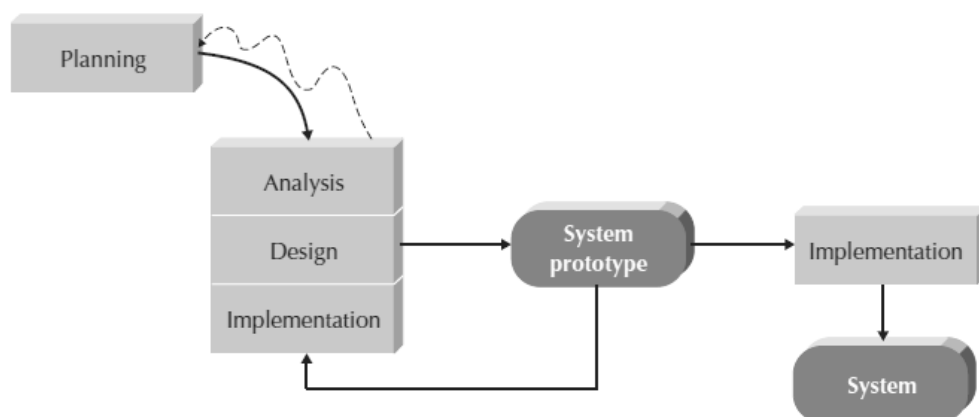
Figure 2.18: Prototyping-based Methodology

Analysis, design, and implementation stages are carried out simultaneously and continuously in a loop until the delivery of the system. Using "quick-and-dirty" approach, the development of the first system prototype starts immediately. It is then shown to stakeholders so that a second prototype can be developed after gathering feedback from them for re-analysis, re-design, and re-implementation. The process lasts until the stakeholders have agreed and accepted the prototype as the new system.

2.5.1.1 Advantages of Prototyping

- Users can interact with a system prototype which was rapidly delivered to them to enhance their understanding of the capability and incapability of it.
- Users are assured of the sizeable progress of the project team from time to time.
- Actual requirements are more rapidly refined.

2.5.1.2 Disadvantages of Prototyping

- Attentive and detailed analysis is rather uneasy to achieve due to the fast-paced system delivery.
- Original design decisions may turn impractical if the major changes occur on the system prototype.

2.5.2 Waterfall Development from Structured Methodology
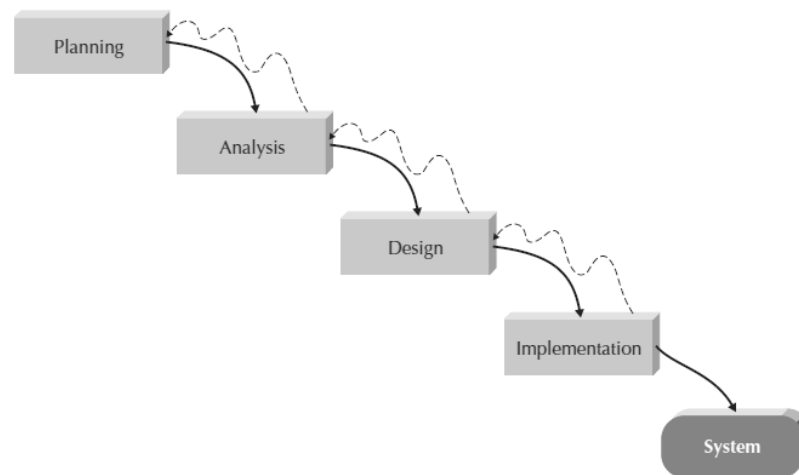
Figure 2.19: Waterfall Development-based Methodology

Waterfall development-based methodology proceeds sequentially from one stage to the next, i.e. one stage concludes and then the next one initiates. The main deliverables for each stage are usually very lengthy in terms of the number of pages (often hundreds of them).

2.5.2.1 Advantages of Waterfall Development

System requirements are identified way ahead of the implementation, and any changes to them are reduced as the project goes on.

2.5.2.2 Disadvantages of Waterfall Development

- Before the implementation, the system design needs to be stated in detail.
- The time taken between the completion of the system proposal and the system delivery is lengthy.
- Crucial requirements may be disregarded due to the lengthy deliverables.

- The changes in business environment requires substantial rework of the already-implemented system.

2.5.3   Extreme Programming (XP) from Agile Development
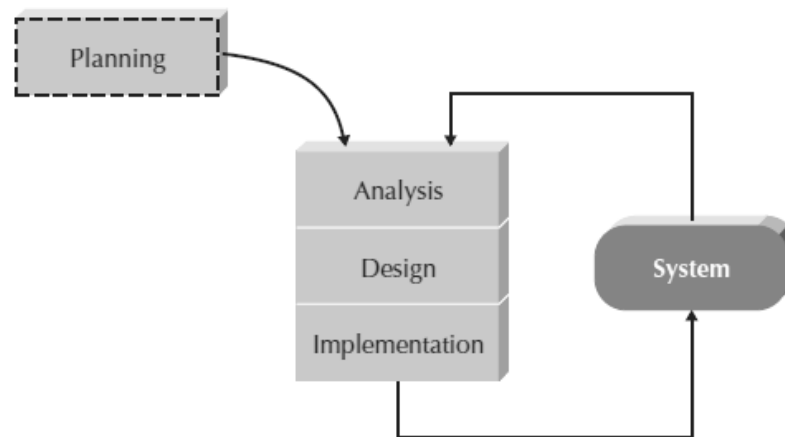
Figure 2.20: Extreme Programming Methodology

Four essential values (communication, simplicity, feedback, and courage) are what the XP is founded on. Meanwhile, continuous testing, simple coding and close interactions with users are the three main principles. The planning stage at the early of the system is performed superficially. Afterwards, similar to the prototype-based methodology, the analysis, design, and implementation stages are carried out simultaneously and continuously in a loop until the delivery of the system. XP greatly depends on refactoring, which is the practice of restructuring system code to simplify it. System requirements obtained from users are used to first develop some simple modules to assess if they satisfy what the users want. Users must help clarify any doubts and concerns for the development of the system. Standards for names, descriptions and coding practices are utilized to reduce confusion.

2.5.3.1   Advantages of Extreme Prototyping

Works well for small projects with highly motivated, cohesive, stable, and experienced teams.

2.5.3.2   Disadvantages of Extreme Prototyping

- Does not work well for large projects or teams.
- Lack of discipline leads to unfocused and chaotic projects.
- Downplays documentation of analysis and design.

2.5.4   Development Methodology Selection Criteria

The following are the factors that affect the selection of development methodology for a project: (Refer to **Table 2.6** for how well each development methodology performs with respect to different factors)

- Clarity of the user requirements
- Familiarity with the base technology
- Complexity of system
- The need for system reliability
- Time pressures
- The need to see progress on the time schedule

Table 2.6 Development Methodology Selection Criteria

Ability to develop systems	RAD methodology	Structured methodology	Agile methodology
	Prototyping	Waterfall	XP
with unclear user requirements	Excellent	Poor	Excellent
with unfamiliar technology	Poor		Poor
that are complex		Good	
that are reliable			Good
with a short time schedule	Excellent	Poor	Excellent
with schedule visibility			Good

2.6   Mobile Operating Systems

Google Android and Apple iOS are the two mobile OSs that are being considered as the platform on which the Final Year Project system will be built upon. This section compares both OSs, and discusses how they differ from each other, in order to decide which one of them is more suitable for the implementation phrase of the project.

2.6.1   License

Android is an open source development platform based on Linux. Apache License governs all the source code, which has lists of reviewed issues that are publicly available for access. Although open source, the trademark of Google Android is not legally available to be used by manufacturers of Android-operated devices until they are certified by Google using CDD (Compatibility Definition Document) (Parabal, 2011).

iOS is closed source, licensed under proprietary EULA (End-user license agreement), which enforces a number of terms, such as the following (Lohmann, 2010).

- **App Store only**: any applications programmed using Apple's SDK may only be publicly distributed through App Store, and Apple has the right to reject an app even though it confirms to each and every single conditions required by Apple.
- **No tinkering with any Apple products**: programmers are prohibited from developing an iOS application that will have the possibility of allowing a person to make any changes to it. This means that no App Store applications

can be open source, which is to eliminate the chance for anyone to perform "*jailbreaking*"[4] on the application or the entire device.

2.6.2   Official Application Store

By 2014, there are roughly 1.45 million apps on **Google Play**, which surpassed App Store for the first time since 2010 (Ariel, 2015) (See **Figure 2.21**). Besides, there are nearly 400k developers distributing their apps on Google Play (See Figure 2.22).

Google Play, charges its developers a one-time fee of USD $25, after which the developers may upload their Android apps (Google Play Developer Help, n.d. a). Once a user buys an app on Google Play, 70% of the sales revenue goes to the developer, while the remaining 30% is for "distribution partner and operating fees" (Google Play Developer Help, n.d. b) .

App Store hosts over 1.21 million apps, all of which are available for iPhone, iPad, iPod Touch, or all of them (Ariel, 2015) (See **Figure 2.21**). Over 270k developers are contributing to the development of iOS apps (See **Figure 2.22**).

App Store charges each developer USD $99 per year before they are allowed to distribute their iOS apps (Apple Inc., n.d. a). Similar to Google Play, developers on App Store also receive 70% of the app price (Apple Inc., n.d. b).

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[4] *Jailbreaking*: The process of eliminating restrictions on an iOS-operated device to obtain root access to iOS file system and manager.
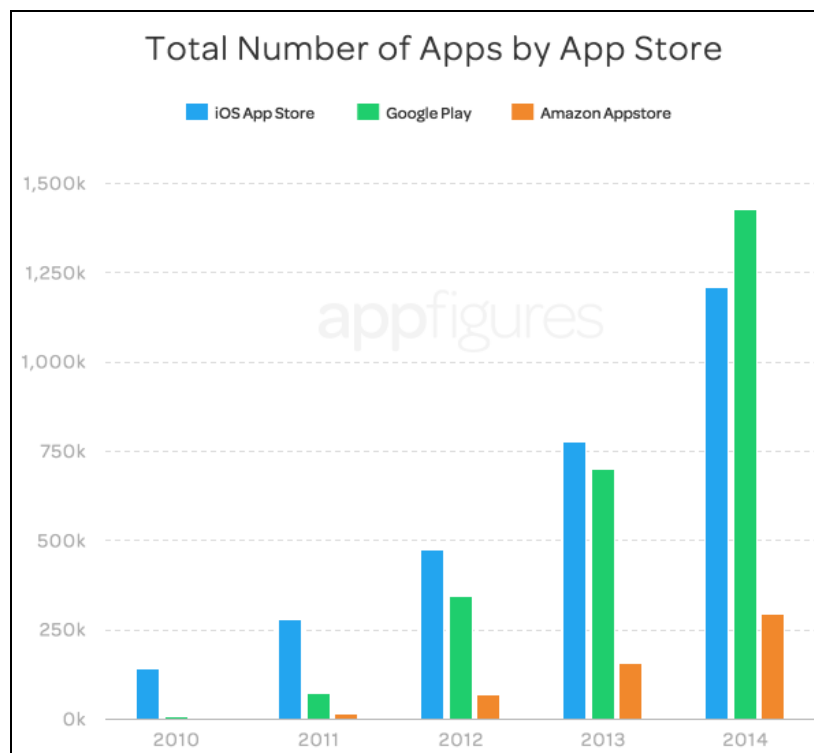
Figure 2.21: Total Number of Apps by various App Stores 2010 - 2014
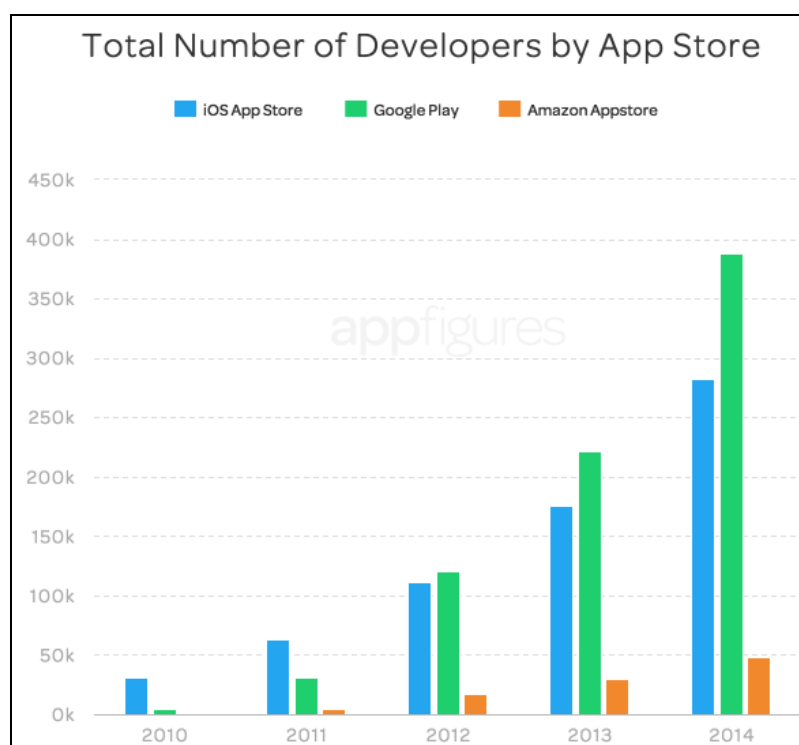
(Ariel, 2015)

Figure 2.22: Total Number of Developers by various App Stores 2010 - 2014

(Ariel, 2015)

2.6.3 Software Upgrades

Android updates are made available to users every six to nine months, roughly twice a year (Isaac, 2011). However, except for Nexus devices, all updates on users' Android-operated devices usually reach after several months from the official release time. Part of the reason behind this delay is the wide range of hardware components of Android mobile devices, which is a time and resource consuming process that requires specific tailor on each of the devices (Cunningham, 2012). As a result, Android devices which were released a longer time ago might only be able to be updated to a certain maximum version, even if the particular devices are in fact able to cope with the update features, because manufacturers often prioritize their update effort on latest devices. This led to widespread criticisms by consumers due to the often short-lived after-sale support (Gillmor, 2012).

Apple practices an annual update cycle for each major iOS version (Ackerman, 2014). Each update is usually offered to all iOS-operated devices, except for truly older models where some hardware aspects might cause issues on the device performance and operation (Raphael, 2013). Nonetheless, the system update support that iOS provides is still considered persistent and long-lasting, especially when compared to Android where its devices mostly only get updates during their first 2 years after release (See **Figure 2.23**) (krfraj, 2013).
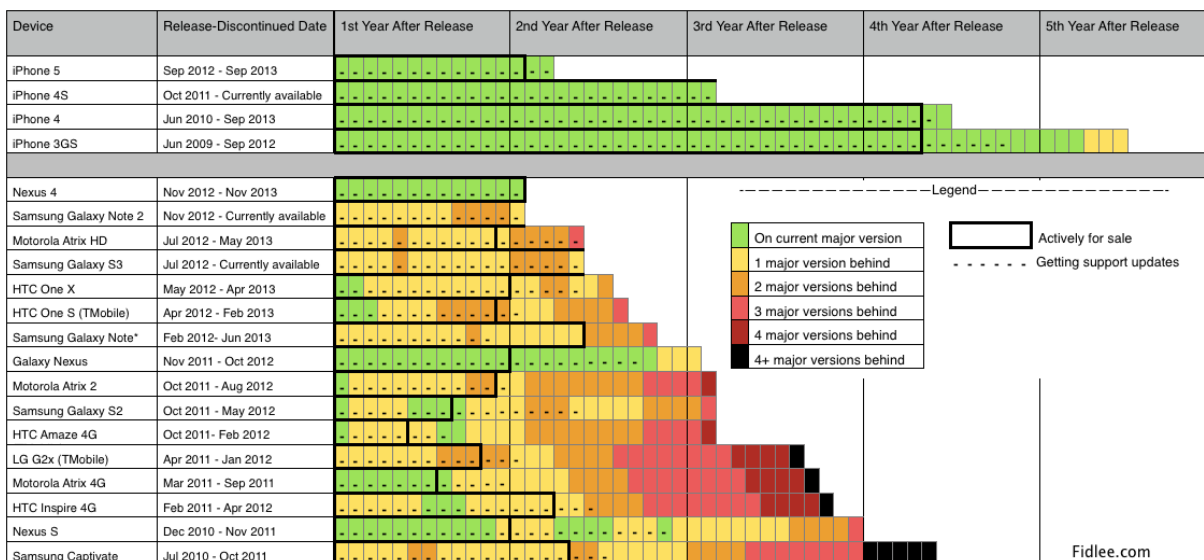
Figure 2.23: Android versus iOS Software Update Support with respect to Year after Release

2.6.4 Market Share

According to a research that captured mobile OS usage percentage record as latest as September 2014 (International Data Corporation (IDC), 2014), a total of 335 million units of smartphone shipments were achieved by the end of the third quarter (Q3) of 2014. The data (See **Figure 2.24** and **Table 2.7**) shows that Android dominates the market share with an astonishing 84.4% shipments; iOS holds 11.7% shipments, while the rest of the share is made up of Windows Phone, BlackBerry OS, etc.
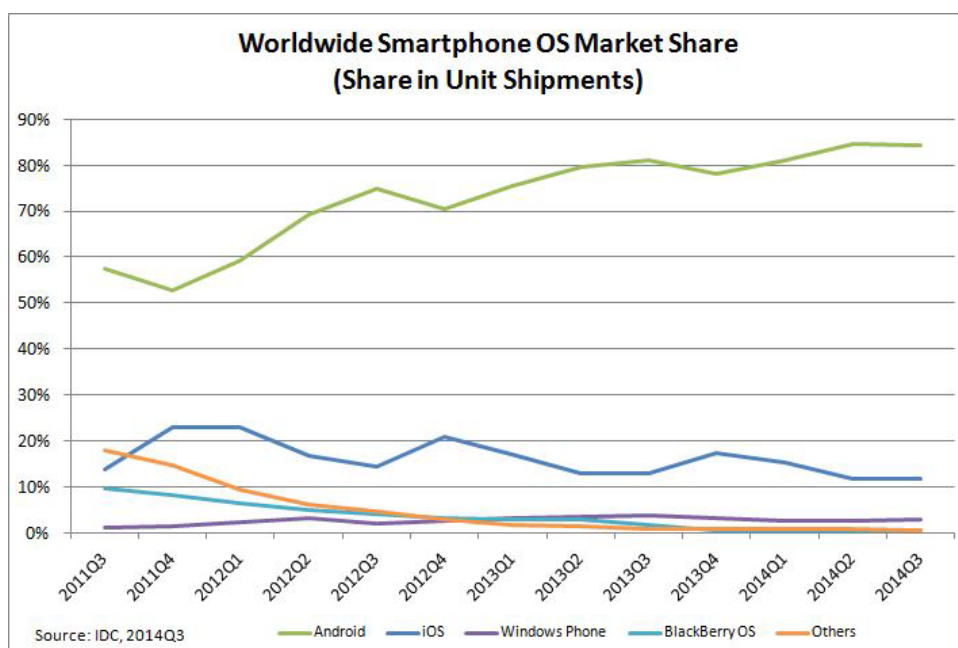
Figure 2.24: Worldwide Smartphone OS Market Share by Q3 2011 - Q3 2014

(International Data Corporation (IDC), 2014)

Table 2.7: Wordwide Smartphone OS Market Share Q3 2011 - Q3 2014

(International Data Corporation (IDC), 2014)

Period	Android	iOS	Windows Phone	BlackBerry OS	Others
Q3 2014	*84.4%*	*11.7%*	2.9%	0.5%	0.6%
Q3 2013	81.2%	12.8%	3.6%	1.7%	0.6%
Q3 2012	74.9%	14.4%	2.0%	4.1%	4.5%
Q3 2011	57.4%	13.8%	1.2%	9.6%	18.0%

Locally speaking, by March 2014, Android leads the Malaysian market with 65%, while 13% of smartphone users possess an iOS phone (i.e. an iPhone). (See **Figure 2.25**)
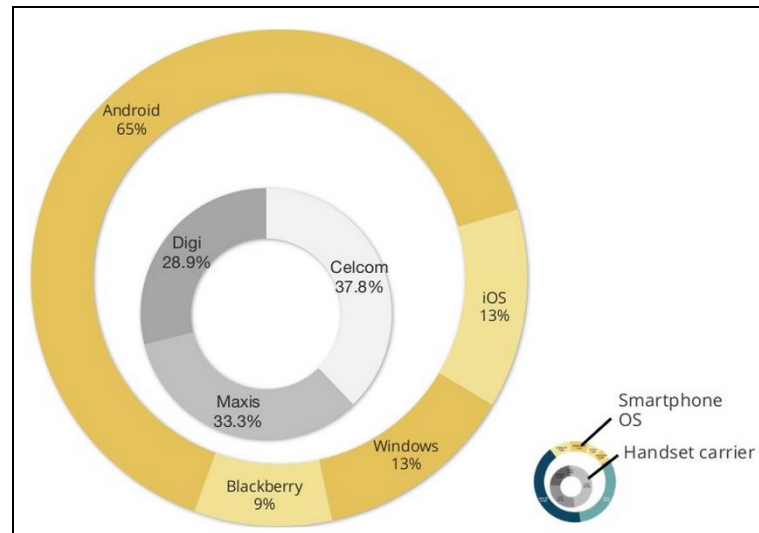
Figure 2.25: Smartphone Market Share in Malaysia by Q1 2014

(Wong, 2014)

2.6.5 Choice of Mobile Operating System

After reviewing various aspects of Android and iOS, the former is selected as the mobile OS that the project system will be built upon. The open source nature of Android makes development easier and more affordable. Not only that, statistically speaking, more smartphone users are using Android-operated devices, which increases the opportunity for the Final Year Project application to be used.

Also, more and more developers are contributing their applications to Google Play, which is an indication that Android has a higher preference. Thus, choosing Android as the mobile application development platform is regarded as more advantageous, even in the future.

2.7   User Interface Design Principles for Android Mobile Applications

This section discusses the principles and guidelines to which the Final Year Project system should conform, which are derived from Android Developers (Android Developers, n.d. a), the official Android development website that comprises information needed for a developer to design, develop, and distribute an Android app.

Android design principles strive to "keep users' best interests in mind". When applying design thinking and creativity, users' point of view must be considered first. The following three goals should be the main focus when delivering an Android app.

- **Enchant me**

    A combination of purpose, simplicity, and beauty should be achieved to produce an effective and painless experience.

- **Simplify my life**

    The application should be easy to use and understand, intuitive even for first timers, and simple tasks should not necessitate complicated steps.

    Keep it brief: Brief sentences with simple words make understanding easier, because users might want to skip the reading if there are too many words in a particular section.

    Only show what I need when I need it: Unnecessary options or additional actions should not be presented all at once so as not to overwhelm the users.

    If it looks the same, it should act the same: The same layout should be implemented for all the same functionalities. Likewise, different functionalities should not have the similar layout. This is to make the application more intuitive and to reduce the chances of users making mistakes while navigating through the app.

- **Make me amazing**

  It's not my fault: Simple instructions should be displayed to inform users when an error occurs, so that they know what and how to solve the problem. However, detailed technical information should not be provided since not all users have some technical understanding of the system.

  Sprinkle encouragement: Complicated tasks should be broken down into smaller, simpler actions so that users will less likely feel difficult when trying to accomplish them.

  Make important things fast: Each action on a single screen has a different level of priority. Not all actions or buttons are equally important. The arrangement often makes the application easier and faster to use.

CHAPTER 3

METHODOLOGY

3.1   Choice of Development Methodology

With reference to **Section 2.5**, the development methodology which is thought to best depict the nature of the project is prototyping. Anyhow, some slight modifications are imposed on the prototype-based methodology so that it provides the best outline possible for the project.
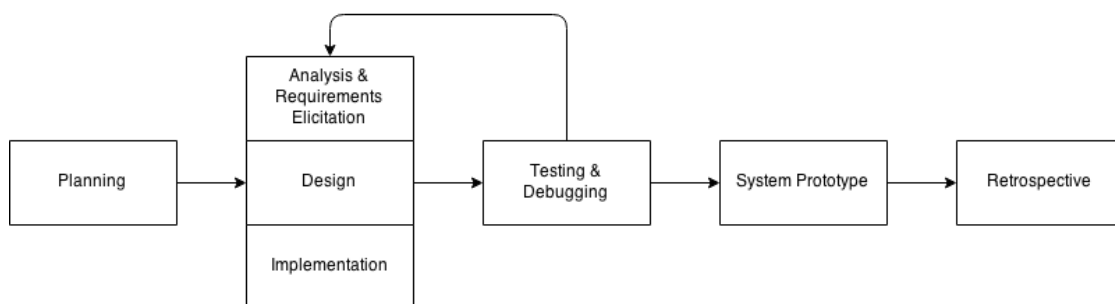
Figure 3.1: Modified Prototyping-based Methodology

"Analysis" is extended to "**Analysis and Requirements Elicitation**" since it describes the tasks involved in the stage better, which not only includes analysis of relevant information, but also incorporates the elicitation of requirements from various reliable and accredited sources.

"**Testing and debugging**" is an additional stage which takes place before the "System Prototype" in order to investigate the quality of the end-product of the project, and also to ensure that the system runs properly without any bugs. In addition, this stage will also involve testers who will not be involved in the development process of the system, so that a general system acceptance level can be obtained from the testers who are representative of the real users.

"**Retrospective**" is another additional stage which takes place after the delivery of the system prototype. At this stage, the elements that lead to the success or failure of the project are determined and analysed to encourage improvement on the system should the project be carried out after the Final Year Project.

"**System**" stage is excluded from the development methodology since the end-product of the Final Year Project is more of a prototype, rather than a complete system.

3.2   Project Plan

3.2.1   Work Breakdown Structure

TASK NAME

1. **Planning**
   1.1   Project I briefing
   1.2   Meeting with some lecturers to confirm a project supervisor
   1.3   Project title
         1.3.1   Discussion with supervisor
         1.3.2   Research
         1.3.3   Confirmation
   1.4   Brief proposal description submission to supervisor

2. **Analysis & requirements elicitation**
   2.1   Problem domain
         2.1.1   Research & analysis
         2.1.2   Formation
   2.2   Project objectives definition
   2.3   Project scope definition
   2.4   Literature review
   2.5   Domain expert interview
   2.6   Survey form
         2.6.1   Drafting
         2.6.2   Review by supervisor
         2.6.3   Modification & revision
         2.6.4   Distribution to respondents to answer
         2.6.5   Collection of answered survey forms
         2.6.6   Analysis of collected data
   2.7   Project development methodology
         2.7.1   Research, analysis & evaluation
         2.7.2   Selection
         2.7.3   Adaptation to the project

3.2.2 Gantt Chart

	MAIN TASK	May 2014	June 2014	July 2014	August 2014	September – December 2014	January 2015	February 2015	March 2015	April 2015
1.	Planning		■							
2.	Analysis & requirements elicitation			■						
3.	Design						■			
4.	Implementation & development							■		
5.	Testing & debugging								■	
6.	Deployment of system								■	
7.	Post-mortem									■

Figure 3.2: Project Gantt Chart Overview

	TASK		29 May 2014				2 June								9 June							16 June	
			T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T
1.	**PLANNING**		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	1.1	Project I briefing	▨																			
	1.2	Meeting with some lecturers to confirm a project supervisor		▨	▨	▨	▨	▨	▨	▨	▨	▨	▨									
	1.3	Project title													▨	▨	▨	▨				
		1.3.1	Discussion with supervisor													▨							
		1.3.2	Research														▨	▨					
		1.3.3	Confirmation																▨				
	1.4	Brief proposal description submission to supervisor																		▨	▨	

Figure 3.3: Gantt Chart of "Planning" Stage

TASK			18 June 2014					23 June 2014							30 June 2014							7 July 2014							14 July 2014							21 July		
			W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W
2.	ANALYSIS & REQUIREMENTS ELICITATION																																					
2.1	Problem domain																																					
	2.1.1	Research & analysis																																				
	2.1.2	Formation																																				
2.2	Project objectives definition																																					
2.3	Project scope definition																																					
2.4	Literature review																																					

Figure 3.4: Gantt Chart of "Analysis & Requirements Elicitation" Stage (Part 1)

TASK			24 July				28 July							4 August							11 August							18 August					
			T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
2.	ANALYSIS & REQUIREMENTS ELICITATION (continued)																																	
2.5	Domain expert interview																																	
2.6	Survey form																																	
	2.6.1	Drafting																																	
	2.6.2	Review by supervisor																																	
	2.6.3	Modification & revision																																	
	2.6.4	Distribution to respondents to answer																																	
	2.6.5	Collection of answered survey forms																																	
	2.6.6	Analysis of collected data																																	
2.7	Project development methodology																																	
	2.7.1	Research, analysis & evaluation																																	
	2.7.2	Selection																																	
	2.7.3	Adaptation to the project																																	
	2.7.4	Project planning documentation																																	
	2.7.4.1	WBS development																																	
	2.7.4.2	Gantt chart																																	

Figure 3.5: Gantt Chart of "Analysis & Requirements Analysis" Stage (Part 2)

	TASK	12 Jan 2015							19 Jan							26 Jan							2 Feb						
		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
3.	**DESIGN**	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
3.1	User interface	░	░	░	░	░	░	░	░																				
3.2	System navigation								░	░	░	░	░																
3.3	Storyboard designs															░	░	░	░	░	░								
3.4	Functionality																						░	░	░	░	░	░	░
3.5	Database																						░	░	░	░	░	░	░
3.6	Lesson content & assessment																						░	░	░	░	░	░	░

Figure 3.6: Gantt Chart of "Design" Stage

	TASK	9 Feb							16 Feb							23 Feb							2 Mar							9 Mar				
		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F
4.	**IMPLEMENTATION**	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓												
4.1	User interface	░	░	░	░																													
4.2	Functionality					░	░	░	░	░	░	░																						
4.3	Integration												░	░	░	░	░	░																
4.4	Database																		░	░														
4.5	Lesson content & assessment																				░	░												
5.	**TESTING & DEBUGGING**																						▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
5.1	Alpha testing																						░	░	░	░	░	░	░					
5.2	Beta testing																													░	░	░	░	░

Figure 3.7: Gantt Chart of "Implementation" and "Testing & Debugging" Stages

	TASK	14 Mar		16 Mar							23 Mar							30 Mar					
		S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
6.	**SYSTEM PROTOTYPE**	■	■	■	■	■	■	■	■														
7.	**RETROSPECTIVE**									■	■	■	■	■	■	■	■	■	■	■	■	■	■
7.1	Possible contributions of system								▨	▨	▨												
7.2	Limitations											▨	▨	▨	▨								
7.3	Future enhancement																	▨	▨	▨	▨	▨	▨

Figure 3.8 Gantt Chart of "Deployment of System" and "Retrospective" Stage

3.2.3   Task Description

The project starts with **planning**. Then, **analysis**, **design**, and **implementation** stages were carried out concurrently, although more emphasis is placed on analysis during the conduct of Project I. Towards the later stage of Project II, after all the 3 parallel stages have been completed, the system is **tested and debugged** to check for errors or bugs. This process is carried out by both the author himself and also several other external testers who are not involved in the development of the system in any way.

Afterwards, the project goes back to analysis, design, and implementation stages again in order to make the necessary amendments and modifications to the system. Once the project has moved on from the loop, the **system prototype** is developed, and the **retrospective** session is carried out at last.

Up until the end of Project I session, main tasks 1 and 2 (planning, analysis and requirements elicitation) have been completely carried out, while main task 3 (system design) is still under progress. It has been continued during the Project II period, along with the other later tasks, main tasks 4 to 7 (including implementation, testing and debugging, system prototype, and post-mortem).

3.2.3.1   Main task 1: Planning

The details of Final Year Project I were briefed during Project I lecture. Afterwards, meetings with several lecturers were conducted in order to seek a suitable project supervisor. Once a supervisor and the student achieved mutual understanding and consensus, discussion on the project title took place. After some research, the title was confirmed, and a brief proposal description was submitted to the project supervisor so that an overview and vision of the project could be provided.

3.2.3.2   Main task 2: Analysis and Requirements Elicitation

Much research and analysis were done in order to zero in on a problem domain, so that the project problem statement could be formed. Then, the objectives and scope of the project were defined. A lengthy period of time right after that was spent on literature review, including reviewing the appropriate development methodology for the project. In the meantime, 2 face-to-face meetings with a domain expert, Dr. Swagata Sinha Roy, were held. As soon as a development methodology was determined, it was modified to specifically tailor it to suit the project.

Besides that, a survey form was created to gather some information from potential users. After the survey form was reviewed by supervisor, it was immediately distributed to a number of respondents. The collected data was analysed and presented. Work Breakdown Structure and Gantt chart, which are part of the project planning process, were developed later on.

3.2.3.3   Main task 3: Design

At first, rough graphical user interfaces are hand drawn. A flow line is generated to depict the general flow of the proposed system. By combing these two materials, a series of storyboard designs are developed. Other than that, the design of the system functionality and database is carried out. Besides, the system content, i.e. the lessons and assessment for the mobile application is designed as well.

3.2.3.4   Main task 4: Implementation

All the materials that have been designed during the previous phase are actialy implemented at this point.

3.2.3.5   Main task 5: Testing and Debugging

Two types of testing are carried out: alpha testing and beta testing. Alpha testing is done "in-house" by the author himself, who is directly involved with the system development. The testing is done using three approaches: manual testing, graphical user interface testing, and proofreading.

Beta testing is done by testers, who are representatives of real users, and are not involved in the development of the Final Year Project. An analysis is performed after their feedback has been collected.

3.2.3.6   Main task 6: System Prototype

After error checking and bug fixes have taken place, the actual end-product of the Final Year Project will emerge in the form of a system prototype.

3.2.3.7   Main task 7: Retrospective

The feedback of end-users, who are the testers of the system prototype, will be evaluated. Not only that, their interaction with the system will be evaluated as well. Following that, potential future enhancement for the prototype will be specified. Finally, the lessons learned throughout the conduct of the Final Year Project will be documented and reviewed.

3.3   Needs Analysis

A survey form has been produced and distributed to a number of respondents to collect information about

- their opinions on learning of English through music or song lyrics
- their acceptance and preferences on a computer software or mobile app for such learning method
- their English language background
- how frequent they listen to English songs

3.3.1   Mode of Distribution and Collection

The survey form was created in the form of Microsoft Office Word 2010 document. (See **Appendix E**) This is because the initial idea was to distribute physical copies of the form to respondents and require them to complete it on the spot since the expected duration of answering process is less than 5 minutes. However, considering the difficulty of physically meeting most respondents, and the amount of time it takes to collect completed survey forms, a Google form was then created. (See https://docs.google.com/forms/d/1wOYY5o3ELl-wgcUz3GvTyIiYzoz3RtvmDRpTWwHSfXI/viewform?usp=send_form for the Google form) The content of both the Microsoft Office Word 2010 and Google forms are exactly the same.

The Google form link was sent through Facebook private chat boxes to respondents who were first asked whether they are willing to participate in the survey process or not. Following the link, the respondents filled in the questionnaire, and submitted it by clicking the "Submit" button at the end of the form. The responses of the respondents were immediately received once they submitted the form.

3.3.2   Sample Size and Selection

The population for the survey is comprised of secondary and tertiary education students since they are the target audience of the proposed multimedia application. Because the survey is still on-going up until the commencement of Final Year Project II, so the number of respondents is not finite. As of 18 August 2014, a total of **32 respondents** have completed and submitted the survey. The respondents were randomly selected as long as they fit the target audience scope, and they come from different secondary or tertiary institutions and are undertaking different courses.

3.3.3   Questionnaire Structure and Sections

The questionnaire is composed of **3 parts**:
Part A: Personal Information
Part B: Learning of English language
Part C: Appreciation of English popular songs

Part A is about the respondents' personal information, including age, gender, current level of education, as well as native and second languages. Other than that, mobile phone number and email address are listed so that the respondents can be contacted to ask about their willingness to test the developed system during later stage.

During **Part B** of the questionnaire, the respondents are asked about their English learning methods, English proficiency tests, and awareness of Academic Word List (AWL). This part also identifies their awareness of learning of English language through music or song lyrics, and their acceptance and preferences on a computer software or mobile app for such learning method.

The first portion of **Part C** allows respondents to rate their opinions and appreciation towards English songs using a 4-point *Likert scale*[5]: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The latter portion accesses how frequent the respondents listen to English songs.

3.3.4   Data Analysis and Results

3.3.4.1   Analysis of Respondents' Basic Background Information
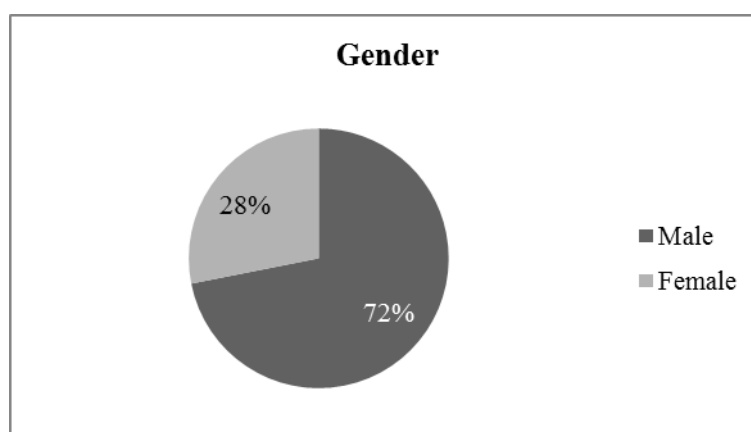
Figure 3.9: Gender of Respondents

Figure 3.9 shows that there are 23 males (72%) and 9 females (28%) who have participated in the survey as of 18 August 2014.

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[5] *Likert scale*: a widely used approach to scale responses in survey research, named after its inventor, psychologist Rensis Likert. (Likert, 1932) The term is often used interchangeably with *rating scale*.
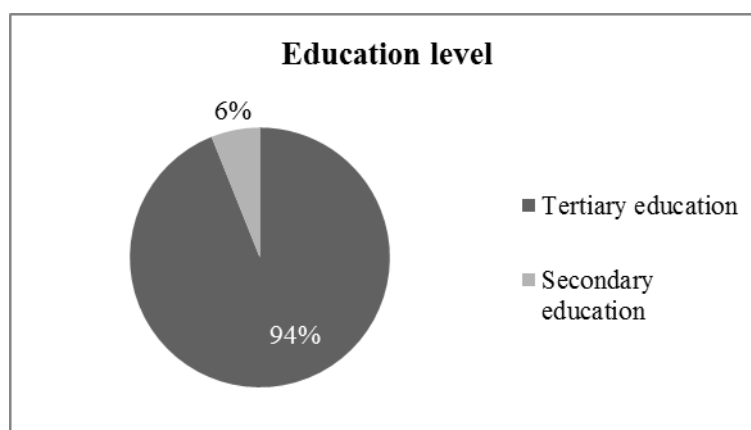
Figure 3.10: Education Level of Respondents

Figure 3.10 shows that 30 respondents are from tertiary education institutions, while only 2 of them (6%) are secondary students.

3.3.4.2 Analysis of Respondents' English Language Background and Their Opinions on an Electronic System for Learning English through Music
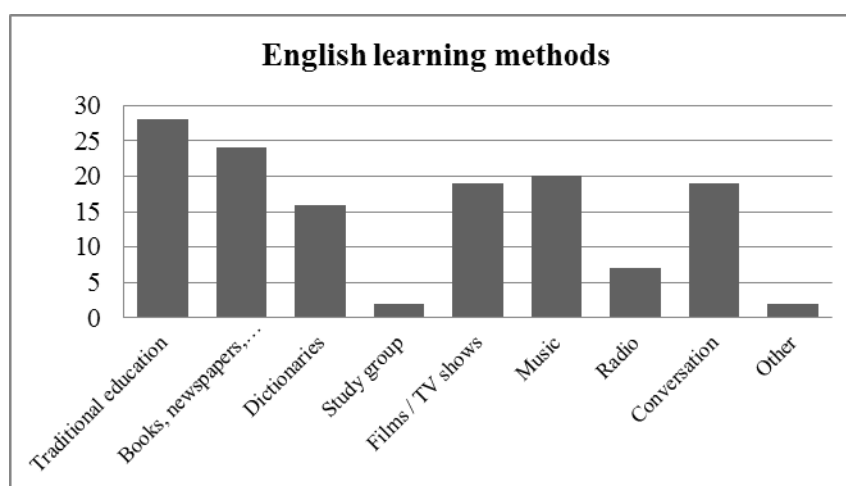
Figure 3.11: English Learning Methods of Respondents

Figure 3.11 shows that most respondents (28 of them, 20%) chose traditional education or classroom learning as one of the ways they learn English. This is unarguably evident since all respondents must undergo classroom learning for many

subjects since kindergarten. Books, newspapers, magazines, or any other extracurricular reading materials come behind traditional education as the second most-picked English learning method, chosen by 24 of the respondents (18%).

Films / TV shows and music, which are an entertainment, share close rates, with the former being chosen by 19 respondents (14%), while the latter by 20 of them (15%). Same as films / TV shows, conversation is chosen by 19 respondents (14%). However, radio, which is also a form of entertainment, is only 7 respondents' (5%) approach to learn English.

16 respondents (12%) use dictionaries to help them learn English. Meanwhile, only 2 respondents (1%) participate in study groups to learn the language. Other than that, 2 respondents (1%) state that they also learn English by playing games.
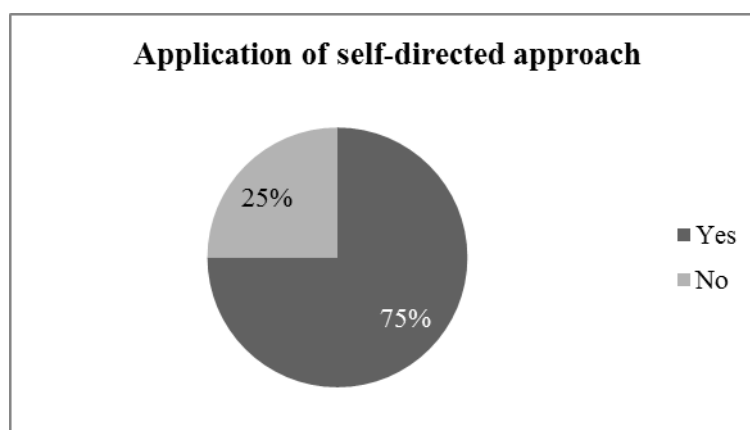
Figure 3.12: Respondents' Application of Self-Directed Approach on Learning

Figure 3.12 shows that 24 respondents (75%) apply self-directed approach during the process of learning English, but 8 of them (25%) do not.
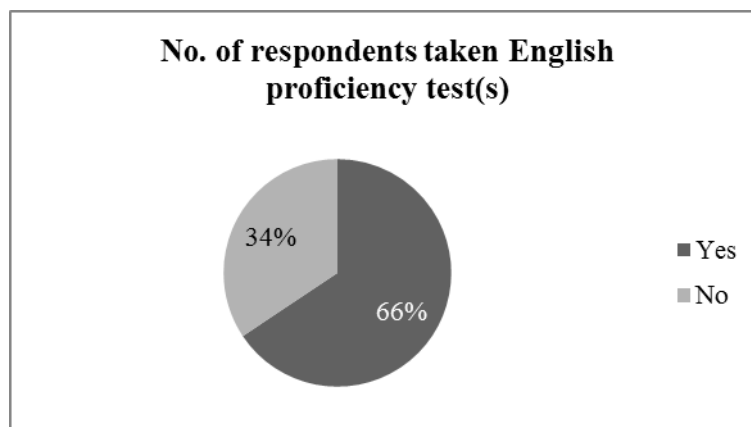
Figure 3.13: Respondents who have taken English Proficiency Test(s)

Figure 3.13 shows that 21 respondents (66%) have taken English language proficiency tests, but 11 of them (34%) have not.
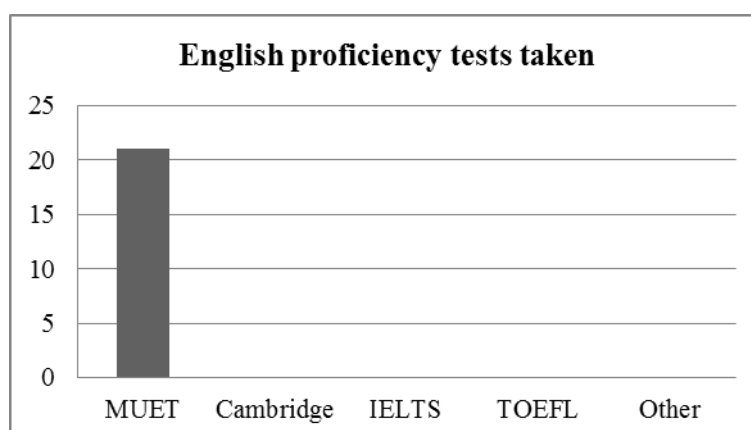
Figure 3.14: English Language Proficiency Tests Taken by Respondents

Figure 3.14 shows that, out of the 21 respondents who have taken English proficiency tests, all of them (100%) have taken Malaysian University English Test (MUET). Other tests such as Cambridge English Language Assessment, International English Language Testing System (IELTS), and Test of English as a Foreign Language (TOEFL) were not taken by any one of them.

Awareness of AWL

19%

81%

■ Yes
■ No
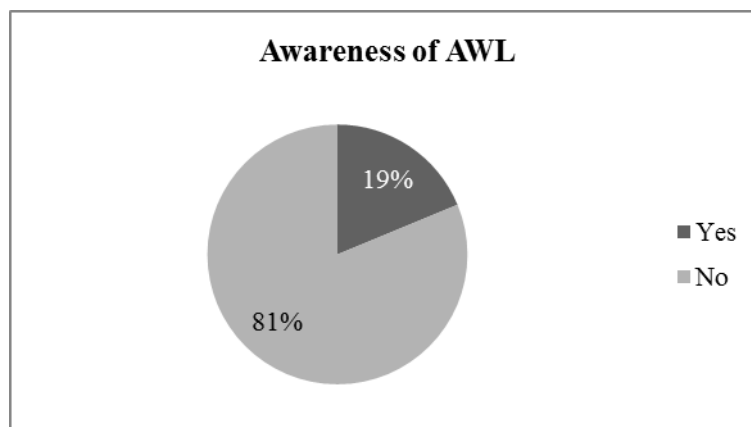
Figure 3.15: Respondents' Awareness of Academic Word List (AWL)

Figure 3.15 shows that only 6 respondents (19%) are aware of the existence of Academic Word List (AWL), while the rest of them (81%) are not.

Awareness of learning English through music / song lyrics

16%

84%

■ Yes
■ No
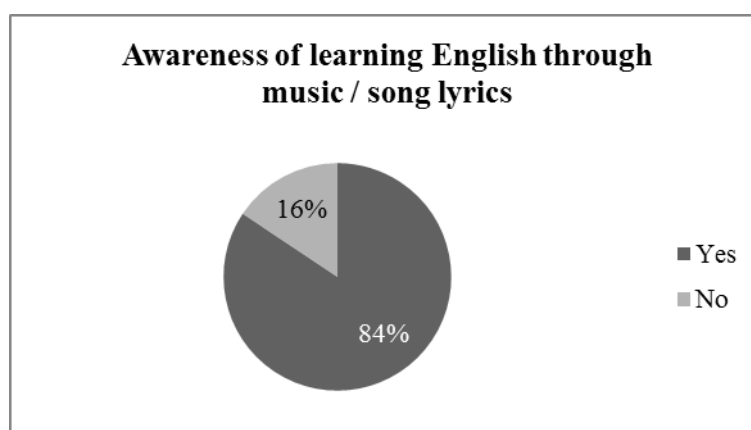
Figure 3.16: Respondents' Awareness of Learning English Language through Music or Song Lyrics

Figure 3.16 shows that 27 respondents (84%) are aware that learning of English through English music / song lyrics is possible, but 5 of them (16%) are not.

Experience of learning English through music / song lyrics

48%   52%

■ Yes
■ No
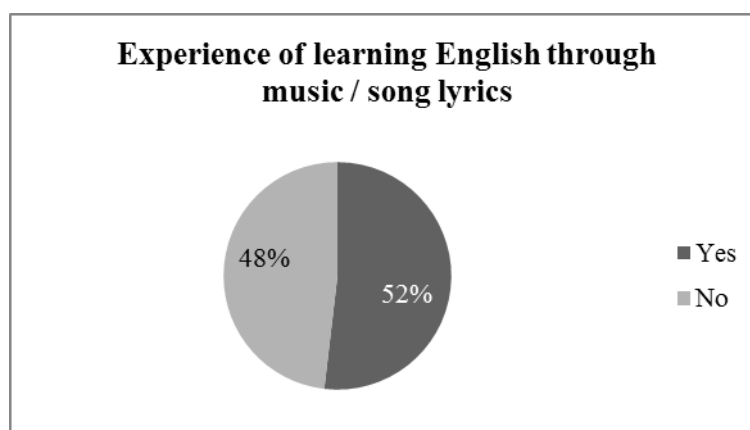
Figure 3.17: Respondents' Experience of Learning English Language through Music or Song Lyrics

Figure 3.17 shows that, out of 27 respondents who are aware that learning of English is possible through English music / song lyrics, 14 (52%), which is over half of them, have experienced the aforementioned method, whereas 13 of them (48%) have not.

Willingness to consider using a computer software / mobile app to learn English through music / song lyrics

3%

97%

■ Yes
■ No
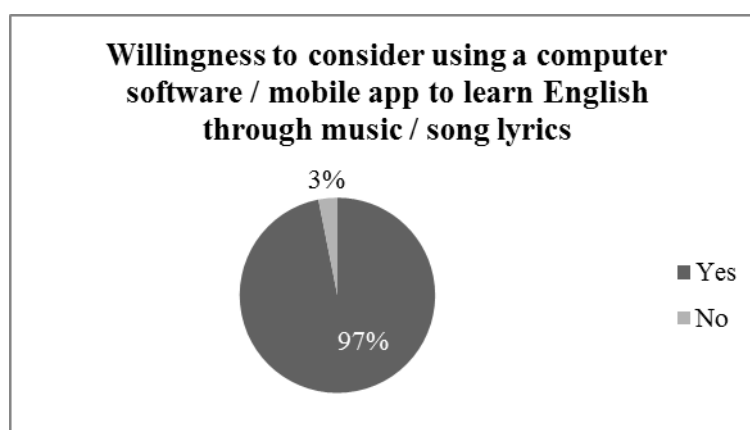
Figure 3.18: Respondents' Willingness to Consider Using an Electronic System to Learn English through Music or Song Lyrics

Figure 3.18 shows that, if there is a computer software / mobile app that lets the respondents learn English through song lyrics, almost all of them (31 respondents, 97%) would consider using it. Only 1 respondent would not, as he / she opines that language in the song lyrics are not that formal since the words are usually constructed for lyrical purpose only, for which there may not be consideration for

grammar and some other language aspects. Besides, the respondent also mentions that he / she seldom listens to English songs and watches English movies.
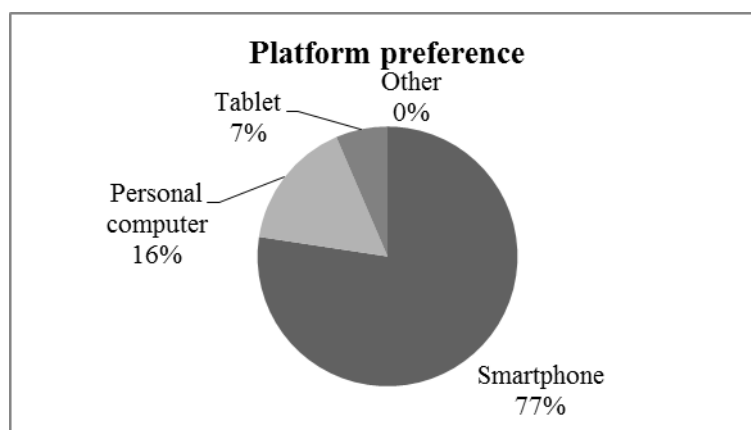
Figure 3.19: Respondents' Platform Preferences for the Proposed System

Figure 3.19 shows that, out of the 31 respondents who would consider using the proposed multimedia application, 24 of them (77%) prefer to use smartphones to run the application, while only 5 (16%) chose personal computers and 2 (7%) chose tablets.
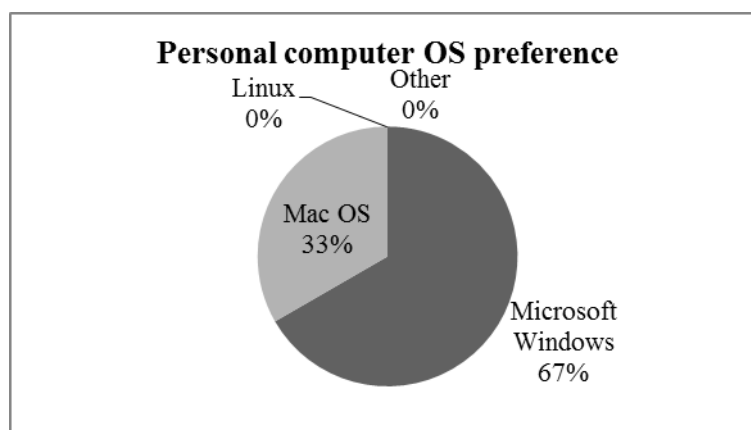
Figure 3.20: Respondents' Personal Computer Operating System Preferences

Figure 3.20 shows that, out of 5 respondents who prefer to use the proposed application on personal computer, 4 of them (67%) chose Microsoft Windows and 2 (33%) chose Mac OS. Meanwhile, none of them chose Linux.
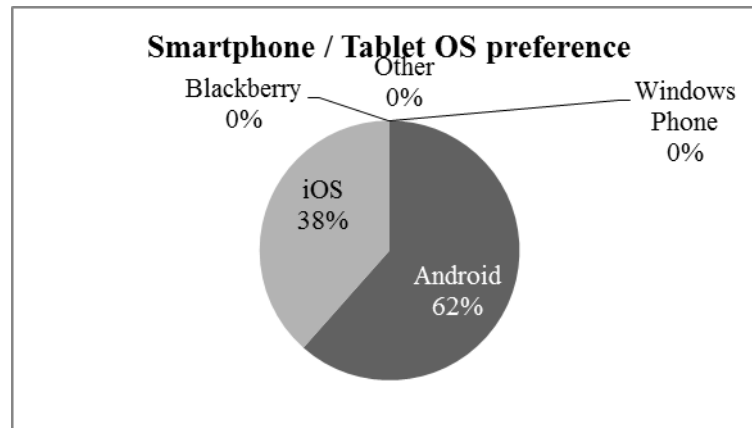
Figure 3.21: Respondents' Smartphone or Tablet Operating System Preferences

Figure 3.21 shows that, out of 26 respondents who prefer to use the proposed application on smartphones or tablets, 16 of them (62%) chose Android and 10 of them (38%) chose iOS. Windows Phone and Blackberry were not chosen by any one of the respondents.

3.3.4.3   Analysis of Respondents' Appreciation of English Popular Songs
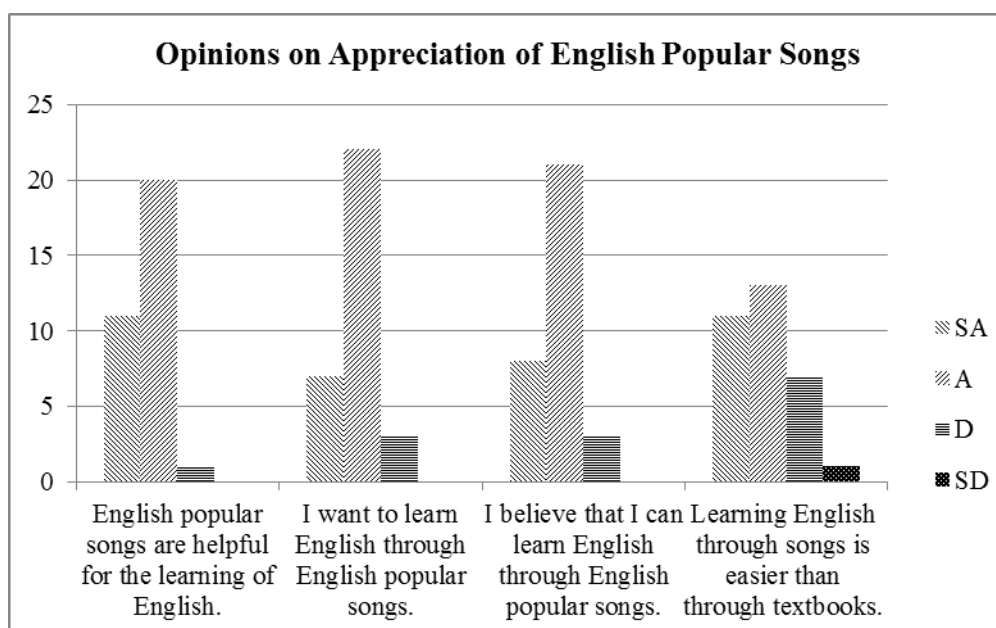
Figure 3.22: Respondents' Opinions on Appreciation of English Popular Songs

Figure 3.22 shows that more than half of the respondents (88.28%) either agree or strongly agree on all of the above 4 statements. However, out of all the 32 respondents, 1 (3%) disagrees that English popular songs are helpful for the learning of English. Meanwhile, 3 respondents (9%) disagree that they want to learn English through English popular songs. Similarly, 3 respondents (9%) disagree that they can learn English through English popular songs. Besides, 7 out of 32 of them (22%) disagree that learning English through songs is easier than through textbooks, while 1 (3%) strongly disagrees on this.
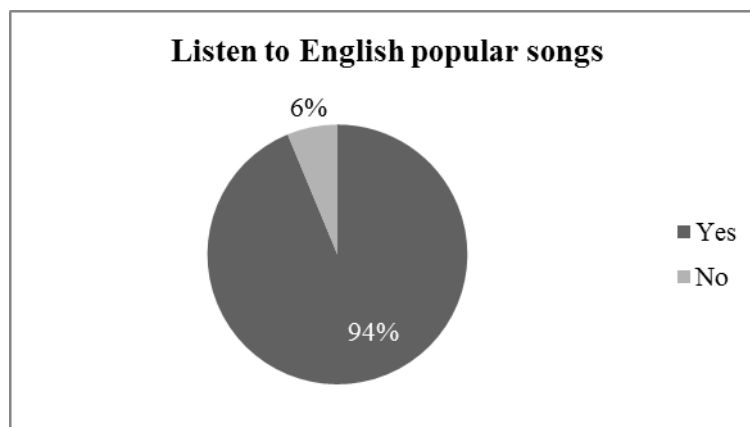
Figure 3.23: Whether or not Respondents Listen to English Popular Songs

Figure 3.23 shows that 30 respondents (94%) listen to English popular songs, but 2 of them (6%) do not.
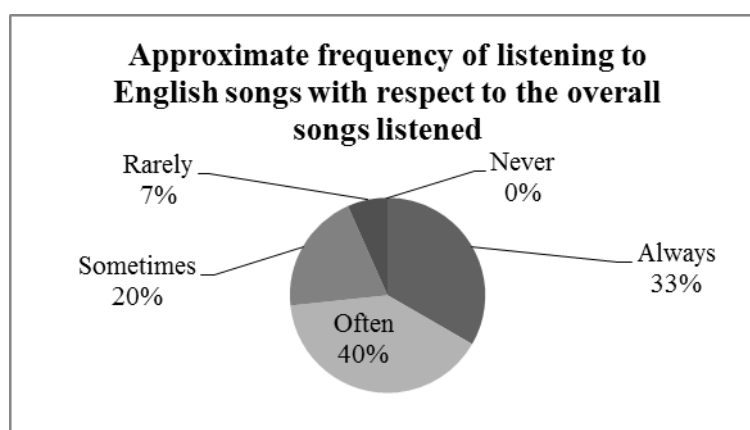
Figure 3.24: Respondents' Approximate Frequencies of Listening to English Songs with respect to the Overall Songs They Listen, regardless of the Languages

Figure 3.24 shows that, out of the 30 respondents who listen to English popular songs, 10 of them (33%) always listen and 12 (40%) often listen when compared with the overall songs that they listen, regardless of the languages. Meanwhile, 6 respondents (20%) listen to English songs sometimes, and 2 of them (7%) never listened under the same comparison.
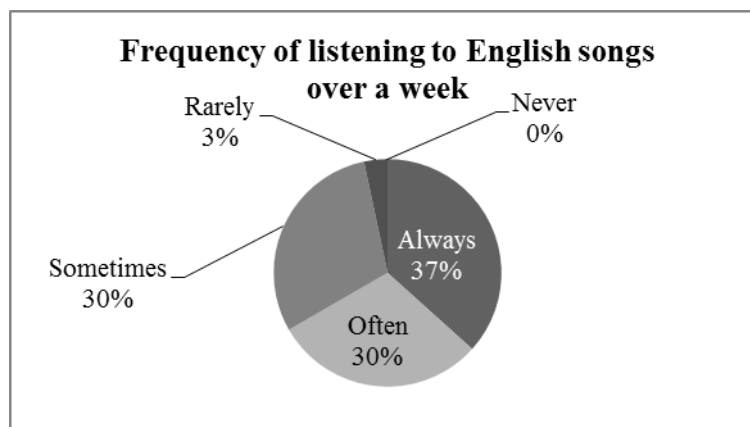
Figure 3.25: Respondents' Frequencies of Listening to English Songs over a Week

Figure 3.25 shows, out of the 30 respondents who listen to English popular songs, 11 of them (37%) always listen and 9 of them (30%) often listen to English songs weekly, whereas 9 respondents (30%) listen to them weekly, and 1 respondent (3%) rarely listen.

CHAPTER 4

SYSTEM DESIGN AND MODELLING

4.1 Storyboard Designs with Screen Sketches
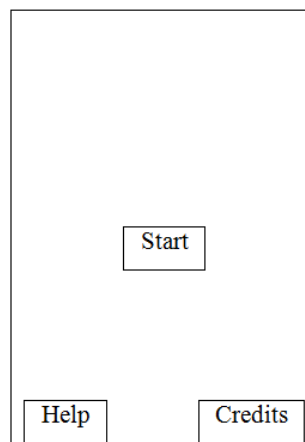
Figure 4.1: Storyboard of Main Menu

As seen from **Figure 4.1**, there are three buttons: "Start", "Help", and "Credits" at the Main Menu module, each of which will redirect a user to a different screen.
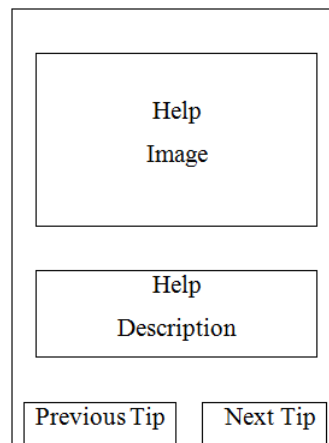
Figure 4.2: Storyboard of "Help"

When the user clicks "Help" button at the main menu, he / she will be redirected to the Help module. Each "Help Image" will show a screenshot of the system which will slighted enhanced with some visual effects to put attention on the part which needs explanation. "Help Description", which will certainly be related to the "Help Image" shown, will explain how to interact with the system. Since there will be a series of tips in the Help module, the user will be allowed to click "Previous Tip" or "Next Tip" button to navigate through the tips.

```
┌─────────────────────────┐
│                         │
│                         │
│                         │
│        App info         │
│                         │
│                         │
│                         │
│        Disclaimer       │
│                         │
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│                         │
│                         │
└─────────────────────────┘
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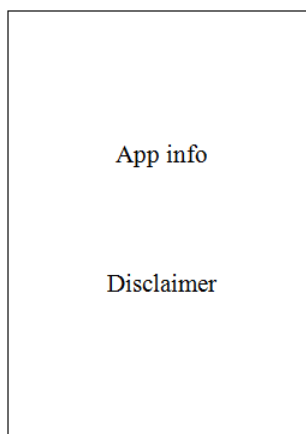
Figure 4.3: Storyboard of "Credits"

When the user clicks "Credits" button at the main menu, he / she will be redirected to the Credits module. The screen will show some information about the system, as well as a disclaimer to avoid copyright infringement issues, since there will be a lot of copyrighted materials within the system, such as images and audio files.

```
┌─────────────────────────┐
│       Lesson List       │
│                         │
│  - Lesson 1             │
│  - Lesson 2             │
│  - Lesson 3             │
│       Lesson 3.1        │
│       Lesson 3.2        │
│  - Lesson 4             │
│  - …                    │
│  - …                    │
└─────────────────────────┘
```
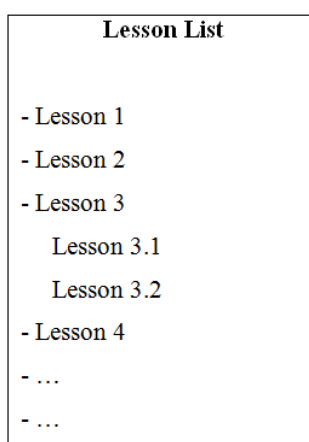
Figure 4.4: Storyboard of Lesson Selection

When the user clicks "Start" at the main menu, he / she will be redirected to the Lesson Selection module. Here, a list of grammar lessons will be shown. For certain main lessons that have sub-lessons, the main lessons will be expandable upon clicking to show all the available sub-lessons.

Lesson Playlist

Lesson Content

Cover art | 1. Song name
Artist:
Album:

Cover art | 2. Song name
Artist:
Album:

Cover art | 3. Song name
Artist:
Album:
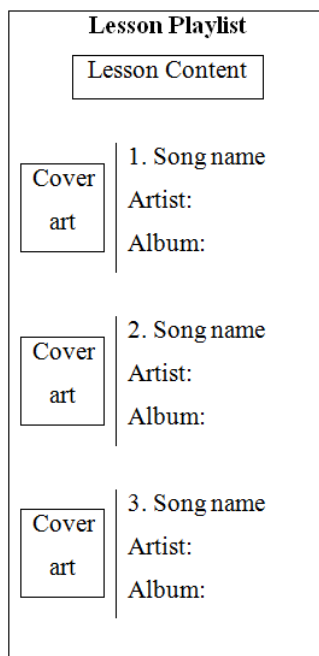
Figure 4.5: Storyboard of Song Selection

When the user selects any one of the lessons at the Lesson Selection screen (See **Figure 4.4**), he / she will be redirected to the Song Selection module. A list of songs will be shown, along with their information such as cover arts, artists, and albums. "Lesson Content" button will be positioned above the song list so that it will not be overlooked by the user when he / she first enters this screen.

Lesson Name

Lesson Part 1   Lesson Part 2

This lesson contains 2 sections:
1. …
2. …
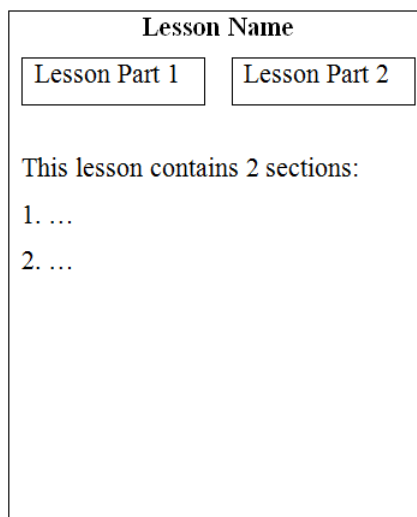
Figure 4.6: Storyboard of Lesson Content Introduction

When the user clicks "Lesson Content" button at the Song Selection screen, he / she will be redirected to the Lesson Content module. However, an introduction will be provided, and the user will have to manually click one of the tabs available ("Lesson Part 1" or "Lesson Part 2" tab) to go to the actual lesson content. Such design is implemented because showing all of the lesson content at the same screen will most probably make the user feel complicated or disoriented, especially if there is a lot of words, sentences, and examples in a single lesson.
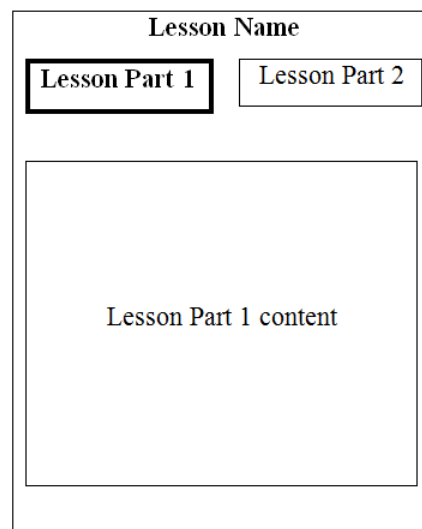
Figure 4.7: Storyboard of Actual Lesson Content

When the user clicks one of the lesson tabs ("Lesson Part 1" or "Lesson Part 2"), the lesson introduction as seen in **Figure 4.6** will be replaced with the actual lesson content of the corresponding selected lesson tab. The selected lesson tab will be highlighted to show the user that the actual content being displayed belongs to that lesson tab. Since there will usually be a large amount of texts, the content area (e.g. "Lesson Part 1 content") will be scrollable.

Figure 4.8: Storyboard of Song Playback with Lyrics

When the user selects any one of the songs at the Song Selection screen (See **Figure 4.5**), he / she will be redirected to the Song Playback module. As soon as the user is redirected to this screen, the audio of the corresponding song will play immediately. A "Now Playing" status bar will be displayed at the top of the screen to inform user which song is currently playing. By default, the lyrics will be shown, and the "Lyrics" tab will be highlighted as well to show the user that the lyrics being displayed belongs to the "Lyrics" tab. The user will be able to control the playback of the song through the four buttons at the bottom of the screen, which are "Rewind", "Play / Pause", "Fast Forward", and "Repeat" buttons from left to right. Since there will usually be a large amount of texts for the lyrics, the "Lyrics" area will be scrollable. Note that "Quiz" is a button which will redirect the user to another screen, unlike "Lyrics" and "Explanation" which are tabs.
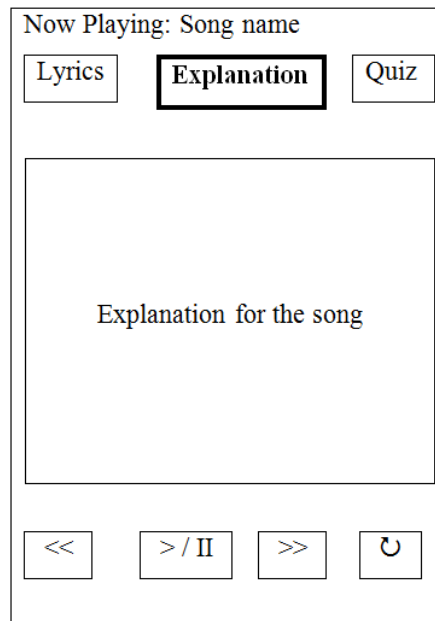
Figure 4.9: Storyboard of Song Playback with Explanation

At the same screen as **Figure 4.8**, when the user clicks "Explanation" tab, the lyrics will be replaced with some explanations which are related to the same song. Since there will usually be a large amount of texts for the explanation, the "Explanation" area will be scrollable.

```
┌─────────────────────────────────────────┐
│                   Quiz                   │
│                              1 / 10      │
│  Question                                │
│  - choice A                              │
│  - choice B                              │
│  - choice C                              │
│  - choice D                              │
│                                          │
│  ┌─────────────────┐                     │
│  │  Check answer   │                     │
│  └─────────────────┘                     │
│  ┌─────────────────┐                     │
│  │ Answer response │                     │
│  └─────────────────┘                     │
│      ┌──────────────────┐┌──────────────┐│
│      │Check overall result││Next Question││
│      └──────────────────┘└──────────────┘│
│                                          │
└─────────────────────────────────────────┘
```
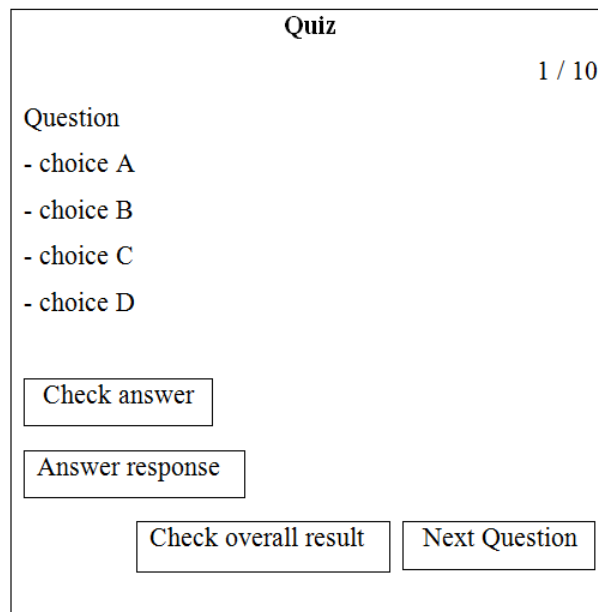
Figure 4.10: Storyboard of Quiz

When the user clicks "Quiz" button from the song playback screen (See **Figure 4.8**), he / she will be redirected to the Q & A sub-module of the Quiz module. There will be a question counter at the top right of the screen to indicate to the user of their progress, so that they are able to know which question they are currently attempting, and how many questions in total that needs to be attempted before the end of the quiz. The question will be followed by a set of four choices, in a multiple choice question style. Once the user has made a choice, he / she will be able to click "Check answer" to obtain immediate responsive feedback from the system so that he / she will know whether or not the choice was correct. The feedback will be displayed at "Answer response" area. Note that this area is empty at first, and will only show the choice feedback after the user has clicked "Check answer". After each answering, the user will be able to move on to the next question by clicking "Next Question" button. Another thing worth noting is that "Check overall result" button will not be clickable until after the user has attempted all the provided questions. At the final question, when the user clicks "Check overall result" button, he / she will be redirected to the Results sub-module (See **Figure 4.11**).
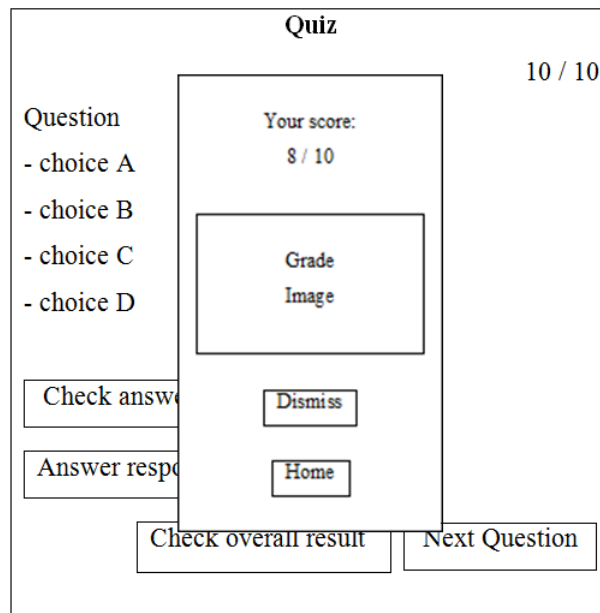
Figure 4.11: Storyboard of Result Popup

After the user has attempted all of the questions at the Q & A sub-module and clicked "Check overall result" (See **Figure 4.10**), a popup will be shown at the center of the screen, leading to the Results sub-module of the Quiz module. The score of the user will be displayed at the top of the popup area. "Grade Image" will display the corresponding grade according to the score. For example, if the user scored 8 / 10, which is 80%, an image of "A" will be displayed. By clicking "Dismiss" button, the popup will disappear, while "Home" button will redirect the user back to the Main Menu module (See **Figure 4.1**).

4.2 System Flow Line
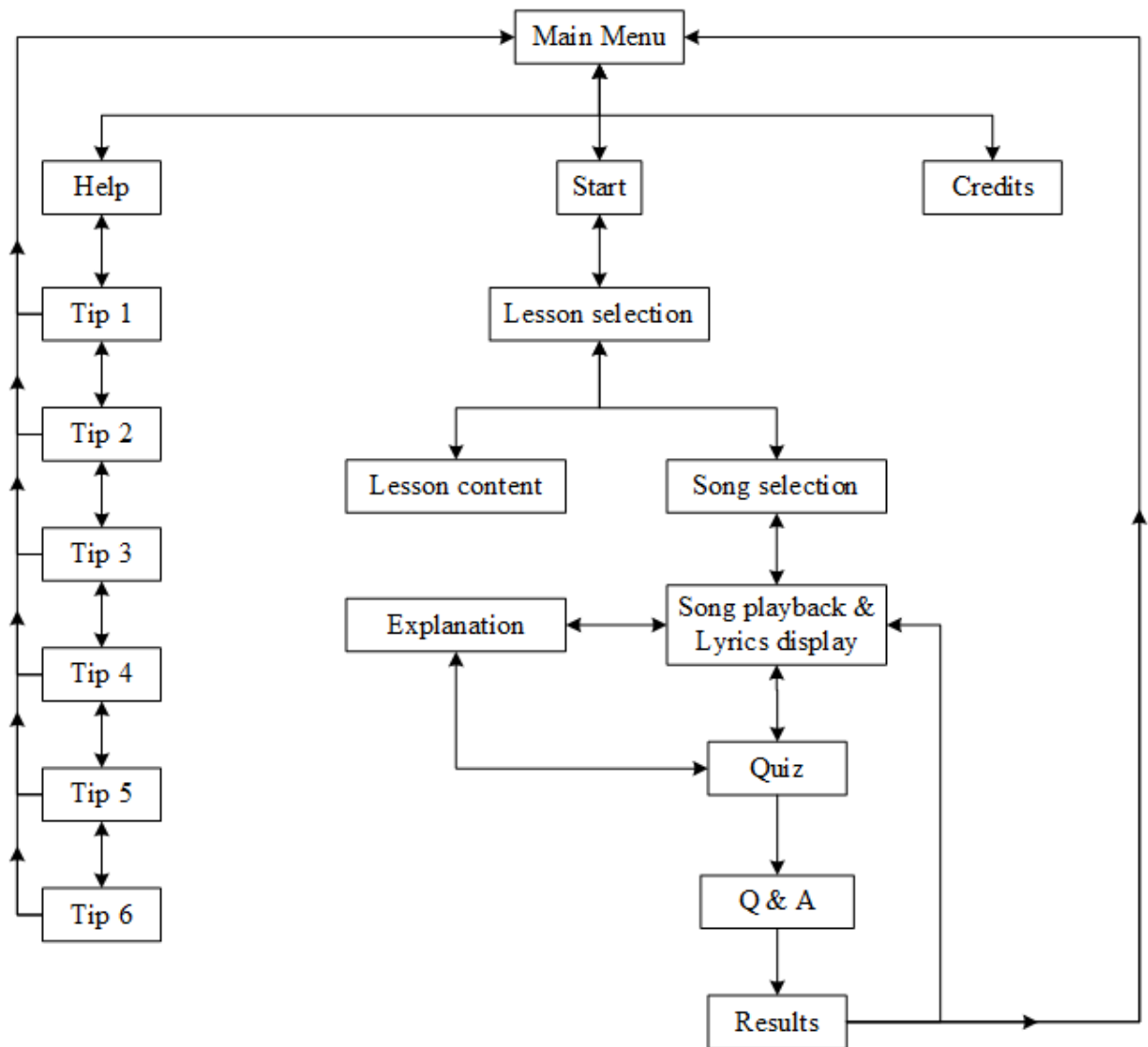
Figure 4.12: System Flow Line

4.3   Entity-Relationship Diagram
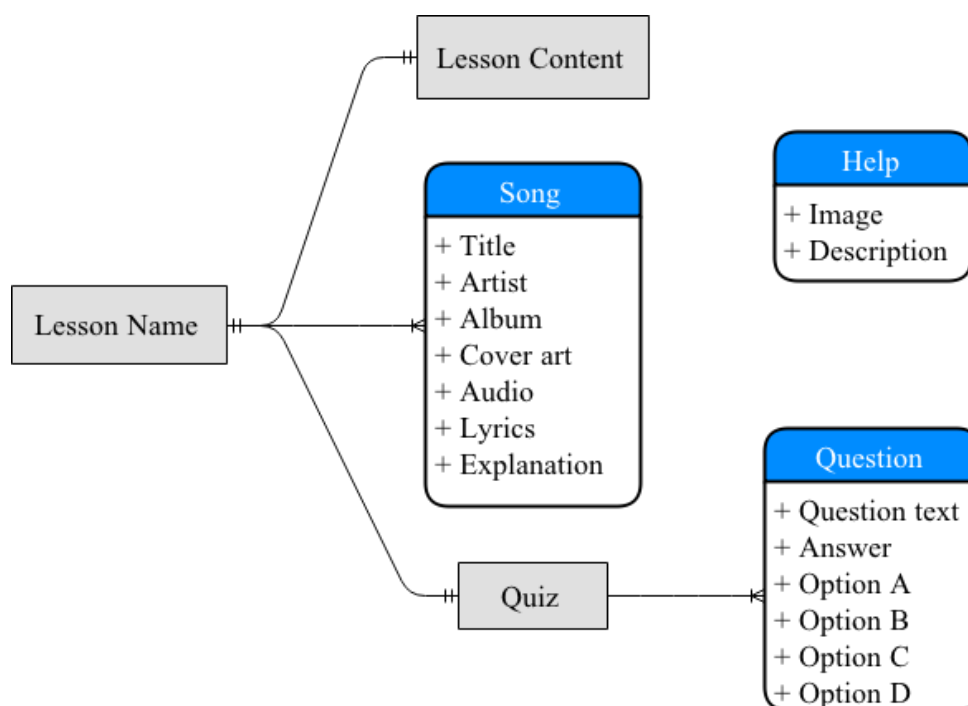
Figure 4.13: Entity-Relationship Diagram

Figure 4.13 shows how the data of the system is managed. "Lesson Name" is the main identifier for most of the data. There is a one-to-one relationship between "Lesson Name" and "Lesson Content", which represents there is only one lesson content under a lesson. Similarly, the relationship between "Lesson Name" and "Quiz" is one-to-one as well, since there is only one set of quiz for each lesson.

Meanwhile, "Lesson Name" and "Song" have a one-to-many relationship. This is due to the fact that there are multiple songs under the same lesson. Each song contains various information, including the song title, artist, album, cover art, audio, lyrics, and explanation. Likewise, there is also a one-to-many-relationship between "Quiz" and "Question", since there are numerous multiple choice questions within a set of quiz. Question text, answer, and four options are the attributes that comprise each question. In addition, "Help", which is utilized for the Help module, is a stand-alone entity with two attributes, namely "Image" and "Description".

4.4　　Technologies Used

The following development tools and programming languages are utilized during the implementation phase of the project.

4.4.1　Development Tools

- **Android Studio**

  Android Studio is an IDE that specifically caters to development of Android-based applications (Ducrohet, 2013). December 2014 saw the first official stable release, starting with version 1.0 (Protalinski, 2014). Computers that operate with Windows, Linux, or Mac OS X are able to download and then install it for development purposes (Haslam, 2013).

- **JDK (Java Development Kit)**

  JDK, a product by Oracle Corporation, is an implementation that allows for development of Java based applications. The kit is a bundle that contains a number of components, such as Java Compiler, Java Interpreter, Java Disassembler, and Java Header File Generator (cs-Fundamentals.com, n.d.). Android Studio requires JDK with a minimum version of 7 to be installed before it can be used (Android Developers, n.d. b).

4.4.2　Programming Languages

- **Java**

  By integrating the concepts of concurrency, classes, and object-orientation (Gosling et al., 2014), Java allows its programmers to "write once, run anywhere" (WORA) (Computer Weekly, 2002), which represents the needlessness of code recompilation in order for it to run on one machine and

another (Oracle, 1997). With users of reportedly 9 million as of 2014, Java is one of the most-used programming languages (Tiobe Software, 2014).

- **XML (Extensible Markup Language)**
Usability, generality, and simplicity are the three design aims that XML heavily stresses on (W3C, 2008). Using XML, documents are encoded in a format which is readable to both human and machine (W3Schools Online Web Tutorials, n.d.).

CHAPTER 5

VERIFICATION AND VALIDATION

5.1   Alpha Testing

Alpha testing, which is meant to be done "in-house" by the personnel directly involved with the system development, was carried out by the author himself. Seeing that the system is a mobile application, the internal testing was conducted in three different methods: manual testing, user interface testing, and proofreading.
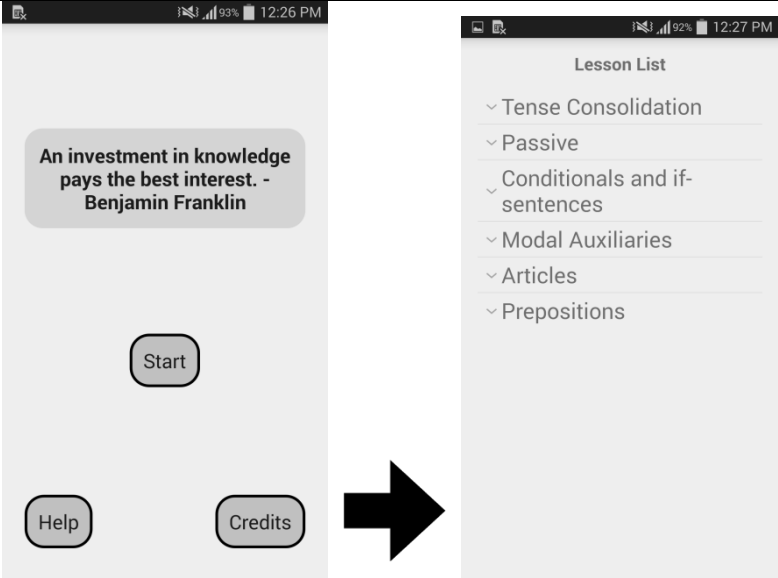
5.1.1   Manual Testing
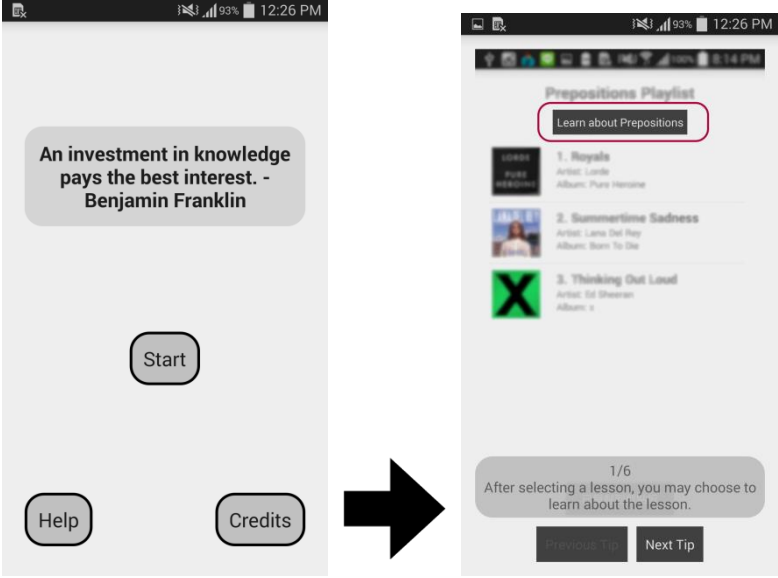
The testing was conducted using an actual Android mobile device, Samsung Galaxy Note 3, which has an Android version of 4.4.2 (API Level 19), with a screen resolution of 1080 x 1920 pixels. All possible test scenarios have been generated, and the corresponding screenshots are provided for each of the scenarios to better illustrate the test steps taken to achieve the desired test scenarios. The manual testing carried out mainly focused on the functionality and the overall navigation of the system.
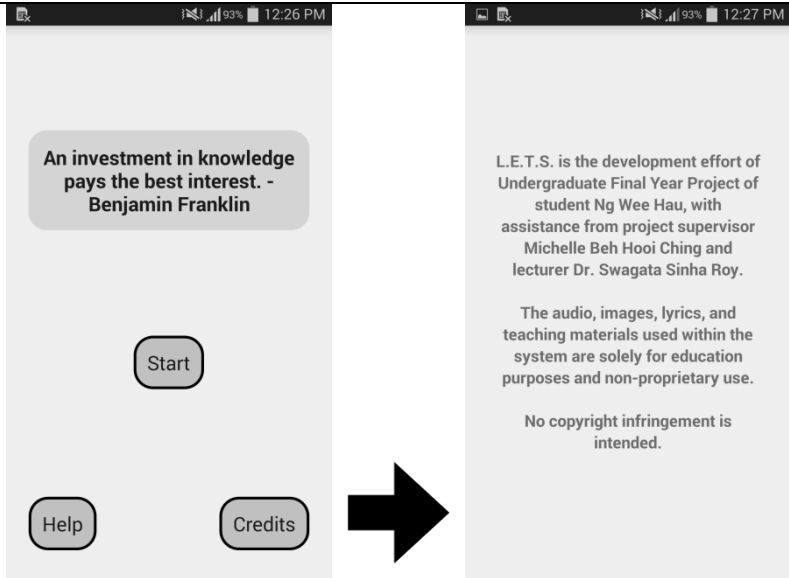
As stated in **Subsection 1.4.5**, there are a total of five modules within the system.
1. Main menu
   - Help
   - Credits
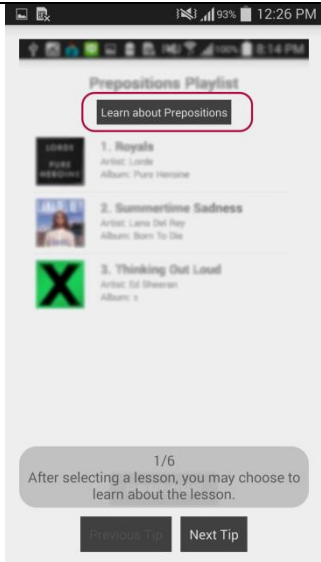
2. Lesson and song selection

3. Lesson content

4. Song playback

5. Quiz
   - Q & A
   - Results

MODULE 1	MAIN MENU
Test Case 1	Click "Start".
Expected Result	Lesson list is shown.
Status	Pass
Screenshots	

Test Case 2	Click "Help".
Expected Result	A series of tips are shown.
Status	Pass
Screenshots	

Test Case 3	Click "Credits".
Expected Result	The application information and the disclaimer are shown.
Status	Pass
Screenshots	

MODULE 1.1	**HELP**
Test Case 1	At page 1 of Help, click "Previous Tip".
Expected Result	No response from the app. "Previous Tip" button is disabled at the first page of help.
Status	Pass
Screenshots	
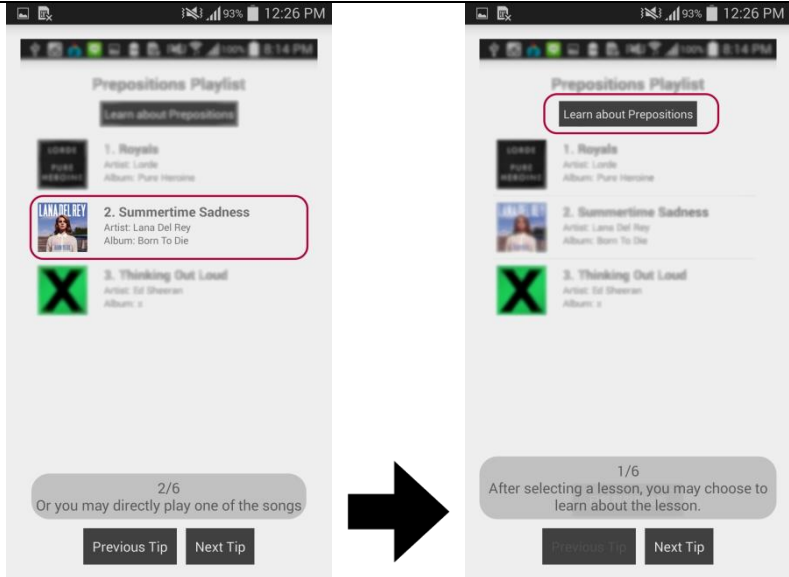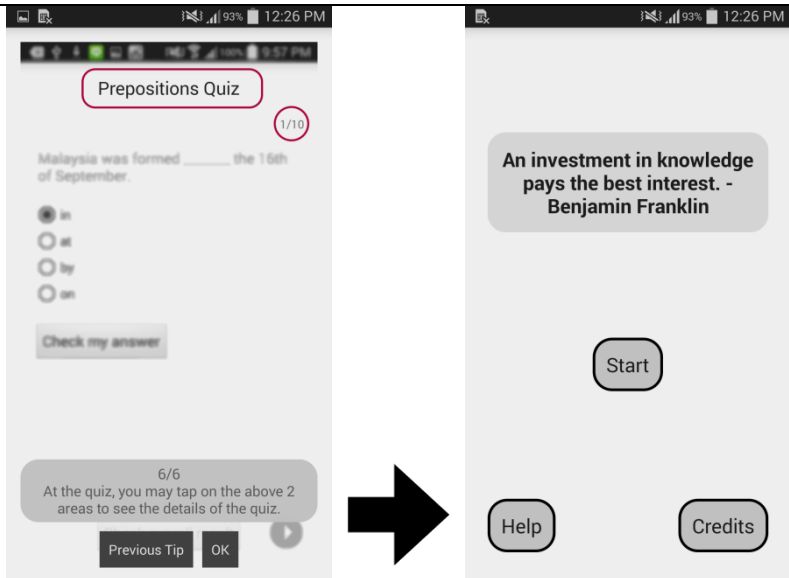
Test Case 2	At page 1 of Help, click "Next Tip".
Expected Result	Page 2 of Help is shown. "Previous Tip" button is enabled.
Status	Pass
Screenshots	
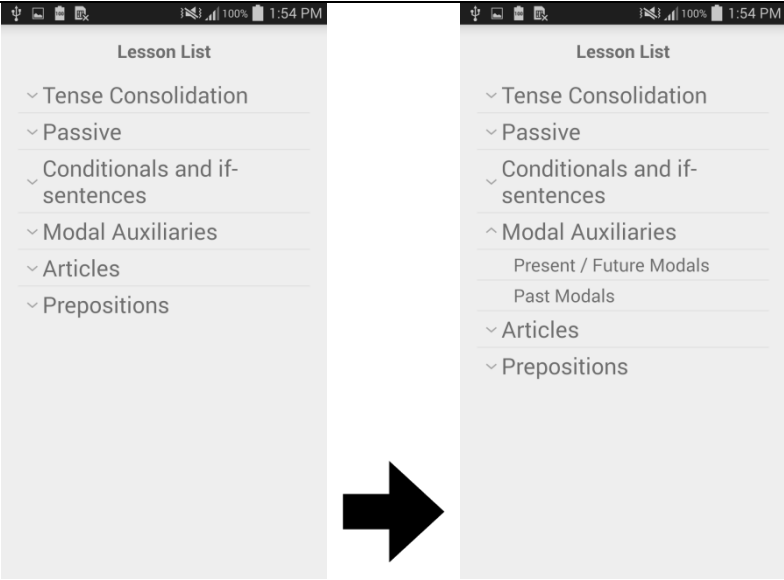
Test Case 3	At pages 1 until 4 of Help, click "Next Tip".
Expected Result	A new page of Help is shown.
Status	Pass
Screenshots	
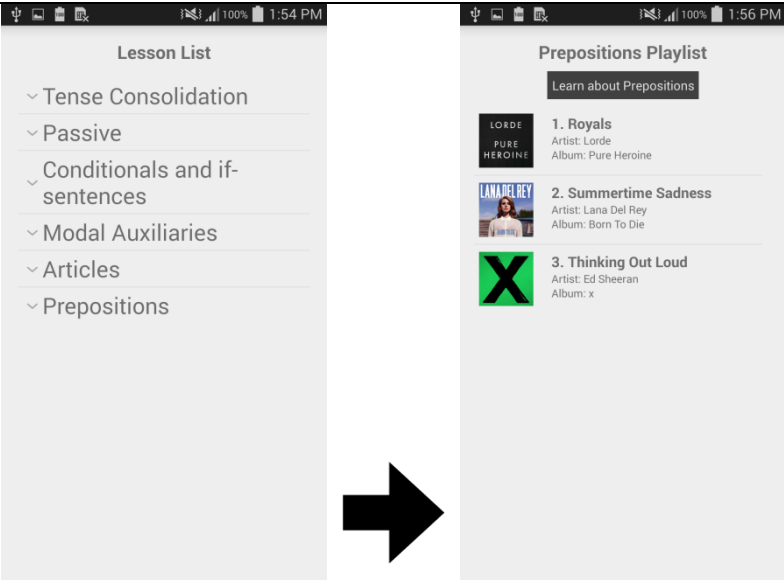
Test Case 4	At page 5 of Help, click "Next Tip".
Expected Result	Page 6 of Help is shown. "Next Tip" button is replaced with "OK" button.
Status	Pass
Screenshots	
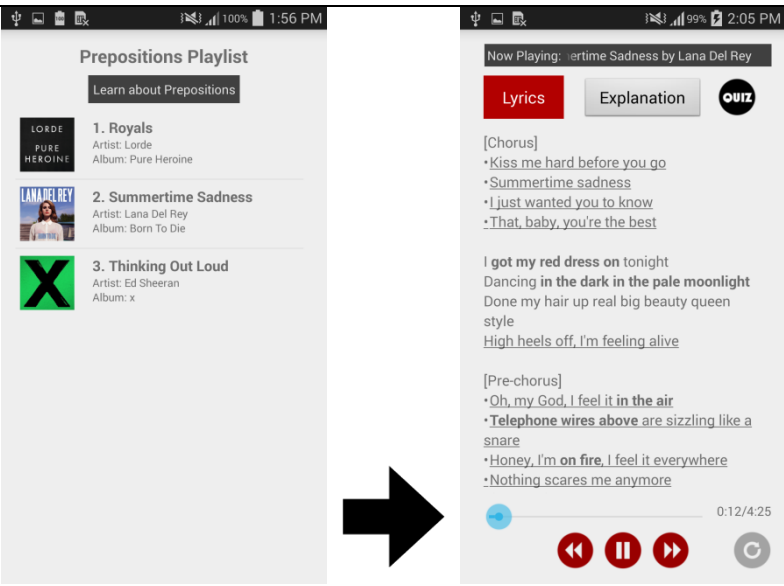
Test Case 5	At pages 3 until 6 of Help, click "Previous Tip".
Expected Result	Previous page of Help is shown.
Status	Pass
Screenshots	
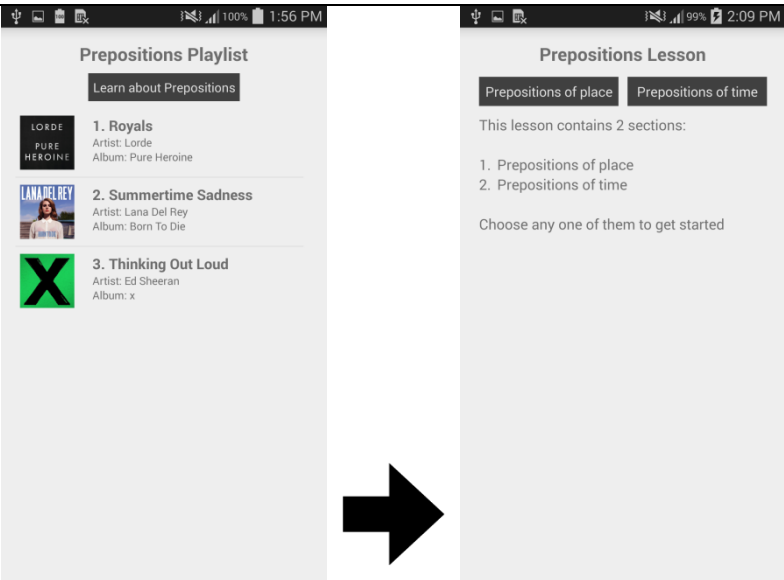
Test Case 6	At page 2 of Help, click "Previous Tip".
Expected Result	Page 1 of Help is shown. "Previous Tip" button is disabled.
Status	Pass
Screenshots	
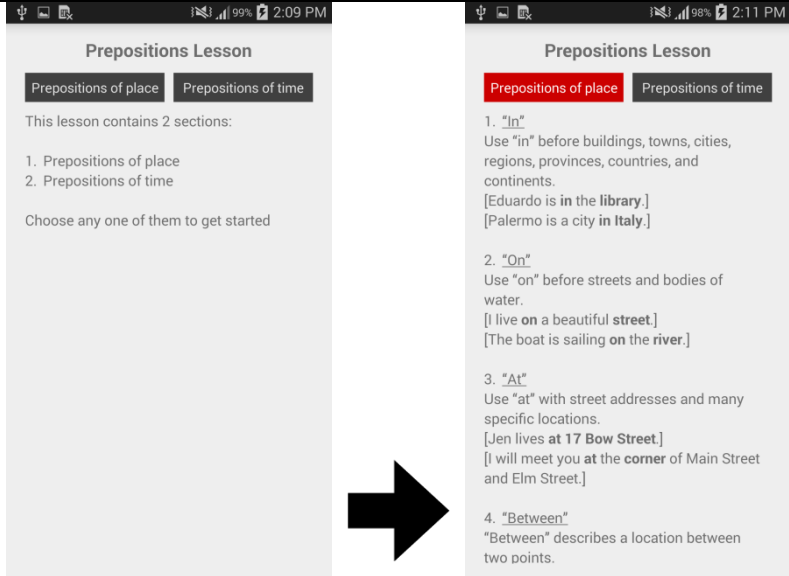
Test Case 7	At page 6 of Help, click "OK".
Expected Result	Return to main menu.
Status	Pass
Screenshots	
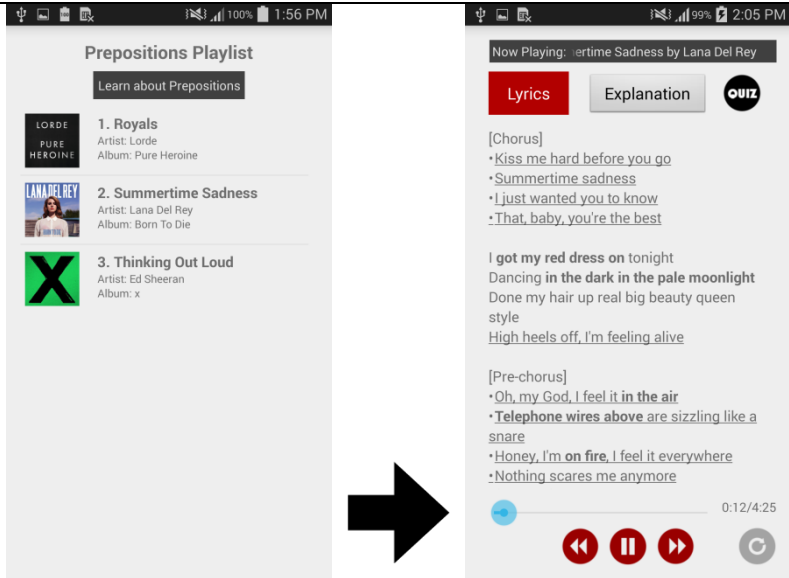
MODULE 2	LESSON & SONG SELECTION
Test Case 1	Click "Modal Auxiliaries".
Expected Result	The list is expanded. "Present / Future Modals" & "Past Modals" are shown.
Status	Pass
Screenshots	
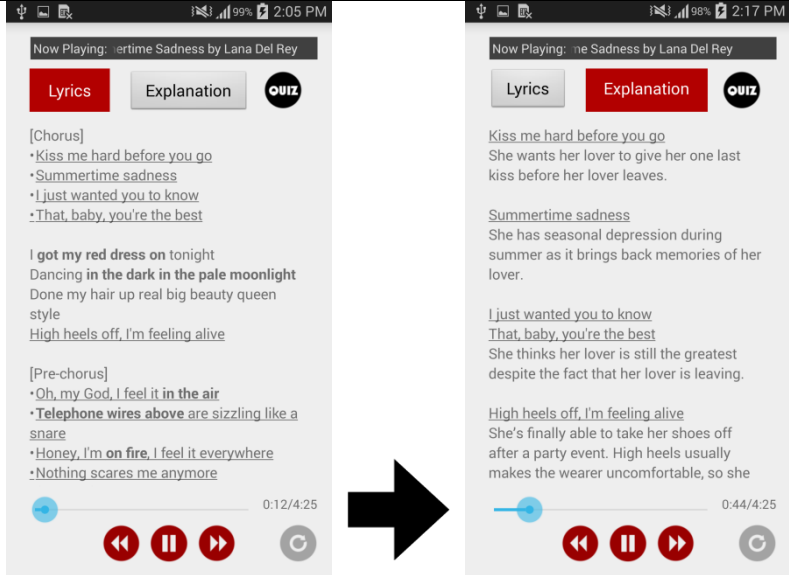
Test Case 2	Click any lesson
Expected Result	The corresponding playlist is shown.
Status	Pass
Screenshots	
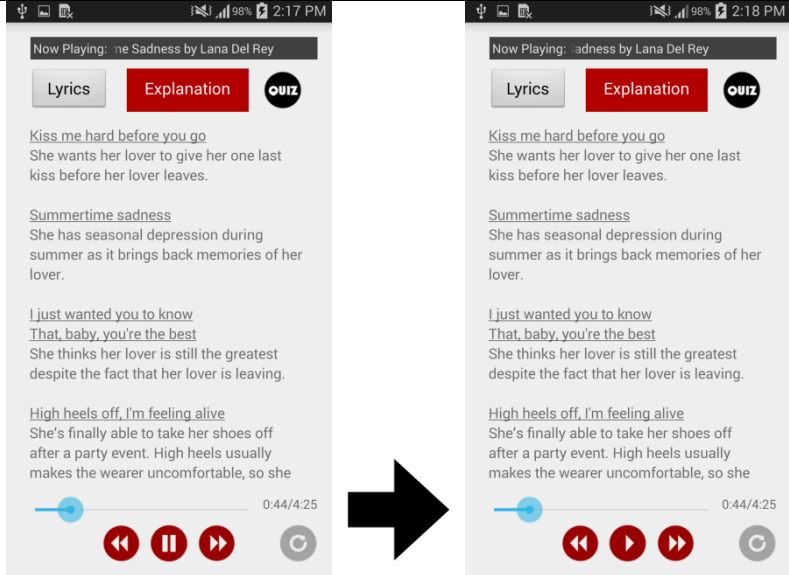
Test Case 3	Click any song from the playlist.
Expected Result	Audio player is shown. The corresponding song starts playing.
Status	Pass
Screenshots	
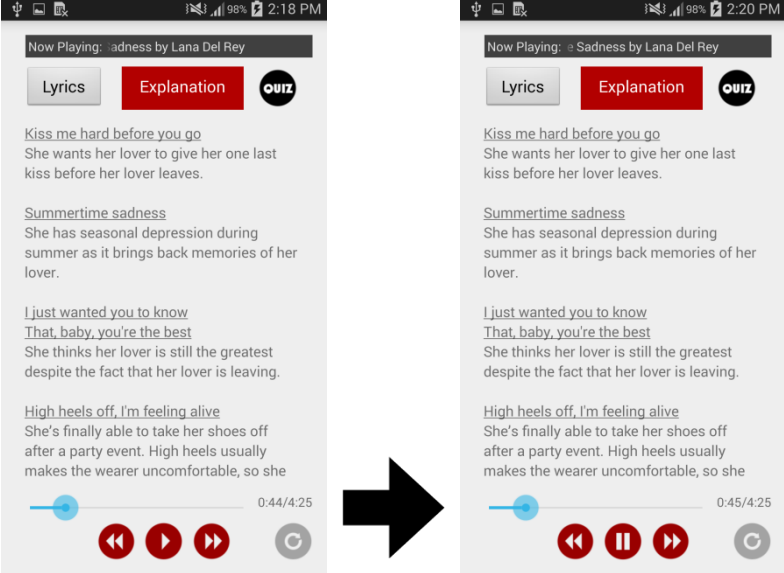
MODULE 3	LESSON CONTENT
Test Case 1	At a playlist, click "Learn about [lesson_name]"
Expected Result	The corresponding lesson introduction is shown.
Status	Pass
Screenshots	
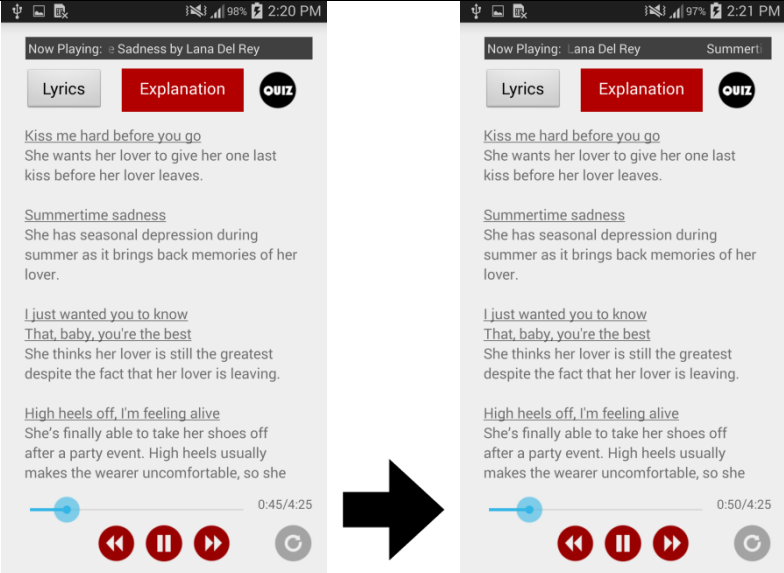
Test Case 2	Click any tab of the lesson.
Expected Result	The corresponding lesson content is shown.
Status	Pass
Screenshots	

MODULE 4	SONG PLAYBACK
Test Case 1	Click any song from the playlist.
Expected Result	Audio player is shown. The corresponding song starts playing. The corresponding lyrics is shown.
Status	Pass
Screenshots	
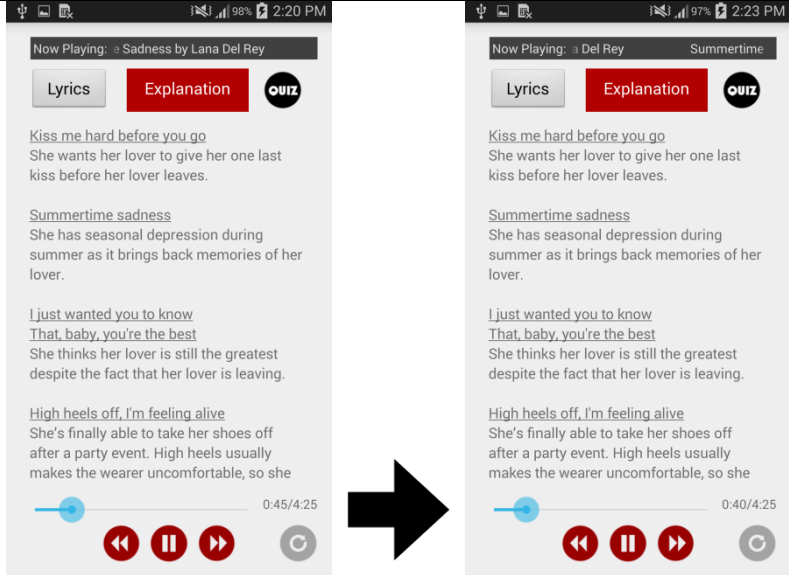
Test Case 2	Click "Explanation" tab.
Expected Result	The corresponding explanation is shown.
Status	Pass
Screenshots	
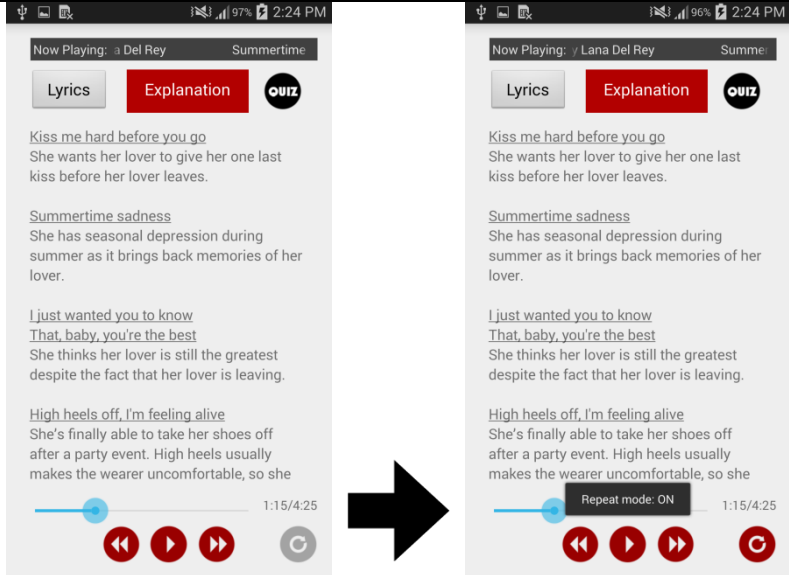
Test Case 3	Click "Pause" button.
Expected Result	The song stops playing. "Pause" button changes to "Play" button.
Status	Pass
Screenshots	
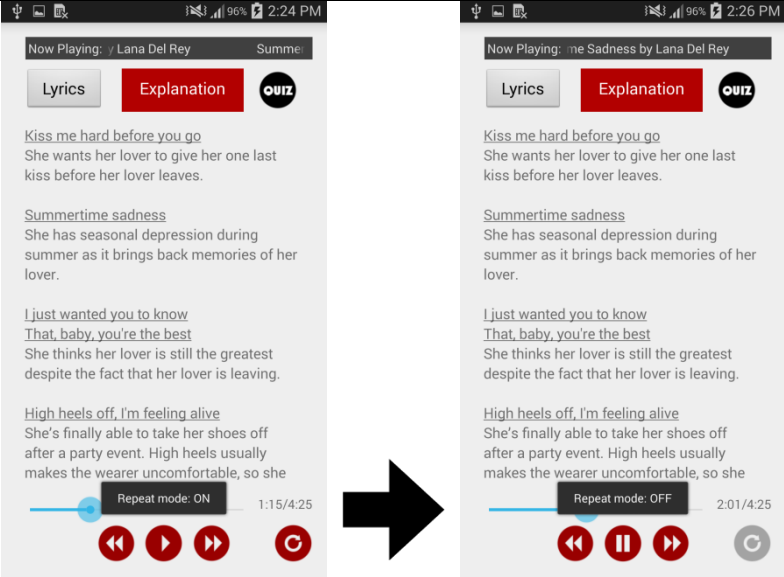
Test Case 4	Click "Play" button.
Expected Result	The song resumes. "Play" button changes to "Pause" button.
Status	Pass
Screenshots	
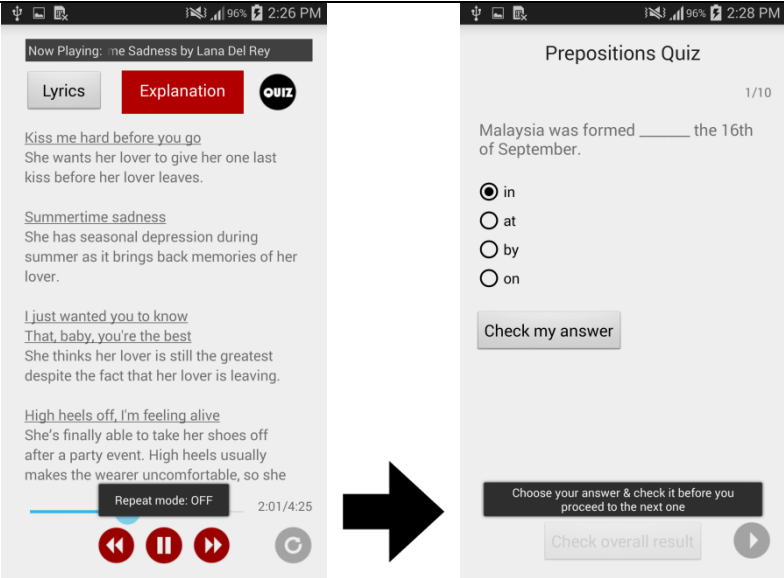
Test Case 5	Click "Fast Forward" button.
Expected Result	The song skips 5 seconds ahead and continues playing.
Status	Pass
Screenshots	
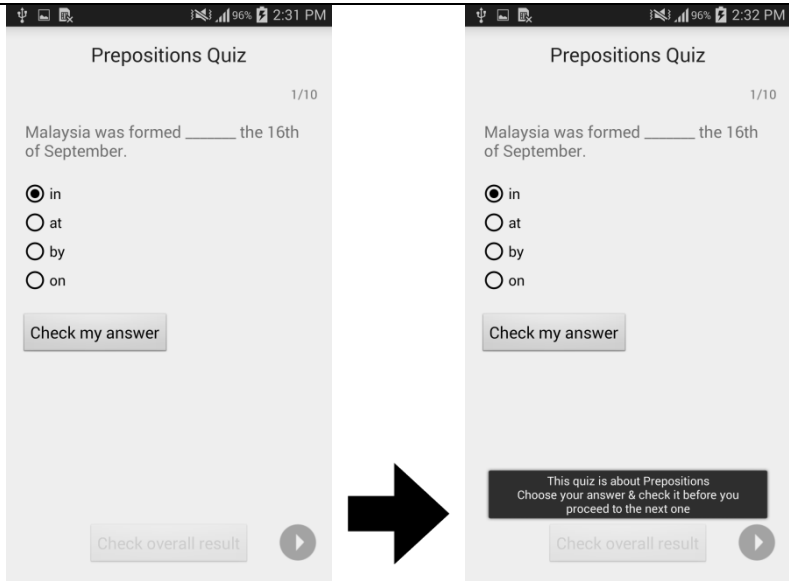
Test Case 6	Click "Rewind" button.
Expected Result	The song goes back 5 seconds and continues playing.
Status	Pass
Screenshots	

Test Case 7	Click "Repeat" button when it is in gray colour.
Expected Result	The song will replay after it reaches the end. "Repeat" button becomes red. The popup message "Repeat mode: ON" is shown.
Status	Pass
Screenshots	

Test Case 8	Click "Repeat" button when it is in red colour.
Expected Result	The song will not replay after it reaches the end. "Repeat" button becomes gray. The popup message "Repeat mode: OFF" is shown.
Status	Pass
Screenshots	
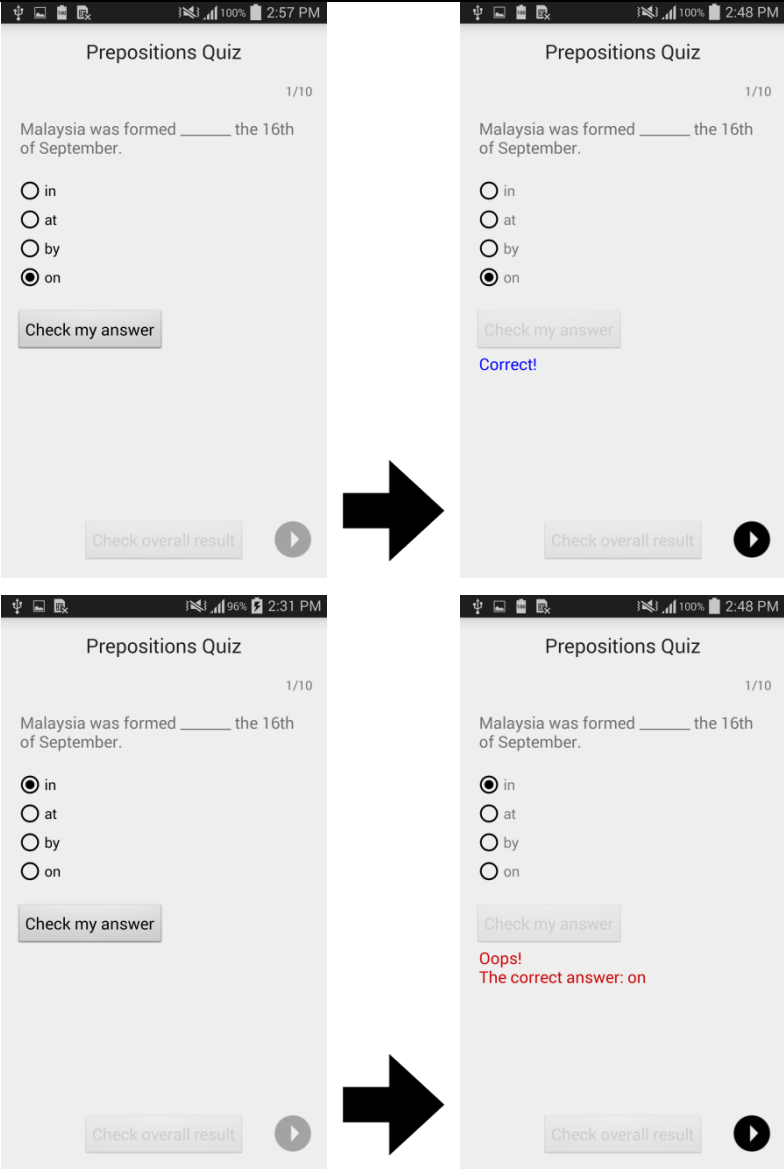
Test Case 9	Click "Quiz" button.
Expected Result	Quiz is shown. The popup message "Choose your answer & check it before you proceed to the next one" is shown.
Status	Pass
Screenshots	

MODULE 5	QUIZ
MODULE 5.1	**Q & A**
Test Case 1	Click quiz header area (e.g. Prepositions Quiz area).
Expected Result	The popup message "This quiz is about [lesson_name]. Choose your answer & check it before you proceed to the next one" is shown.
Status	Pass
Screenshots	

Test Case 2	Click question number area (e.g. 1/10 area)
Expected Result	The popup message "You are now at question [current_question_number]. [remaining_questions_amount] to go" is shown.
Status	Pass

Screenshots	
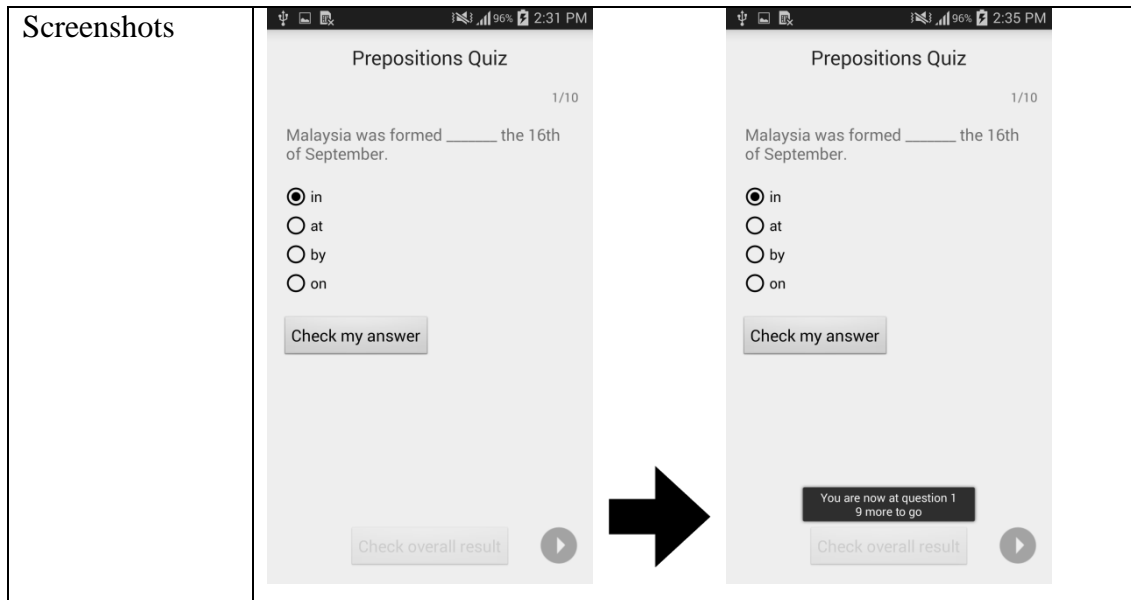
Test Case 3	Click "Check Overall Result" and "Next Question" buttons.
Expected Result	No response from the app. "Check overall result" and "Next question" buttons are disabled until after "Check my answer" button is clicked.
Status	Pass
Screenshots	
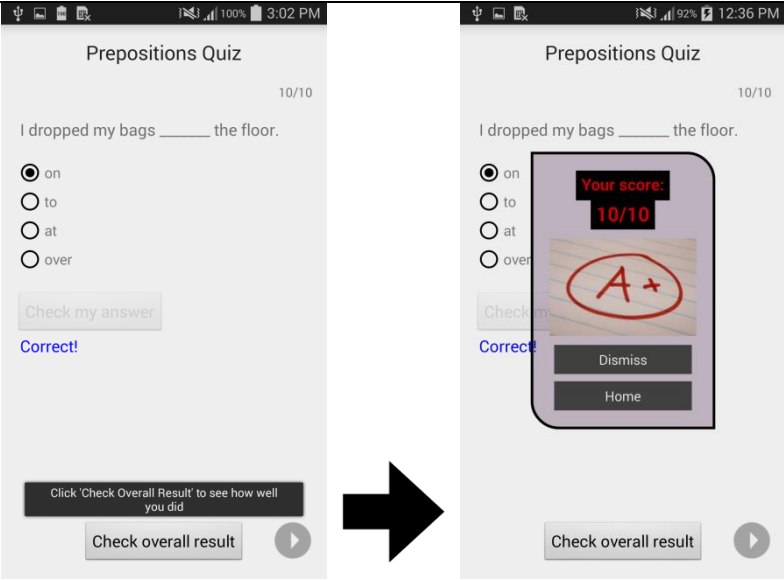
Test Case 4	Choose an answer, then click "Check my answer"
Expected Result	The answer response "Correct!" is shown in blue if the choice is correct. The answer response "Opps! The correct answer: [correct_answer]" is shown. "Check my answer" is disabled. "Next question" button is enabled.
Status	Pass
Screenshots	

Test Case 5	Click "Next question" button after "Check my answer" is clicked.
Expected Result	The next question is shown.
	"Check my answer" is enabled.
	Answer response is removed.
	"Next question" button is disabled.
Status	Pass
Screenshots	

Test Case 6	Click "Check my answer" at the final question.
Expected Result	"Check my answer" is disabled.
	Answer response is shown.
	The popup message "Click 'Check overall result' to see how well you did" is shown.
	"Check overall result" button is enabled.
Status	Pass

Screenshots	

Test Case 7	Click "Check overall result" when it is enabled.
Expected Result	The Result popup is shown.
Status	Pass
Screenshots	

MODULE 5.2	RESULTS
Test Case 1	Score is 100%.
Expected Result	The corresponding score is shown. "A+" image is shown.
Status	Pass
Screenshots	
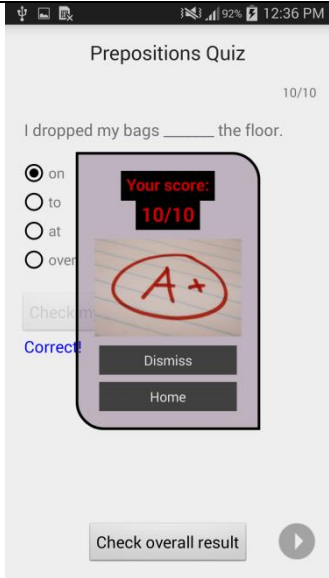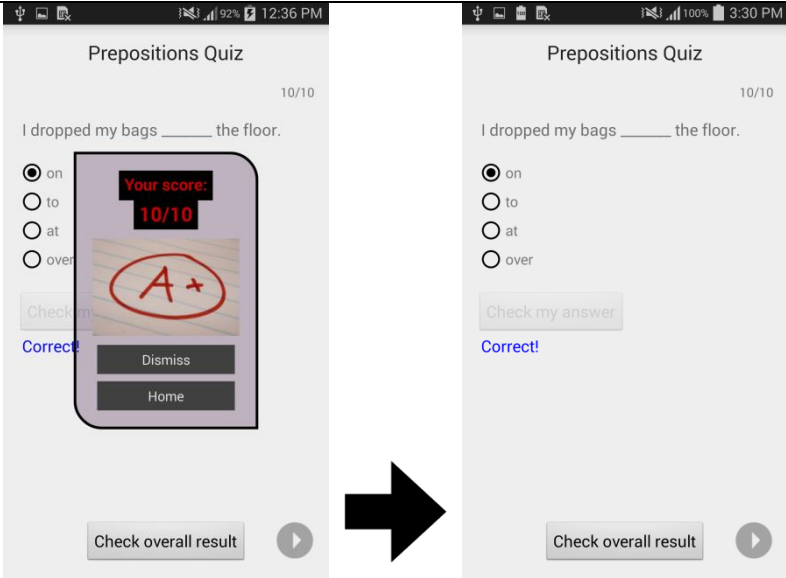
Test Case 2	Score is 80% or above but not 100%.
Expected Result	The corresponding score is shown. "A" image is shown.
Status	Pass
Screenshots	

Test Case 3	Score is 50% or above but less than 80%.
Expected Result	The corresponding score is shown. "B" image is shown.
Status	Pass
Screenshots	

Test Case 4	Score is more than 0% but less than 50%.
Expected Result	The corresponding score is shown. "C" image is shown.
Status	Pass
Screenshots	

Test Case 5	Score is 0%.
Expected Result	The corresponding score is shown. "F" image is shown.
Status	Pass
Screenshots	

Test Case 6	Click any buttons besides "Dismiss" or "Home" button when Result popup is shown.
Expected Result	No response from the app. Either "Dismiss" or "Home" button must be clicked first before any other actions can be taken.
Status	Pass
Screenshots	

Test Case 7	Click "Dismiss" button when Result popup is shown.
Expected Result	The last quiz question is shown.
Status	Pass
Screenshots	

Test Case 8	Click "Home" button when Result popup is shown.
Expected Result	Main menu is shown.
Status	Pass
Screenshots	

Test Case 9	Click "Return" at main menu. (after clicking "Home" button at Result popup)
Expected Result	The application is exited, instead of returning back to the Result popup.
Status	Pass
Screenshots	

5.1.2   Graphical User Interface Testing

Since the manual testing for the system was only performed on one actual device, there might be some problems with the graphical user interface, the layout, or the arrangement of the elements on screen when a different mobile device is used to execute the system. Such issues arise mostly because different devices have different screen resolutions, resulting in the misplacement of certain elements on screen, especially when a device is relatively smaller than the one being used to test the system. Therefore, the fact that graphical user interface testing is essential is particularly true given that the testers who participated in the beta testing (See **Section 5.2**) could use any Android-operated mobile device that they own.

To accomplish such testing, an Android emulator named GenyMotion is utilized. GenyMotion contains over 20 pre-configured devices with a wide range of support of API versions, from 2.0 to 5.0 (GenyMotion, n.d.). It allows its users to easily run their Android apps on devices with various screen resolutions and Android versions (See **Appendix F** for a list of virtual Android devices provided by GenyMotion).
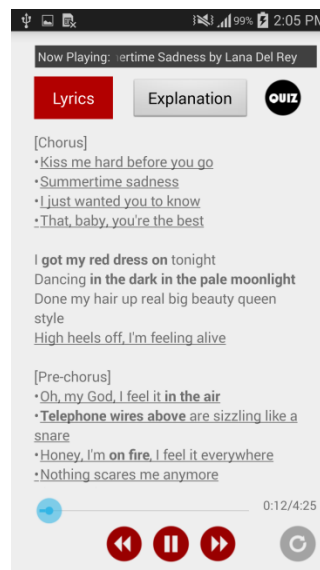
Figure 5.1: System Screenshot using Actual Device, Samsung Galaxy Note 3

Figure 5.2: System Screenshot using Virtual Device, Samsung Galaxy Note 3

From **Figure 5.1** and **Figure 5.2**, it can be seen that the user interface portrayed by a virtual device is exactly the same as the one shown by an actual device. Thus, it is reliable to use GenyMotion to emulate the user interface on various virtual devices.

A number of virtual devices were chosen for the user interface testing, including Samsung Galaxy S5, Google Nexus 6, and Sony Xperia S. (See **Figures 5.3, 5.4, and 5.5**)
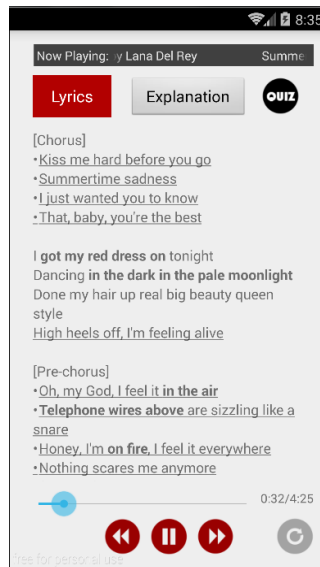
Figure 5.3: System Screenshot using Virtual Device, Samsung Galaxy S5
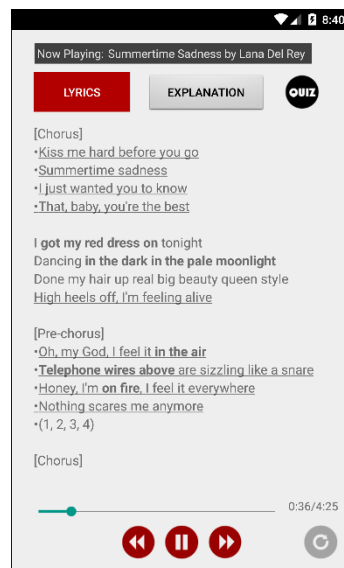
Figure 5.4: System Screenshot using Virtual Device, Google Nexus 6

Figure 5.5: System Screenshot using Virtual Device, Sony Xperia S

From **Figure 5.4**, it can be seen that one major difference that it has is the auto capitalization of letters within the buttons. For example, "Lyrics" tab button appears as a sentence case (only first letter is capitalized) in other virtual devices, while it appears as an uppercase (all letters are capitalized) on Google Nexus 6. Anyhow, aside from the capitalization of the button words, the rest is still consistent.

After the testing was done on the selected virtual devices, it has been concluded that no major issues were found which would have largely affected the graphical user interface, the layout, or the arrangement of elements on screen.
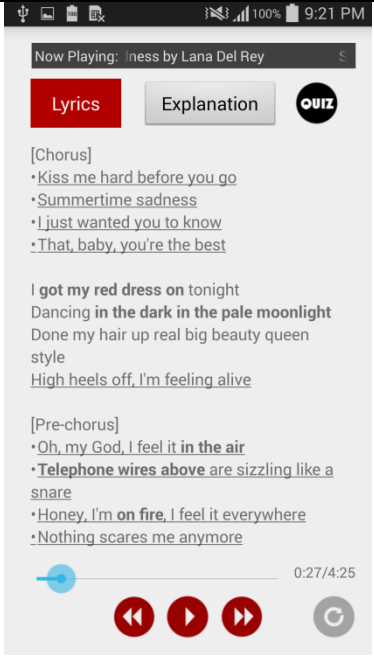
5.1.3   Proofreading
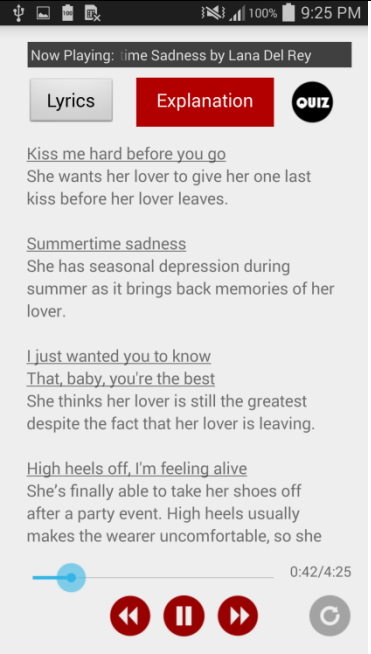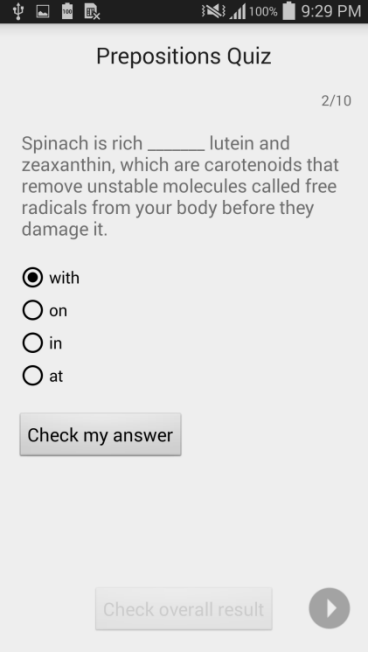
Due to the large amount of texts that occur within the system, proofreading is a very necessary step in order to detect and correct any production errors of text before the system is delivered to the users. During this process, the testing generally involves checking of spelling, punctuation, grammar, font styles, alignment, and content. By doing so, an overall consistent style could be maintained through the entire

navigation of the system, besides being able to avoid confusion or misunderstanding when reading them.

No.	Screenshots	Proofreading checklist
1.		• Playlist header ("Prepositions Playlist") must match the lesson name. [Alignment: Center] • The lesson name of "Learn about [lesson_name]" (e.g. Learn about Prepositions) must match the lesson name. [Alignment: Center] • Song titles, artists, albums, and cover arts must be correct for each song. [Alignment: Left] • No spelling mistakes, especially for the artist names which are usually unique.
2.		• Lesson header must match the lesson name. [Alignment: Center] • Title of the lesson tabs must be correct. [Alignment: center] • Lesson introduction ("This lesson contains …") must have the correct number of sections, and the correct lesson titles. [Alignment: equally divided between the tabs] • The introduction must be grammatically correct without any spelling or punctuation mistakes. [Alignment: left]

3.	**Prepositions Lesson** Prepositions of place · Prepositions of time 1. "In" Use "in" before buildings, towns, cities, regions, provinces, countries, and continents. [Eduardo is in the library.] [Palermo is a city in Italy.] 2. "On" Use "on" before streets and bodies of water. [I live on a beautiful street.] [The boat is sailing on the river.] 3. "At" Use "at" with street addresses and many specific locations. [Jen lives at 17 Bow Street.] [I will meet you at the corner of Main Street and Elm Street.] 4. "Between" "Between" describes a location between two points.	• The lesson content must be related to the corresponding tabs. [Alignment: left] • Numbering, font styling (bolding, italicizing, underlining), punctuation, spacing, and spelling must be correct. • A new preposition must be numbered, underlined, and double quoted. • Lesson examples must be enclosed within square brackets ("[" and "]"). • A line of spacing must be provided after each description, before the lesson examples. • A new preposition must begin after 2 lines of space from the previous preposition. • Words related to the lesson are bolded. • The sentences must be grammatically correct without any spelling or punctuation mistakes.
5.	Now Playing: Iness by Lana Del Rey S Lyrics Explanation QUIZ [Chorus] · Kiss me hard before you go · Summertime sadness · I just wanted you to know · That, baby, you're the best I got my red dress on tonight Dancing in the dark in the pale moonlight Done my hair up real big beauty queen style High heels off, I'm feeling alive [Pre-chorus] · Oh, my God, I feel it in the air · Telephone wires above are sizzling like a snare · Honey, I'm on fire, I feel it everywhere · Nothing scares me anymore 0:27/4:25	• Now Playing status must show the correct song name and artist. The status must be automatically scrolling horizontally if the length exceeds the width of the screen. [Alignment: left] • The lyrics must match the song. [Alignment: left] • Words related to the lesson are bolded. • Words or phrases underlined are provided with explanations at "Explanation" tab.

5.		• The explanation must be for the corresponding song. [Alignment: left] • Words or phrases from the lyrics must be underlined. • The corresponding explanation must come after each of the words or phrases. • A new line of lyrics must begin after 1 line of spacing from the previous explanation. • Every explanation must end with a full stop. • The sentences must be grammatically correct without any spelling or punctuation mistakes.
6.		• Each question must end with either a full stop or a question mark. [Alignment: left] • The length of the blank ("____") must be the same through all of the quizzes, and there must be one space before and after the blank. • The sentences must be grammatically correct without any spelling or punctuation mistakes. • The answer for each question must be correct.

5.2   Beta Testing

Beta testing was done with a number of testers, who are representatives of real users, and were not involved in the system development in any way.

To conduct the testing, the installer (with the extension of .apk) was installed into the Android devices of the testers. Prior to the process, they had been informed that the application requires storage of at least 120 MB to be available on their devices. After the app had been successfully installed into a tester's device, he / she was encouraged to go through the "Help" module of the app before official getting started with the testing. Each tester took approximately 30 minutes for the entire process.

After the testing, they were asked to fill in a questionnaire. The intent of the questionnaire was to learn about the testers' opinions and thoughts after having some experience with the app.

5.2.1   Mode of Beta Testing, Mode of Distribution and Collection of Questionnaire

It was initially planned to have a face-to-face meeting with all of the testers for beta testing and to complete the questionnaire on the spot. However, considering the difficulty of physically meeting most of them, the entire process of beta testing was completed via online social media such as Facebook.

The installer of the app was first uploaded on Google Drive (See https://drive.google.com/file/d/0B2unRatIiFk8TmVzNFVJU0xlUUU/view) to allow the testers to download it onto their mobile devices, which would then be properly installed.

The survey form was created in the form of Microsoft Office Word 2010 document. (See **Appendix G**) A Google form was then created as well (See

https://docs.google.com/forms/d/1onjZkdUwL05uiE7fNQOCkVkeKQpfOJpCSohtrL yjuWQ/viewform) so that the testers were able to answer them online.

5.2.2   Sample Size and Selection

The population for the survey is comprised of mainly tertiary education students. The number of participants for beta testing is not finite since the process is still on-going by the time of writing. As of 2 April 2015, a total of **18 testers** have participated the testing and completed the questionnaire. Anyone with Android-operated mobile devices was eligible for the testing, although there was a slight emphasis on secondary or tertiary education students.

5.2.3   Structure and Sections of Beta Testing and Questionnaire

The questionnaire is composed of **2 parts**:
Part A: Basic Demographic Information
Part B: User Satisfaction

Part A is to roughly know about the identity of the testers so that there is a general image about each of them which might be useful for later stages of the Final Year Project. The testers were asked about their age group, self-assessed English language proficiency level, and their experience with learning-based mobile applications.

Part B of the questionnaire focuses on testers' overall experience with the application. They were asked on the ease of use and navigation, the overall layout interface, and the lesson content and assessment provided.

5.2.4   Data Analysis and Results

5.2.4.1   Analysis of Testers' Basic Demographic Information
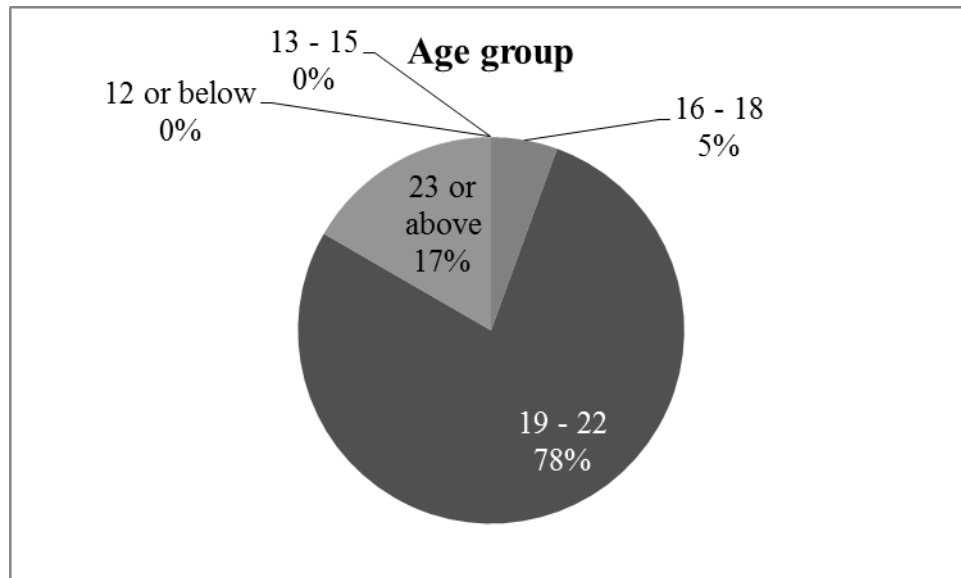
Figure 5.6: Age Group of Testers

Figure 5.6 shows that there is 1 tester (5%) whose age is between 16 - 18, 14 testers (78%) who are 19 - 22 years old, and 3 testers (17%) who are at least 23 years old. Meanwhile, none of them are 15 years old or younger.

Students / Non-students

11%

89%

- Students
- Non-students
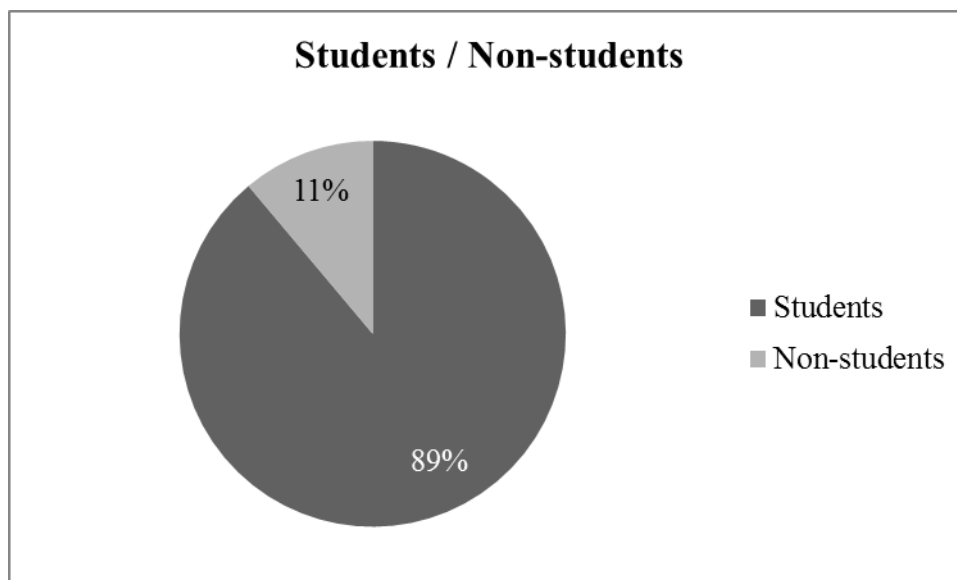
Figure 5.7: Students or Non-students among Testers

Figure 5.7 shows that there are 16 testers (89%) who are currently enrolled in education institutions, while the other 2 testers (11%) are not.

Self-assessed English language proficiency level

Native speaker 0%

Basic 17%

Advanced 28%

Intermediate 55%
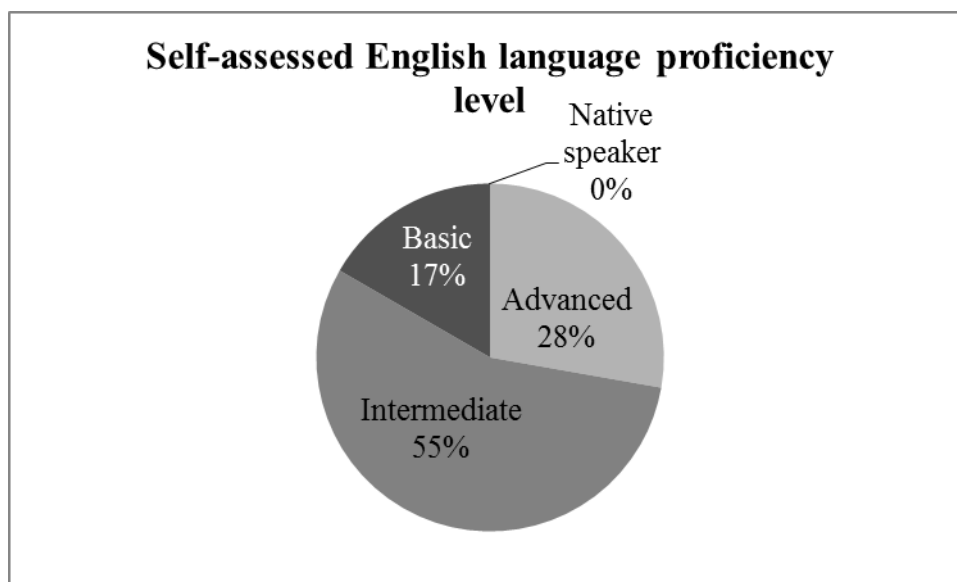
Figure 5.8: Self-assessed English Language Proficiency Level of Testers

Figure 5.8 shows that there are 3 testers (17%) who consider their English language proficiency level as basic. Most of the testers (10 testers, 55%) think that they have an intermediate level of English proficiency level. Besides that, 5 testers (28%) feel

that their proficiency of English language is at advanced level. In addition, none of them are native speakers.
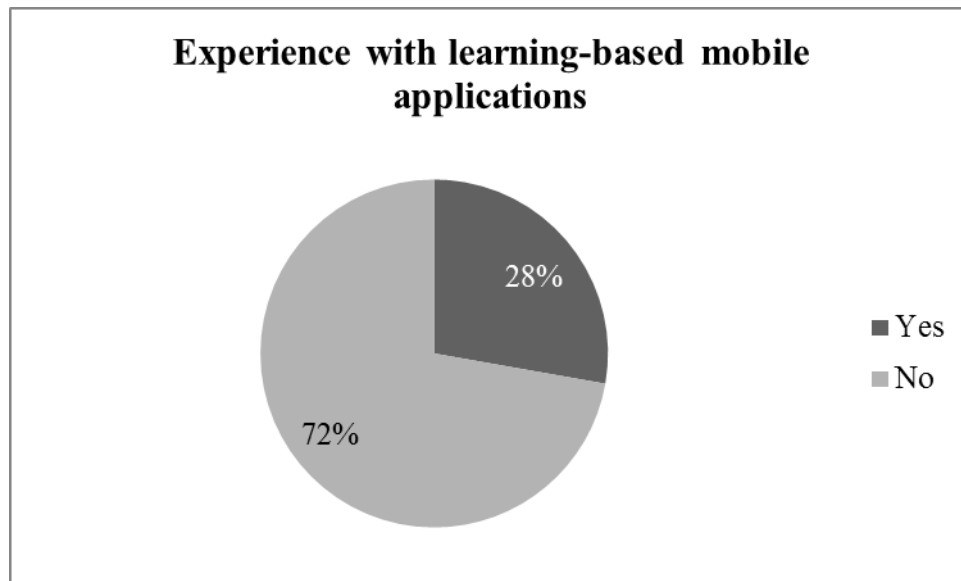
Figure 5.9: Testers' Experience with Learning-based Mobile Applications

Figure 5.9 shows that out of the 18 testers who took part in the beta testing, only 5 of them (28%) have used their mobile devices as a means of learning. According to their responses, dictionaries are what they usually use for learning. Besides that, one tester learned how to play guitar using a mobile app named "Jamn Player". Thus, it can be observed that not many smartphone users actually use their devices as a learning tool.

5.2.4.2   Analysis of Testers' Satisfaction with the System
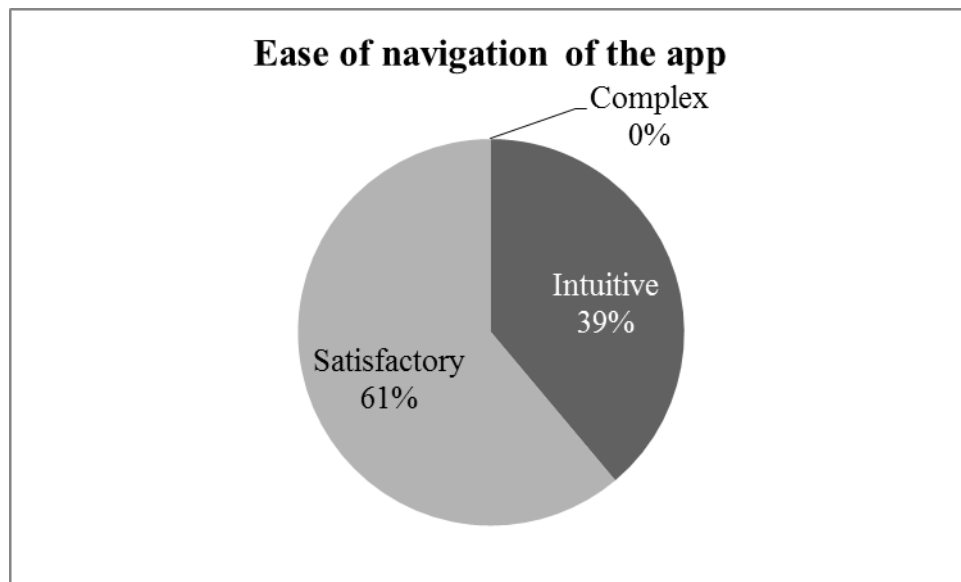
Figure 5.10: Ease of Navigation of the System from Testers' Point of View

Figure 5.10 shows that 11 testers (61%) think that the Final Year Project system have a satisfactory level of navigation ease, while 7 testers (39%) think it is intuitive. Thankfully, none of them consider the navigation of the system to be complex.
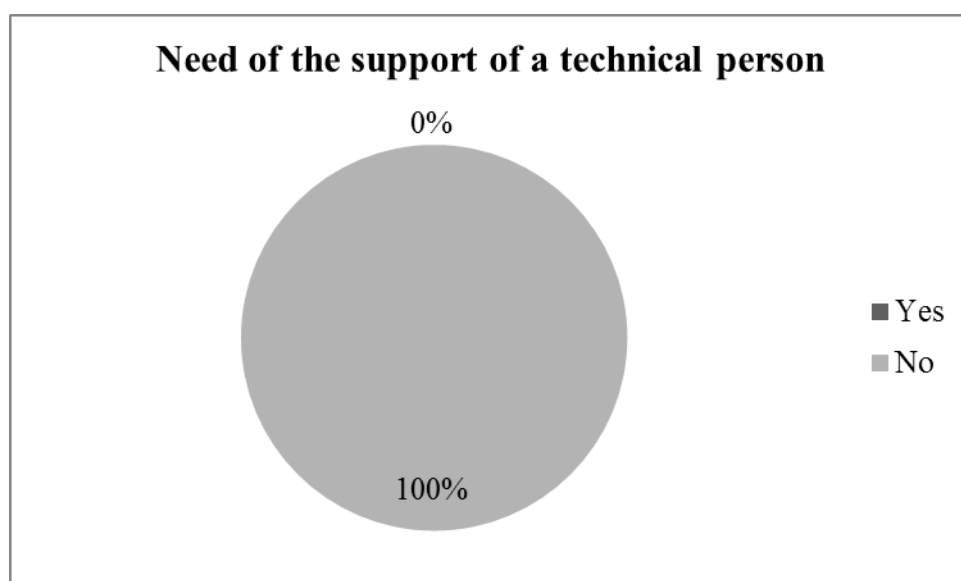
Figure 5.11: Need of the Support of a Technical Person

Figure 5.11 shows that none of the testers felt the need to have the support of a technical person when using the system. This could mean that the system is easy to learn and use, and is not very complicated to understand how it works. Thus, they were able to interact with the system on their own without any assistance from the author or any other technical person.
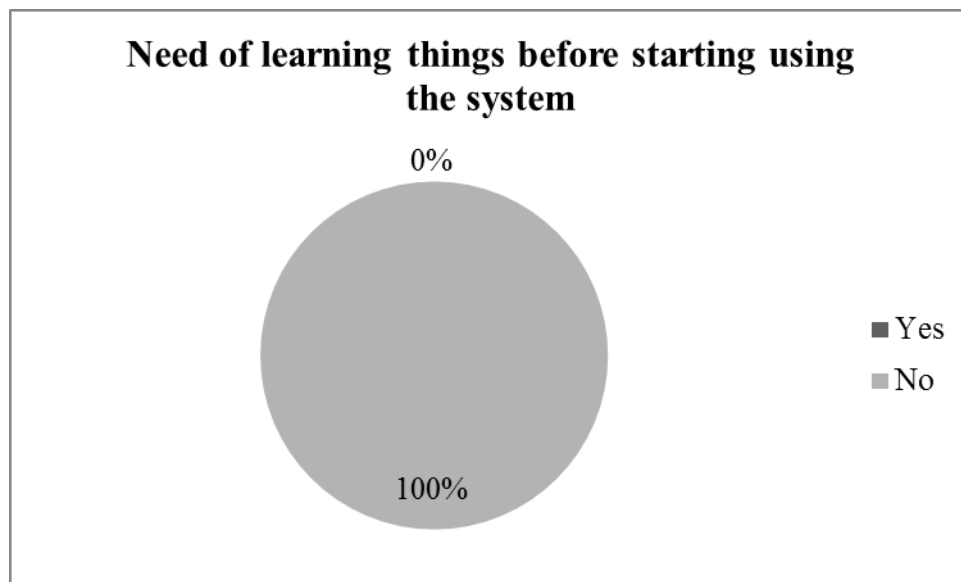
Figure 5.12: Need of Learning Things before Starting Using the System

Figure 5.12 shows that none of the testers had to learn a lot of things before they could start interacting with the system. Therefore, it can be said that the system is suitable for many people, regardless of with or without specific knowledge.
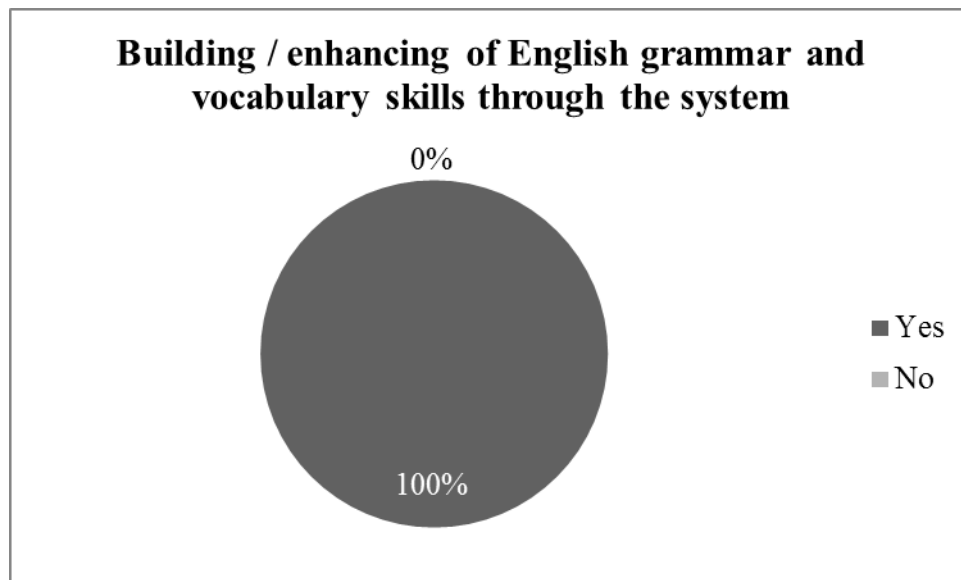
Figure 5.13: Building / Enhancing of English Grammar and Vocabulary Skills through the System

Figure 5.13 shows that all of the testers think that after interacting with the system, their English grammar and vocabulary skills have improved. This could mean that the levels of depth and coverage of the lesson content and assessment provided were sufficiently implemented into the system.
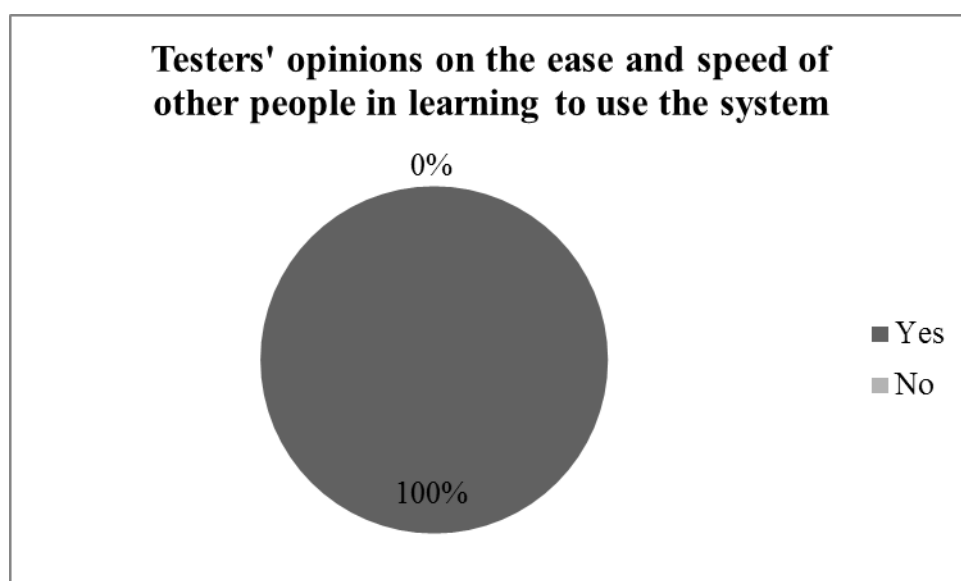
Figure 5.14: Testers' Opinions on the Ease and Speed of Other People in Learning to Use the System

Figure 5.14 shows that all of the testers think that most other people would be able to learn to use the system very easily and quickly. This implies that after the testers had completed interacting with the system, they feel that it is easy and quick to learn how to use the system, thus opining that other people would have the same experience as well.
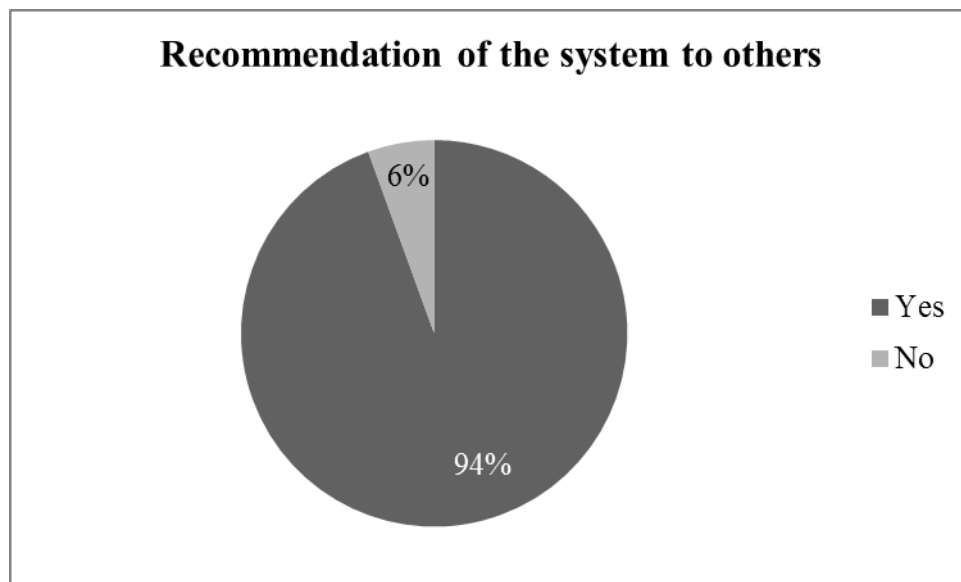
Figure 5.15: Recommending the System to Others

Figure 5.15 shows that almost all of the testers (94%) would recommend the system to others, while only one of them (6%) would not. After directly interviewing the tester who would not recommend the system to others, it is found that the tester considers the layout and overall design of the system are too simple looking and need enhancement. Thus, the tester thinks that people won't purchase it, or even download it for free, if it were available on the app store.
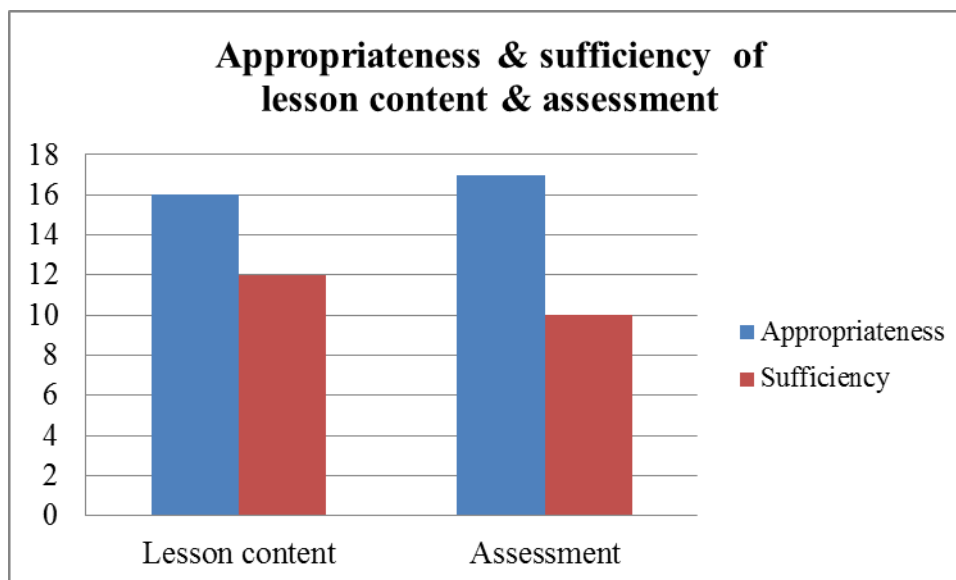
Figure 5.16: Appropriateness and Sufficiency of the Lesson Content within the System

Figure 5.16 shows the satisfactory level of testers regarding the lesson content and assessment within the system in terms of their appropriateness and sufficiency. For the lesson content, 16 testers (88.9%) think that it is appropriate and 12 (66.7%) think that it is sufficient. Meanwhile, 17 testers (95.4%) consider the assessment provided to be appropriate and 10 (55.6%) consider it sufficient.

The last three questions of the questionnaire, which are open-ended, asked about what the testers liked the best and least about they system, and also some comment in case they had any suggestions, questions, or extra information that they wished to share.

In overall, what the testers liked best about the system is the "cleanliness" and simplicity of the graphical user interface, which makes it easy to use. They remarked that the interface is elegant and consistent, which can increase the rate of user retention over time. Also, they think the interface is very responsive since there are always toasts or popup messages that serve as instructions or notification every now and then. Besides the interface, the testers also noted on the fresh and creative approach of learning English grammar and vocabulary. They opined that since the system combines music with learning, it is not as uninteresting and boring as

traditional classroom learning. Some of the testers also mentioned that the system provides a rather efficient and comfortable way of learning English grammar and vocabulary, especially for those who are less interested in it. Other than that, a number of testers also praised the music selection, since most of the songs are their favourites, thus making them enjoy the process of learning. In addition, some testers also stated the system makes learning convenient and easily accessible by implementing it on the mobile platform.

On the other hand, what the testers liked the least is the number of lessons and songs included in the system. They suggested that more lessons and songs should be incorporated. Majority of them also commented that the graphical user interface could be more colourful by adding more diverse colours and background images. Several testers also remarked on the difficulty of the quiz, because they feel that different levels such as beginners, intermediate, and advanced should be added so that they will not have to answer challenging questions since the beginning of the quiz.

CHAPTER 6

CONCLUSION

6.1   Contributions

The following 4 points justify the possible contributions of the project, and they describe the need that the project will satisfy, or the problem that it will address.

1. **A non-traditional way of learning English**

   Through the use of the application, users will be able to experience the fresh way of learning English, which is through music, rather than traditionally through books. For English learners who already have an interest in learning the language through music, the application helps them save time looking for the lyrics by searching online, and also guarantees that they are referring to the correct lyrics. This is due to the fact that many online song lyrics contain some grammar and spelling errors, or even the wrong words with similar pronunciations. Meanwhile, for those who have yet to explore the learning of English musically, the application introduces such a method to them. In either case, the multimedia application provides one more approach for users to learn English, besides the typical ways such as classroom learning and conversations.

   In addition, learning English language through songs is a means which is believed to bring excitement and novelty to the learning process, since classroom style learning is how most learners learn the language. It also

allows users to learn English in a more fun and lively way compared with the usual textbook approach.

2. Consolidation of users' English language foundation

By using songs and their lyrics as a medium, the teaching content will help strengthen the English language foundation of users. Even though the application will only contain a portion of grammar lessons and vocabulary due to numerous constraints of the project, users will still be able to absorb sufficient knowledge on particular language components by learning from the lessons incorporated. Since the project is targeted towards secondary and tertiary education English learners with relatively low English language proficiency levels, the multimedia application is thought to have even more effectiveness and usefulness for and on them. The reason is that students at secondary or higher education institutions are generally assumed to have mastered the basics of the language (Kolowich, 2011).

3. A supplement tool during classroom learning

The application can possibly be used by school teachers as a teaching kit to assist them in teaching, illustrating, and reinforcing English grammar lessons and vocabulary. With textbooks as a form of teaching guide, and the application as one of the teaching materials, teachers may be able to stimulate and foster the students' interest in learning English, and add more liveliness and vividness during the education process.

4. Encouragement of self-directed learning (SDL) process

Users are able to learn English lessons which are available within the application at their own pace. They can also utilize the application with minimal need to seek guidance and instructions from someone else, such as teachers and parents. Likewise, users are not limited to utilize the application on campus only, since they can use it at home as long as there is a computer. Users may repeat any available lessons, by which can help refresh users'

memory and consolidate their knowledge about particular lessons. This thus increases the frequency of exposure and practice of users throughout the course of learning.

6.2   Limitations

The lesson list has the group indicator (downward arrow), which implies that each of the lessons is expandable. However, only one of the lessons is expandable. This could make first time users feel confused because the lessons always look like they are expandable, but that is not the case for all of the them.

The quiz does not contain questions that will allow users to provide their own answers as input, such as fill-in-the-blank questions. This is because with user input, there will need to be a lot of user input validation checking implementations. Such implementations include the checking of space, alphanumeric, Unicode, symbols, and empty input. Thus, allowing user input will largely increase the development effort of the project in terms of time and knowledge, which has already been insufficient.

6.3   Future Enhancement

Should the Final Year Project be carried on after this submission, there will be a number of areas that will need improvement.

1. **Lessons**

   More lessons will be added, and they could be categorized into different levels of difficulties, such as beginners, intermediate, and advanced.

2. Songs

More songs will be added to each lesson to provide more examples of how the grammar rules are applied. More new songs will also be added to match the current musical trend in order to attain users' interest in the system.

3. Quiz

More quiz questions will be added to each lesson. Similar to the lessons, they could be classified into different level of difficulties, such as beginners, intermediate, and advanced. Besides, the questions will be more diverse. Aside from multiple choice questions, fill-in-the-blanks, self-type, sentence rearrangement, and even word puzzles will be available.

4. Graphical user interface

The user interface of the system will be improved. This could be achieved by providing some background images, adding some colours that are diverse but also not contrasting. Certain effects will also be added. For example, when a user clicks "Pause" button, it will glow so long as the user keeps holding on it.

5. Update

The system will have a routine update period, such as on a monthly or bi-monthly basis. This will be to ensure the newer English songs are available in the application, and newer lessons are also provided. Each update will offer more and more features, and will also fix the bugs or mistakes found on the latest version, if any.

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APPENDICES

Appendix A - Common European Framework of Reference for Languages (CEFR) levels description

CEFR Level	Listening / Speaking	Reading	Writing
C2 (Mastery)	Can advise on or talk about complex or sensitive issues, understanding colloquial references and dealing confidently with hostile questions.	Can understand documents, correspondence and reports, including the finer points of complex texts.	Can write letters on any subject and full notes of meetings or seminars with good expression and accuracy.
C1 (Effective Operational Proficiency)	Can contribute effectively to meetings and seminars within own area of work or keep up a casual conversation with a good degree of fluency, coping with abstract expressions.	Can contribute effectively to meetings and seminars within own area of work or keep up a casual conversation with a good degree of fluency, coping with abstract expressions.	Can prepare/draft professional correspondence, take reasonably accurate notes in meetings or write an essay which shows an ability to communicate.
B2 (Vantage)	Can follow or give a talk on a familiar topic or keep up a conversation on a fairly wide range of topics.	Can scan texts for relevant information, and understand detailed instructions or advice.	Can make notes while someone is talking or write a letter including non-standard requests.
B1 (Threshold)	Can express opinions on abstract/cultural matters in a limited way or offer advice within a known area, and understand instructions or public announcements.	Can express opinions on abstract/cultural matters in a limited way or offer advice within a known area, and understand instructions or public announcements.	Can write letters or make notes on familiar or predictable matters.
A2 (Waystage)	Can express simple opinions or requirements in a familiar context.	Can understand straightforward information within a known area, such as on products and signs and simple textbooks or reports on familiar matters.	Can complete forms and write short simple letters or postcards related to personal information.
A1 (Breakthrough)	Can understand basic instructions or take part in a basic factual conversation on a predictable topic.	Can understand basic notices, instructions or information.	Can complete basic forms, and write notes including times, dates and places.

Appendix B - American Council on the Teaching of Foreign Languages (ATCFL) Proficiency Guidelines levels description (American Council on the Teaching of Foreign Languages, n.d.)

	Low (L)	Mid (M)	High (H)
Novice (N)	Speakers at the Novice Low sublevel have no real functional ability and, because of their pronunciation, may be unintelligible. Given adequate time and familiar cues, they may be able to exchange greetings, give their identity, and name a number of familiar objects from their immediate environment. They are unable to perform functions or handle topics pertaining to the Intermediate level, and cannot therefore participate in a true conversational exchange.	Speakers at the Novice Mid sublevel communicate minimally by using a number of isolated words and memorized phrases limited by the particular context in which the language has been learned. When responding to direct questions, they may say only two or three words at a time or give an occasional stock answer. They pause frequently as they search for simple vocabulary or attempt to recycle their own and their interlocutor's words. Novice Mid speakers may be understood with difficulty even by sympathetic interlocutors accustomed to dealing with non-natives. When called on to handle topics and perform functions associated with the Intermediate level, they frequently resort to repetition, words from their native language, or silence.	Speakers at the Novice High sublevel are able to handle a variety of tasks pertaining to the Intermediate level, but are unable to sustain performance at that level. They are able to manage successfully a number of uncomplicated communicative tasks in straightforward social situations. Conversation is restricted to a few of the predictable topics necessary for survival in the target language culture, such as basic personal information, basic objects, and a limited number of activities, preferences, and immediate needs. Novice High speakers respond to simple, direct questions or requests for information. They are also able to ask a few formulaic questions. Novice High speakers are able to express personal meaning by relying heavily on learned phrases or recombinations of these and what they hear from their interlocutor. Their language consists primarily of short and sometimes incomplete sentences in the present, and may be hesitant or inaccurate. On the other hand, since their language often consists of expansions of learned material and stock phrases, they may sometimes sound surprisingly fluent and accurate. Pronunciation, vocabulary, and syntax may be strongly influenced by the first language. Frequent misunderstandings may arise but, with repetition or rephrasing, Novice High speakers can generally be understood by sympathetic interlocutors used to non-natives. When called on to

			handle a variety of topics and perform functions pertaining to the Intermediate level, a Novice High speaker can sometimes respond in intelligible sentences, but will not be able to sustain sentence-level discourse.
Intermediate (I)	Speakers at the Intermediate Low sublevel are able to handle successfully a limited number of uncomplicated communicative tasks by creating with the language in straightforward social situations. Conversation is restricted to some of the concrete exchanges and predictable topics necessary for survival in the target-language culture. These topics relate to basic personal information; for example, self and family, some daily activities and personal preferences, and some immediate needs, such as ordering food and making simple purchases. At the Intermediate Low sublevel, speakers are primarily reactive and struggle to answer direct questions or requests for information. They are also able to ask a few appropriate questions. Intermediate Low speakers manage to sustain the functions of the Intermediate level, although just barely. Intermediate Low speakers express personal meaning by combining and recombining what they know and what they hear from their interlocutors into short statements and discrete sentences. Their responses are often filled with hesitancy and inaccuracies as they search for appropriate linguistic forms and vocabulary while attempting to give form to the message. Their speech is characterized by frequent pauses, ineffective reformulations and self-corrections. Their pronunciation, vocabulary, and syntax are strongly influenced by their first language. In spite of frequent misunderstandings that may require repetition or rephrasing, Intermediate Low speakers can generally be understood by	Speakers at the Intermediate Mid sublevel are able to handle successfully a variety of uncomplicated communicative tasks in straightforward social situations. Conversation is generally limited to those predictable and concrete exchanges necessary for survival in the target culture. These include personal information related to self, family, home, daily activities, interests and personal preferences, as well as physical and social needs, such as food, shopping, travel, and lodging. Intermediate Mid speakers tend to function reactively, for example, by responding to direct questions or requests for information. However, they are capable of asking a variety of questions when necessary to obtain simple information to satisfy basic needs, such as directions, prices, and services. When called on to perform functions or handle topics at the Advanced level, they provide some information but have difficulty linking ideas, manipulating time and aspect, and using communicative strategies, such as circumlocution. Intermediate Mid speakers are able to express personal meaning by creating with the language, in part by combining and recombining known elements and conversational input to produce responses typically consisting of sentences and strings of sentences. Their speech may contain pauses, reformulations, and self-corrections as they search for adequate vocabulary and appropriate language forms to express themselves. In spite of the limitations in their vocabulary and/or pronunciation and/or grammar and/or syntax, Intermediate Mid speakers are	Intermediate High speakers are able to converse with ease and confidence when dealing with the routine tasks and social situations of the Intermediate level. They are able to handle successfully uncomplicated tasks and social situations requiring an exchange of basic information related to their work, school, recreation, particular interests, and areas of competence. Intermediate High speakers can handle a substantial number of tasks associated with the Advanced level, but they are unable to sustain performance of all of these tasks all of the time. Intermediate High speakers can narrate and describe in all major time frames using connected discourse of paragraph length, but not all the time. Typically, when Intermediate High speakers attempt to perform Advanced-level tasks, their speech exhibits one or more features of breakdown, such as the failure to carry out fully the narration or description in the appropriate major time frame, an inability to maintain paragraph-length discourse, or a reduction in breadth and appropriateness of vocabulary. Intermediate High speakers can generally be understood by native speakers unaccustomed to dealing with non-natives, although interference from another language may be evident (e.g., use of code-switching, false cognates, literal translations), and a pattern of gaps in communication may occur.

	sympathetic interlocutors, particularly by those accustomed to dealing with non-natives.	generally understood by sympathetic interlocutors accustomed to dealing with non-natives. Overall, Intermediate Mid speakers are at ease when performing Intermediate-level tasks and do so with significant quantity and quality of Intermediate-level language.	
Advanced (A)	Speakers at the Advanced Low sublevel are able to handle a variety of communicative tasks. They are able to participate in most informal and some formal conversations on topics related to school, home, and leisure activities. They can also speak about some topics related to employment, current events, and matters of public and community interest. Advanced Low speakers demonstrate the ability to narrate and describe in the major time frames of past, present, and future in paragraph-length discourse with some control of aspect. In these narrations and descriptions, Advanced Low speakers combine and link sentences into connected discourse of paragraph length, although these narrations and descriptions tend to be handled separately rather than interwoven. They can handle appropriately the essential linguistic challenges presented by a complication or an unexpected turn of events. Responses produced by Advanced Low speakers are typically not longer than a single paragraph. The speaker's dominant language may be evident in the use of false cognates, literal translations, or the oral paragraph structure of that language. At times their discourse may be minimal for the level, marked by an irregular flow, and containing noticeable self-correction. More generally, the performance of Advanced Low speakers tends to be uneven. Advanced Low speech is typically marked by a certain grammatical roughness (e.g., inconsistent control of verb endings), but the	Speakers at the Advanced Mid sublevel are able to handle with ease and confidence a large number of communicative tasks. They participate actively in most informal and some formal exchanges on a variety of concrete topics relating to work, school, home, and leisure activities, as well as topics relating to events of current, public, and personal interest or individual relevance. Advanced Mid speakers demonstrate the ability to narrate and describe in the major time frames of past, present, and future by providing a full account, with good control of aspect. Narration and description tend to be combined and interwoven to relate relevant and supporting facts in connected, paragraph-length discourse. Advanced Mid speakers can handle successfully and with relative ease the linguistic challenges presented by a complication or unexpected turn of events that occurs within the context of a routine situation or communicative task with which they are otherwise familiar. Communicative strategies such as circumlocution or rephrasing are often employed for this purpose. The speech of Advanced Mid speakers performing Advanced-level tasks is marked by substantial flow. Their vocabulary is fairly extensive although primarily generic in nature, except in the case of a particular area of specialization or interest. Their discourse may still reflect the oral paragraph structure of their own language rather than that of the target language. Advanced Mid speakers contribute to conversations on a variety of familiar topics, dealt with	Speakers at the Advanced High sublevel perform all Advanced-level tasks with linguistic ease, confidence, and competence. They are consistently able to explain in detail and narrate fully and accurately in all time frames. In addition, Advanced High speakers handle the tasks pertaining to the Superior level but cannot sustain performance at that level across a variety of topics. They may provide a structured argument to support their opinions, and they may construct hypotheses, but patterns of error appear. They can discuss some topics abstractly, especially those relating to their particular interests and special fields of expertise, but in general, they are more comfortable discussing a variety of topics concretely. Advanced High speakers may demonstrate a well-developed ability to compensate for an imperfect grasp of some forms or for limitations in vocabulary by the confident use of communicative strategies, such as paraphrasing, circumlocution, and illustration. They use precise vocabulary and intonation to express meaning and often show great fluency and ease of speech. However, when called on to perform the complex tasks associated with the Superior level over a variety of topics, their language will at times break down or prove inadequate, or they may avoid the task altogether, for example, by resorting to simplification

	overall performance of the Advanced-level tasks is sustained, albeit minimally. The vocabulary of Advanced Low speakers often lacks specificity. Nevertheless, Advanced Low speakers are able to use communicative strategies such as rephrasing and circumlocution. Advanced Low speakers contribute to the conversation with sufficient accuracy, clarity, and precision to convey their intended message without misrepresentation or confusion. Their speech can be understood by native speakers unaccustomed to dealing with non-natives, even though this may require some repetition or restatement. When attempting to perform functions or handle topics associated with the Superior level, the linguistic quality and quantity of their speech will deteriorate significantly.	concretely, with much accuracy, clarity and precision, and they convey their intended message without misrepresentation or confusion. They are readily understood by native speakers unaccustomed to dealing with non-natives. When called on to perform functions or handle topics associated with the Superior level, the quality and/or quantity of their speech will generally decline.	through the use of description or narration in place of argument or hypothesis.
Superior (S)	Speakers at the Superior level are able to communicate with accuracy and fluency in order to participate fully and effectively in conversations on a variety of topics in formal and informal settings from both concrete and abstract perspectives. They discuss their interests and special fields of competence, explain complex matters in detail, and provide lengthy and coherent narrations, all with ease, fluency, and accuracy. They present their opinions on a number of issues of interest to them, such as social and political issues, and provide structured arguments to support these opinions. They are able to construct and develop hypotheses to explore alternative possibilities. When appropriate, these speakers use extended discourse without unnaturally lengthy hesitation to make their point, even when engaged in abstract elaborations. Such discourse, while coherent, may still be influenced by language patterns other than those of the target language. Superior-level speakers employ a variety of interactive and discourse strategies, such as turn-taking and separating main ideas from supporting information through the use of syntactic, lexical, and phonetic devices. Speakers at the Superior level demonstrate no pattern of error in the use of basic structures, although they may make sporadic errors, particularly in low-frequency structures and in complex high-frequency structures. Such errors, if they do occur, do not distract the native interlocutor or interfere with communication.		
Distinguished (D)	Speakers at the Distinguished level are able to use language skillfully, and with accuracy, efficiency, and effectiveness. They are educated and articulate users of the language. They can reflect on a wide range of global issues and highly abstract concepts in a culturally appropriate manner. Distinguished-level speakers can use persuasive and hypothetical discourse for representational purposes, allowing them to advocate a point of view that is not necessarily their own. They can tailor language to a variety of audiences by adapting their speech and register in ways that are culturally authentic. Speakers at the Distinguished level produce highly sophisticated and tightly organized extended discourse. At the same time, they can speak succinctly, often using cultural and historical references to allow them to say less and mean more. At this level, oral discourse typically resembles written discourse. A non-native accent, a lack of a native-like economy of expression, a limited control of deeply embedded cultural references, and/or an occasional isolated language error may still be present at this level.		

Appendix C - Interagency Language Roundtable (ILR) levels description (Interagency Language Roundtable, n.d.)

ILR Level	Level Description
0 (No proficiency) 0+ (Memorized proficiency)	• oral production limited to occasional, isolated words • may be able to ask questions or make statements with reasonable accuracy only with memorized utterances or formulae • unable to read connected prose but may be able to read numbers, isolated words and phrases, personal and place names, street signs, office and shop designations • understanding limited to occasional isolated words or memorized utterances in areas of immediate needs. • may be able to produce symbols in an alphabetic or syllabic writing system or 50 of the most common characters
1 (Elementary proficiency) 1+ (Elementary proficiency, plus)	• can fulfill travelling needs and conduct themselves in a polite manner • able to use questions and answers for simple topics within a limited level of experience • able to understand basic questions and speech, which allows for guides, such as slower speech or repetition, to aid understanding • has only a vocabulary large enough to communicate the most basic of needs; also makes frequent punctuation and grammatical mistakes in writing of the language • The majority of individuals classified as Level 1 are able to perform most basic functions using the language. This includes buying goods, reading the time, ordering simple meals and asking for minimal directions.
2 (Limited working proficiency) 2+ (Limited working proficiency, plus)	• able to satisfy routine social demands and limited work requirements • can handle with confidence most basic social situations including introductions and casual conversations about current events, work, family, and autobiographical information • can handle limited work requirements, needing help in handling any complications or difficulties; can get the gist of most conversations on non-technical subjects (i.e. topics which require no specialized knowledge), and has a speaking vocabulary sufficient to respond simply with some circumlocutions • has an accent which, though often quite faulty, is intelligible • can usually handle elementary constructions quite accurately but does not have thorough or confident control of the grammar.
3 (General professional proficiency) 3+ (General professional proficiency, plus)	• able to speak the language with sufficient structural accuracy and vocabulary to participate effectively in most conversations on practical, social, and professional topics • can discuss particular interests and special fields of competence with reasonable ease • has comprehension which is quite complete for a normal rate of speech • has a general vocabulary which is broad enough that he or she rarely has to grope for a word • has an accent which may be obviously foreign; has a good control of grammar; and whose errors virtually never interfere with understanding and rarely disturb the native speaker.
4 (Advanced professional proficiency) 4+ (Advanced professional proficiency, plus)	• able to use the language fluently and accurately on all levels and as normally pertinent to professional needs. • can understand and participate in any conversations within the range of own personal and professional experience with a high degree of fluency and precision of vocabulary • would rarely be taken for a native speaker, but can respond appropriately even in unfamiliar grounds or situations • makes only quite rare and minute errors of pronunciation and grammar • can handle informal interpreting of the language.
5 (Functionally native proficiency)	• has a speaking proficiency equivalent to that of an educated native speaker • has complete fluency in the language, such that speech on all levels is fully accepted by educated native speakers in all of its features, including breadth of vocabulary and idiom, colloquialisms, and pertinent cultural references.

Appendix D - Academic Word List (AWL) (Coxhead, 1998)
Note: The 570 words in AWL are divided into 10 sublists, which are ordered in such a way that the words in the first sublist are the most frequent words, and those in the last sublist are the least frequent.

Sublist 1	Sublist 2	Sublist 3	Sublist 4	Sublist 5
analysis	achieve	alternative	access	academic
approach	acquisition	circumstances	adequate	adjustment
area	administration	comments	annual	alter
assessment	affect	compensation	apparent	amendment
assume	appropriate	components	approximated	aware
authority	aspects	consent	attitudes	capacity
available	assistance	considerable	attributed	challenge
benefit	categories	constant	civil	clause
concept	chapter	constraints	code	compounds
consistent	commission	contribution	commitment	conflict
constitutional	community	convention	communication	consultation
context	complex	coordination	concentration	contact
contract	computer	core	conference	decline
create	conclusion	corporate	contrast	discretion
data	conduct	corresponding	cycle	draft
definition	consequences	criteria	debate	enable
derived	construction	deduction	despite	energy
distribution	consumer	demonstrate	dimensions	enforcement
economic	credit	document	domestic	entities
environment	cultural	dominant	emerged	equivalent
established	design	emphasis	error	evolution
estimate	distinction	ensure	ethnic	expansion
evidence	elements	excluded	goals	exposure
export	equation	framework	granted	external
factors	evaluation	funds	hence	facilitate
financial	features	illustrated	hypothesis	fundamental
formula	final	immigration	implementation	generated
function	focus	implies	implications	generation
identified	impact	initial	imposed	image
income	injury	instance	integration	liberal
indicate	institute	interaction	internal	licence
individual	investment	justification	investigation	logic
interpretation	items	layer	job	marginal
involved	journal	link	label	medical
issues	maintenance	location	mechanism	mental
labour	normal	maximum	obvious	modified
legal	obtained	minorities	occupational	monitoring
legislation	participation	negative	option	network
major	perceived	outcomes	output	notion
method	positive	partnership	overall	objective
occur	potential	philosophy	parallel	orientation
percent	previous	physical	parameters	perspective
period	primary	proportion	phase	precise
policy	purchase	published	predicted	prime

principle	range	reaction	principal	psychology
procedure	region	registered	prior	pursue
process	regulations	reliance	professional	ratio
required	relevant	removed	project	rejected
research	resident	scheme	promote	revenue
response	resources	sequence	regime	stability
role	restricted	sex	resolution	styles
section	security	shift	retained	substitution
sector	sought	specified	series	sustainable
significant	select	sufficient	statistics	symbolic
similar	site	task	status	target
source	strategies	technical	stress	transition
specific	survey	techniques	subsequent	trend
structure	text	technology	sum	version
theory	traditional	validity	summary	welfare
variables	transfer	volume	undertaken	whereas
Sublist 6	**Sublist 7**	**Sublist 8**	**Sublist 9**	**Sublist 10**
abstract	adaptation	abandon	accommodation	adjacent
accurate	adults	accompanied	analogous	albeit
acknowledged	advocate	accumulation	anticipated	assembly
aggregate	aid	ambiguous	assurance	collapse
allocation	channel	appendix	attained	colleagues
assigned	chemical	appreciation	behalf	compiled
attached	classical	arbitrary	bulk	conceived
author	comprehensive	automatically	ceases	convinced
bond	comprise	bias	coherence	depression
brief	confirmed	chart	coincide	encountered
capable	contrary	clarity	commenced	enormous
cited	converted	conformity	incompatible	forthcoming
cooperative	couple	commodity	concurrent	inclination
discrimination	decades	complement	confined	integrity
display	definite	contemporary	controversy	intrinsic
diversity	deny	contradiction	conversely	invoked
domain	differentiation	crucial	device	levy
edition	disposal	currency	devoted	likewise
enhanced	dynamic	denote	diminished	nonetheless
estate	eliminate	detected	distorted/distortion	notwithstanding
exceed	empirical	deviation	- equal	odd
expert	equipment	displacement	figures	ongoing
explicit	extract	dramatic	duration	panel
federal	file	eventually	erosion	persistent
fees	finite	exhibit	ethical	posed
flexibility	foundation	exploitation	format	reluctant
furthermore	global	fluctuations	founded	so-called
gender	grade	guidelines	inherent	straightforward
ignored	guarantee	highlighted	insights	undergo
incentive	hierarchical	implicit	integral	whereby
incidence	identical	induced	intermediate	
incorporated	ideology	inevitably	manual	
index	inferred	infrastructure	mature	
inhibition	innovation	inspection	mediation	

initiatives	insert	intensity	medium	
input	intervention	manipulation	military	
instructions	isolated	minimised	minimal	
intelligence	media	nuclear	mutual	
interval	mode	offset	norms	
lecture	paradigm	paragraph	overlap	
migration	phenomenon	plus	passive	
minimum	priority	practitioners	portion	
ministry	prohibited	predominantly	preliminary	
motivation	publication	prospect	protocol	
neutral	quotation	radical	qualitative	
nevertheless	release	random	refine	
overseas	reverse	reinforced	relaxed	
preceding	simulation	restore	restraints	
presumption	solely	revision	revolution	
rational	somewhat	schedule	rigid	
recovery	submitted	tension	route	
revealed	successive	termination	scenario	
scope	survive	theme	sphere	
subsidiary	thesis	thereby	subordinate	
tapes	topic	uniform	supplementary	
trace	transmission	vehicle	suspended	
transformation	ultimately	via	team	
transport	unique	virtually	temporary	
underlying	visible	widespread	trigger	
utility	voluntary	visual	unified	
			violation	
			vision	

Appendix E - Needs Analysis Questionnaire

My name is Ng Wee Hau. I am a Bachelor of Science (Hons) Software Engineering Year 3 Semester 1 student at Universiti Tunku Abdul Rahman (UTAR) (Setapak campus). I am currently working on Final Year Project (Project I). With the help of this questionnaire, I would like to learn what you think and feel about **learning English language through song lyrics**.

This **4-page** long survey form is composed of **3 parts**:
Part A: Personal Information
Part B: Learning of English language
Part C: Appreciation of English popular songs

Instruction: For each field or question with checkboxes (☐), please only **check 1 answer** (☑) that best represents your facts, thoughts or opinions, **unless otherwise specified**.

If you have any doubts on this survey form, or if you wish to obtain more information, please contact me at weehau0803@hotmail.com.

All personal information will be kept private and confidential, and only used as part of aggregate data that helps with the conduct of Final Year Project. It will only be accessible by the author of the project.

Part A: Personal Information

1. Name : _____
2. Age : _____
3. Gender : ☐ Male   ☐ Female
4. Mobile phone number : _____
5. E-mail address : _____

For **tertiary education students** only
6. Course : _____
7. Year of study (e.g. Y3S1) : _____

For **secondary education students** only
8. Form : ☐ Form 1   ☐ Form 2   ☐ Form 3
☐ Form 4   ☐ Form 5   ☐ Other (please specify): _____

9. Native language
☐ English
☐ Mandarin
☐ Bahasa Malaysia
☐ Tamil
☐ Other (please specify): _____

10. Second language(s):
Note: Multiple answers are allowed.
☐ English
☐ Mandarin

☐ Bahasa Malaysia
☐ Tamil
☐ Other (please specify): _____

Part B: Learning of English language

1. How did / do you learn English?
    Note: Multiple answers are allowed.
    ☐ Traditional education (Classroom learning)
    ☐ Books, newspapers, magazines, or any other extracurricular reading materials
    ☐ Dictionaries
    ☐ Study group
    ☐ Films / TV shows
    ☐ Music
    ☐ Radio
    ☐ Conversation
    ☐ Other (please specify): _____

2. Based on your answer(s) for **question no. 1** (besides traditional education), do you apply self-directed approach during the process of learning English?
    Note: Self-directed learning process heavily involves learning on your own or by yourself, while seeking guidance and instructions from others when needed.
    ☐ Yes   ☐ No

3. Have you taken any English language proficiency tests? (Besides compulsory subjects in syllabi, such as Bahasa English in SPM, and university subjects such as English for IT, English for Engineering and Basic Professional Writing)
    ☐ Yes   ☐ No

4. If your answer for **question no. 3** is "Yes", specify the English language proficiency test(s) you have taken, and the score(s) / grade(s) you obtained.
    *Note: Multiple answers are allowed. Please skip this question if your answer for **question no. 3** is "No".*
    ☐ MUET (Malaysian University English Test)   Score / Grade: _____
    ☐ Cambridge English Language Assessment   Score / Grade: _____
    ☐ IELTS (International English Language Testing System)   Score / Grade: _____
    ☐ TOEFL (Test of English as a Foreign Language)   Score / Grade: _____
    ☐ Other (please specify): _____

5. Are you aware of the existence of Academic Word List (AWL)?
    ☐ Yes   ☐ No

6. Learning of English through English music (or song lyrics) is possible. Are you aware of such an English learning method?
    ☐ Yes   ☐ No

7. If your answer for **question no. 6** is "Yes", have you yourself experienced the aforementioned method?
    *Note: Please skip this question if your answer for **question no. 6** is "No".*
    ☐ Yes   ☐ No

8. If there is a computer software / mobile app that lets you learn English through song lyrics, would you consider using it? If your answer is "No", please state the reason.
    ☐ Yes, I would consider using it.   ☐ No, I wouldn't consider using it.
                                                Reason: _____
                                                _____

_____
_____
_____

9. If your answer for **question no. 8** is "Yes", on which platform would you prefer to use the app?
    *Note: Multiple answers are NOT allowed. Please skip this question if your answer for **question no. 8** is "No".*
    ☐ Personal computer
    ☐ Smartphone
    ☐ Tablet
    ☐ Other (please specify): _____

10. If your answer for **question no. 9** is "Personal computer", which operating system would you prefer?
    *Note: Multiple answers are NOT allowed. Please skip this question if your answer for **question no. 9** is not "Personal Computer".*
    ☐ Microsoft Windows
    ☐ Mac OS
    ☐ Linux
    ☐ Other (please specify): _____

11. If your answer for **question no. 9** is "Smartphone" or "Tablet", which operating system would you prefer?
    *Note: Multiple answers are NOT allowed. Please skip this question if your answer for **question no. 9** is not "Smartphone" or "Tablet".*
    ☐ Android
    ☐ iOS
    ☐ Blackberry
    ☐ Windows Phone
    ☐ Other (please specify): _____

Part C: Appreciation of English popular songs
Instruction: For questions no. 1 to 4, please tick (✓) at the appropriate responses that best represent your opinions or thoughts. You may only **choose 1 response** for each question.
The response includes: Strongly Agree (SA); Agree (A); Disagree (D); Strongly Disagree (SD).

		SA	A	D	SD
1.	English popular songs are helpful for the learning of English.				
2.	I want to learn English through English popular songs.				
3.	I believe I can learn English through English popular songs.				
4.	Learning English through songs is easier than through textbooks.				

5. Do you listen to English popular songs?
    ☐ Yes   ☐ No

6. If your answer for **question no. 5** is "Yes", state the approximate frequency of you listening to English songs, with respect to the overall songs you listen to, regardless of the languages.
    *Note: Please skip this question if your answer for **question no. 5** is "No".*
    ☐ Always
    ☐ Often
    ☐ Sometimes
    ☐ Rarely
    ☐ Never

7.   If your answer for **question no. 5** is "Yes", how frequent do you listen to English songs over a week?
     *Note: Please skip this question if your answer for **question no. 5** is "No".*
     ☐ Always
     ☐ Often
     ☐ Sometimes
     ☐ Rarely
     ☐ Never

--- END OF SURVEY FORM ---

Thank you for taking your precious time and effort in completing the questionnaire. Your input will help shape the design and development of my Final Year Project. I appreciate your participation and cooperation.

Appendix F: A list of virtual Android devices provided by GenyMotion

No.	Device model	Android version	API level	Screen resolution
1	Google Nexus 6	5.1.0	22	1440 x 2560
2	Google Galaxy Nexus	4.1.1	16	720 x 1280
3		4.2.2	17	
4		4.3	18	
5	Google Nexus 10	4.2.2	17	2560 x 1600
6		4.3	18	
7		4.4.4	19	
8		5.0.0	21	
9	Google Nexus 4	4.1.1	16	768 x 1280
10		4.2.2	17	
11		4.3	18	
12		4.4.4	19	
13		5.0.0	21	
14	Google Nexus 5	4.4.4	19	1080 x 1920
15		5.0.0	21	
16	Google Nexus 6	5.0.0	21	1440 x 2560
17	Google Nexus 7	4.1.1	16	800 x 1280
18		4.2.2	17	
19		4.3	18	
20		4.4.4	19	
21		5.0.0	21	
22	Google Nexus 7 2013	4.3	18	1200 x 1920
23		4.4.4	19	
24		5.0.0	21	
25	Google Nexus 9	5.0.0	21	2048 x 1536
26	Google Nexus One	2.3.7	10	480 x 800
27	Google Nexus S	2.3.7	10	480 x 800
28		4.1.1	16	
29	HTC Evo	4.1.1	16	720 x 1280
30		4.2.2	17	
31		4.3	18	
32	HTC One	4.2.2	17	1080 x 1920
33		4.3	18	

34		4.4.4	19	
35	HTC One X	4.1.1	16	720 x 1280
36		4.2.2	17	
37	HTC One XL	4.1.1	16	720 x 1280
38		4.2.2	17	
39	LG Optimus L3 II	4.1.1	16	240 x 320
40	Motorola Droid Razr	2.3.7	10	540 x 960
41		4.1.1	16	
42	Motorola Moto X	4.2.2	17	720 x 1280
43		4.3	18	
44		4.4.4	19	
45	Motorola Xoom	4.1.1	16	1280 x 800
46	Samsung Galaxy Note	2.3.7	10	800 x 1280
47		4.1.1	16	
48	Samsung Galaxy Note 2	4.1.1	16	720 x 1280
49		4.2.2	17	
50		4.3	18	
51	Samsung Galaxy Note 3	4.3	18	1080 x 1920
52		4.4.4	19	
53	Samsung Galaxy S2	2.3.7	10	480 x 800
54		4.1.1	16	
55	Samsung Galaxy S3	4.1.1	16	720 x 1280
56		4.2.2	17	
57		4.3	18	
58	Samsung Galaxy S4	4.2.2	17	1080 x 1920
59		4.3	18	
60		4.4.4	19	
61	Samsung Galaxy S5	4.4.4	19	1080 x 1920
62	Sony Xperia S	2.3.7	10	720 x 1280
63		4.1.1	16	
64	Sony Xperia Tablet S	4.1.1	16	1280 x 800
65	Sony Xperia Tablet Z	4.1.1	16	1920 x 1200
66		4.2.2	17	
67	Sony Xperia Z	4.2.2	17	1080 x 1920
68		4.3	18	

APPENDIX G: Beta Testing Questionnaire

Hi. My name is Ng Wee Hau. I am a Bachelor of Science (Hons) Software Engineering Year 3 Semester 3 student at Universiti Tunku Abdul Rahman (UTAR) (Setapak campus). I am currently working on my Final Year Project. With the help of this questionnaire, I would like to learn about **your opinions and feelings towards the Android app that I presented to you**.

This **3-page** long survey form is composed of **2 parts**.
Part A: Basic Demographic Information
Part B: User Satisfaction

Instruction: For each question with checkboxes (☐), please **check only 1 choice** (☑) that best represents your facts, thoughts, or opinions, **unless otherwise specified**.

All personal information will be kept private and confidential, and will only be used as part of aggregate data that helps with the conduct of my Final Year Project. It will only be accessible by the author of the project.

For further information, please contact me via my email at weehau0803@hotmail.com.

Part A: Basic Demographic Information
1. Age group
    ☐ 12 or below
    ☐ 13 - 15
    ☐ 16 - 18
    ☐ 19 - 22
    ☐ 23 or above

2. Are you a student?
    ☐ Yes
    ☐ No

3. How would you rate your English language proficiency level?
    ☐ Native speaker
    ☐ Advanced
    ☐ Intermediate
    ☐ Basic

4. Prior to this Android app, did you ever use your mobile device as a means of learning? If your answer is "Yes", please state what you learned.
    ☐ Yes:
    _____
    ☐ No

Part B: User Satisfaction
1. How would you rate the ease of navigation of the app?

☐ Intuitive
☐ Satisfactory
☐ Complex

2. Did you feel the need to have the support of a technical person when using the app? If your answer is "Yes", please state the reason.
    ☐ Yes
    Reason:
    _____
    _____
    ____
    ☐ No

3. Did you need to learn a lot of things before you could start using the app? If your answer is "Yes", please state what you had to learn.
    ☐ Yes:
    _____
    _____
    ____
    ☐ No

4. After trying out the app, do you think it helped with building / enhancing your English grammar and vocabulary skills?
    ☐ Yes
    ☐ No

5. Do you think that most people would be able to learn to use this app very easily and quickly?
    ☐ Yes
    ☐ No

6. Would you recommend the app to others?
    ☐ Yes
    ☐ No

For questions **no. 7 & 8**, you may check (☑) **more than one** choice.

7. I think the lesson content provided was …
    ☐ appropriate
    ☐ sufficient

8. I think the assessment provided (i.e. quiz session) was …
    ☐ appropriate
    ☐ sufficient

9. What did you like best about the app?

    _____

    _____

10. What did you like least about the app?
.

    _____

    _____

11. Please leave some comments about the app.

_____

_____

--- END OF SURVEY FORM ---

Thank you for taking your precious time and effort in completing the questionnaire. Your participation and cooperation are very much appreciated.