

A HTML5 Based English Learning System for Learning English on Mobile Devices

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ABSTRACT

This research paper explains the development of a mobile based system for learning English as second language for iPhone, iPad, Android Phones, Android tablets, and other smart mobile devices. This is a multi-disciplinary type of research consisting of 3 distinct components or phases. First, HTML5 and jQuery Javascript library was used to develop this multimedia based learning system that delivers a lesson in text, pictures, and audio format. The multimedia based lessons were placed on a server that could be accessed by any PC or smart mobile phones and tablets that support JavaScript library with access to WiFi or 3G networks. Second, thirty English lessons were developed for this system, the English lessons were developed with the assistance of some English lecturers. Finally, university students at Assumption University tried out this system using their mobile devices for a period of 6 weeks. A survey questionnaire was used to evaluate the effectiveness, usability, and students' satisfaction of this system. This paper explains development process of the mobile based mobile learning system and its outcomes.

Author Keywords

English learning, Mobile learning, smart mobile devices, HTML5, jQuery, English as second language, and language learning.

INTRODUCTION

Assumption University of Thailand is the first international university in Thailand. Fully accredited as an institution of higher learning by the Ministry of Education in Thailand, it currently serves about 23,000 undergraduate and graduate students from more than 80 countries. The University is a non-profit institution administered by the Brothers of St. Gabriel, a worldwide Catholic religious order, founded in France in 1705 by St. Louis Marie De Montfort, devoted to education and philanthropic activities. The congregation has been operating many educational institutions in Thailand since 1901 (Assumption University, 2013). Assumption University is a private international university; most students are from middle class and higher income families who own some sort of smart mobile devices and tablets. Majority of Thai and many of foreign students are not well versed in English language, and some are considered poor in their English language skills that need to take some English courses before they can take the core courses. Very recently, Thai minister of Education, Phongthep Thepkanjana, revealed that "Thai students desperately need to improve their English language, especially the listening and speaking skills, in which Thai students are far behind those students in other ASEAN countries" (NNT, 2013).

Learning and the lifelong pursue of knowledge has become one of the most essential activities in the current knowledge-based economy, which is characterized by information age, globalization, knowledge acquisition and transfer, and the information and communication technology revolution. Globalization requires new methods of knowledge acquisition and to convey new skills and tools (Adam *et al.*, 1997).

The traditional learning context is experiencing radical changes and challenges. There are often occasions when people want to learn exactly what they are interested in or what they need to learn, without time and location boundaries. Learners are demanding for better and improved access and convenience at the lower costs and with the direct application of contents to their needs. Computer based learning and computer aided instruction (CAI) have been effective in learning many subjects including languages especially English language (Anaraki, F., 2009).

Mobile technology is introducing new approaches to learning due to the features that are defined by a number of characteristics. They support learning activities that need just-in-time (JiT) and true learning on demand. With the advances in smart mobiles phone and tablet technology and availability of WiFi and 3G networks, it is possible for owners of a mobile device to have instant access to lots of website to acquire knowledge in many areas. The purpose of this paper is to design and develop some English lessons for mobile devices using the new features of HTML5, trying it out among students of the university, and through questionnaire explore its effectiveness and satisfaction among students who wish to improve their language skills. This research will answer the question that if an HTML5 based mobile learning system would be helpful for university students at Assumption University to improve their English proficiency specially their listening and pronunciation of English words and sentences.

LITERATURE REVIEW

One of the first projects where mobile phones were used in language learning was developed by the Stanford Learning Lab in 2000 (Brown, 2001). They basically developed Spanish language learning using voice that could be played on mobile phones and emails to support the study material. They provided voice for vocabulary practice and pronunciation, word and phrase translation, and quizzes to their students. Their results indicated that voice vocabulary lessons and quizzes had great potential if provided in small chunks suitable for the small screen sizes of mobile devices.

Another project at a Japanese university utilized SMS to deliver English vocabulary and their meanings to their students (Thornton, P., & Houser, C., 2005). They sent short lessons on separate and discrete chunks to their students' mobile devices 3 times a day. Each lesson introduced a couple of new words daily and the new words were recycled in subsequent lessons. Students were tested biweekly and compared to groups that received identical lessons by web and on paper. The results indicated that the SMS students learned over twice the number of vocabulary words as the web students, and that SMS students improved their scores by almost twice as much as students who had received their lessons on paper.

One more project in Japan utilized mobile phones that played short audio clips in English to help with pronunciation for English as a Second Language (ESL) students (McNicol, T., 2004). The results indicated that the learning content should be in short learning units or sessions. For instance, a unit on language vocabulary would best fit the capabilities of mobile devices for learning in a brief period, such as around 5 minutes. Another conclusion that was considered very useful was to provide customization of learning material for individual or group needs and learning experience.

Another important project was a Flash-Based Mobile Learning for Learning English as Second Language by the author for learning English on mobile phones with Flash player back in 2008 (Anaraki, F., 2009). This project was the inspiration for the author to develop this research (a HTML5 based learning system for learning English on mobile devices).

Most of the time, in a typical classroom setting, students are involved only passively in learning, i.e., in listening to the instructor, looking at the occasional overhead or slide, and reading (when required) the text book. Research shows that such passive involvement generally leads to a limited retention of knowledge by students, as indicated in the 'cone of experience' shown in Figure 1.

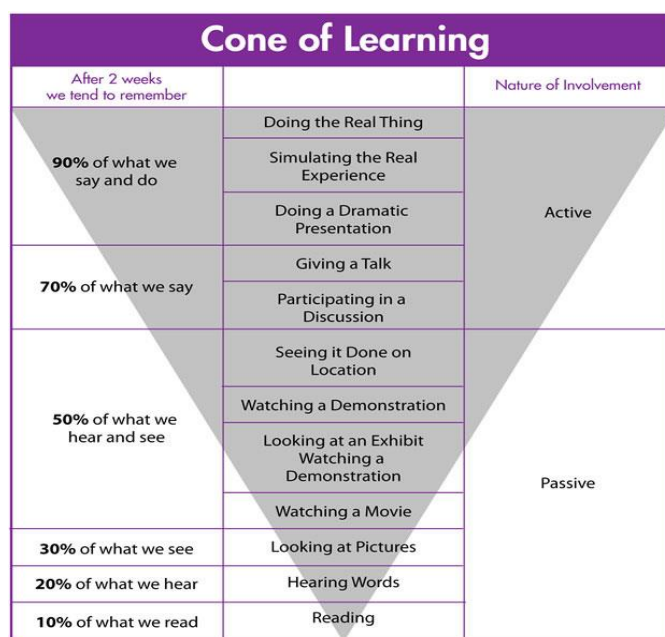


Figure 1: The Cone of Experiences (Source: Dale, E., 1969)

Active learning involves students directly and actively in the learning process itself. This means that instead of simply receiving information verbally and visually, students are receiving and participating and doing.

In conclusion, based on the learning achieved by reviewing the literature review and the cone of experience and similar studies, the author decided to develop a multimedia based learning system where text, pictures, and audio are combined to deliver English lessons suitable for small screen of mobile devices and tablets. Theory and experience has shown that while more senses are used in learning the learning will be more effective.

RESEARCH METHODOLOGY

The purpose of this research was to design and develop a mobile learning system for learning English as a second language using mobile devices capable of playing jQuery Javascript library. These days almost all smart phones such as iPhone, Android Phones, Windows Phones, Blackberry, and various types of iPads and Android tablets in addition to

Windows based computers and Macintosh can play jQuery Javascripts. Most researchers in language learning have mainly focused on a single medium, i.e. SMS (text) or MP3 (voice), to deliver the content to learners. This researcher wanted to develop a multimedia mode of delivery of the content to learners, a combination of text, voice (MP3) and pictures. This researcher with the assistance from couple of professional ESL lecturers developed 30 mobile English lessons to be used by a sample population of students owning an iPhone/iPad or Android phone or tablet at Assumption University.

This research is a multi-disciplinary type of research consisting of 3 distinct components or phases. The first phase of this research was to design and develop a web based system for learning English using HTML5 and jQuery programming for mobile devices. This developed system was the engine or the operating system for mobile language learning. The second phase of this research was to try out this web based mobile system developed in the previous phase in order to evaluate its usefulness and effectiveness in learning English as a second language. In this phase, sample volunteer students owning smart mobile devices were requested to try out the web based mobile system. A survey questionnaire was prepared for the volunteers to answer to seek their views and observation of the lessons on their mobile devices after trying out the English lessons on their mobile devices. The researcher managed to interview informally a small portion of the volunteers to seek their opinions on the web based mobile learning system. The third and the last phase of this research was to analyze the data gathered in the second phase in order to explore the attitude of students towards learning English on their mobile devices and to evaluate the usefulness of the developed web based mobile English learning system. Both quantitative and qualitative methods forming a mixed type of research have been utilized to analyze the data. Based on the analysis of data, conclusions were made indicating the strengths and weaknesses of the developed system and recommendations on how to improve the system.

The main objectives of the research were as follows:

- Develop a multimedia (text, voice, picture) web based system for learning English on smart mobile devices.
- Use HTML5 and jQuery programming to allow full control of the mobile device and the lessons by the user.
- Engage students in their learning English language at their pace and on their free time wherever they like to learn (active learning).
- Let students listen to native speakers reading a passage or a lesson to improve their pronunciation.
- Provide the text of a passage/lesson so that while listening, students can also see and read the text on the screen on their mobile device. Students can also learn spelling, grammar, and rules for conversation by listening and reading simultaneously.

DEVELOPMENT OF THE SYSTEM

Very similar to the Learning Management System (LMS) for the Internet based eLearning systems, the Mobile Learning Systems needs to contain 2 main components, namely the content (learning material) and the interface with the learner. Currently this system has no management features to be called Mobile Learning Management System. This prototype system, however, could be considered as an embryonic model for a fuller version with management of user activities. In this section the two components of the system are presented and discussed.

The English lessons used for this research were borrowed from a friend of the researcher who is an ESL lecturer in Thailand. The contents of the lessons should be optimized for the small screens of mobile devices, usually between 3 to 7 inches. The contents should be grouped into small chunks of data. Each chunk then could be displayed on the screen of the mobile device. The content could be multimedia material; for this research the researcher is making use of text and pictures to display the contents as learning material and the voice of native speaker for listening purpose. As the developed Mobile English Learning System is intended to be used for learning English as a second language for the trial purpose, it would be useful to show the pictures of English nouns or actions for better understanding of the meaning of English words by showing their pictures.

The resolutions of most modern mobile devices are either 1280 x 720 pixels (720p) or 1920 x 1080 pixels (1080p/full-HD) spread along the width and height of the smart phone's screen. This researcher optimized the texts of all the English lessons for the resolution of 720p and 1080p/full-HD. Mobile devices with lower resolutions display the text with less clarity or sharpness, though still legible. The contrast and brightness could be controlled by the user through mobile device features. Figure 2 depicts how the content is optimized for a screen resolution of 1280 x 720 pixels.

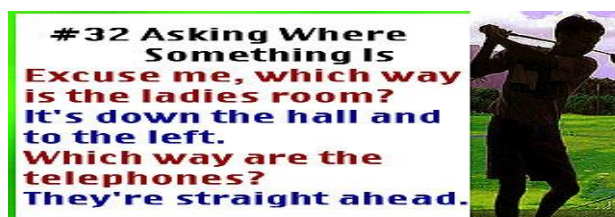


Figure 2: Screenshot of a screen

The voices of two native speakers, one American gentleman (ESL lecturer who prepared the 30 English lessons) and a British lady (English lecturer), were recorded while reading the passages of the lessons in MP3 format. Unfortunately at this time various browsers such as Firefox, Chrome, Internet Explorer, Safari, etc. use different audio format for HTML5 (HTML5 Audio, 2013). The sound associated with the text is in MP3 format with a bit rate of 64 kilo bits per second (kbps). The higher the bit rate the better the quality of sound and also the larger the file size would be. Such a small delay (1 to 2 seconds) is acceptable for these lessons as it provides a couple of seconds to the learner to read and meditate upon the text on the screen. The researcher had to use Miro Audio/Video converter to convert all the MP3s to OGG and WebM formats so that all the lessons would be available to all smart phones and all the popular possible browsers available on the mobile devices. Using HTML5 and jQuery, the right sound format is selected automatically depending on what browser is used.

The lessons are prepared as sequence of 8 – 10 slides (images). Each slide contains the text as an image (jpg format). At the bottom of each slide 3 touch-sensitive buttons are displayed which are 'Previous', 'Play', and 'Next' as shown in Figure 3. The 'Play' button is toggled to 'Pause' when clicked.



Figure 3: A slide of a lesson on a mobile phone with user

When the Play button is touched, tabbed, or clicked the audio plays the right audio format using the following HTML5 code.

```
<img class='audiopic' src='images/1-1.jpg' alt='media/1-1.ogg' data-ogg='media/1-1.ogg' data-mpeg='media/1-1.mp3' data-webm='media/1-1.webm' />
```

The above HTML5 code shows an image called 1-1.jpg with the 3 media (audio) file format as 1-1.ogg, 1-1.mp3, or 1-1.webm depending on what browser is used. Currently various browsers do not support all the audio file formats. So the audio file should be prepared in various formats so that all users could listen to the audio files no matter what browser they use.

The audio section codes of the HTML5 which are activated when 'Play' button is pressed is shown below:

```
<audio id='iplayer'>
<source src='media/1-1.ogg' id='oggSource' type='audio/ogg'/>
<source src='media/1-1.mp3' id='mpegSource' type='audio/mpeg'/>
<source src='media/1-1.webm' id='webMSource' type='audio/webm'/>
</audio>
```

The HTML5 for showing the 3 touch-sensitive buttons are shown below:

```
<div class="controls">
<a class="button-controls" id='previous' href="#">Previous</a>
<a class="button-controls" id='play' href="#">Play</a>
<a class="button-controls" id='next' href="#">Next</a>
</div>
```

As almost all new smart phones are touch screen enabled, the interface with the user is also enabled by touching the function displayer on the screen, i.e. to play the audio for the current screen, to go backward or forward one screen at a time.

The learner should be able to select a lesson, be able to play a lesson slide by slide, and at the end of each slide, the learner should have a choice to repeat the same slide or be able to go forward to the next slide. At the end of a lesson (the

last slide), the learner can decide to repeat the same lesson from the beginning all over again or simply quit the lesson and return back to the normal mode of operation of the mobile device.

The prototype system was developed using jQuery Javascript library package under Windows 7 Operating System and HTML5. jQuery is an open source software which is a multi-browser JavaScript library designed to simplify the client-side scripting of HTML. For this project the researcher downloaded and installed 2 jQuery libraries namely jquery.js and player.js, and also a cascading style sheet (CSS3) called style.css from the jQuery site (jquery.com). The developed System for Learning English as a Second Language was in HTML5 file format which can be played on any computer, including PC, Macintosh, Linux systems or any smart mobile devices with browsers that support HTML5. By limiting each lesson to 8-10 slides, the lesson could be short enough to learn in less than 5 minutes. The lessons could be played on most mobile devices. Figure 3 displays a slide of a lesson on a mobile device.

TRYING OUT THE SYSTEM

In order to conduct this research the author placed 30 lessons on a server belonging to the Graduate School of eLearning at Assumption University Suvarnabhumi Campus. The url of some sample lessons could be accessed at:

<http://ews.elearning.au.edu/h5>

It is also possible to save the English lesson and the jQuery libraries on a mobile device storage and run the lessons without a need of WiFi or 3G to access the website. But for this experiment, participants were requested to access the lessons through the website when they are online.

Information about this research and free mobile English learning was posted at most floors on the IT Center where many students visit daily to do their computer related assignments or access the Internet. The only requirement for the students to access and use the lessons was to answer to a survey questionnaire after using the system for between 4 to 6 weeks of using the system.

During the 6 weeks of availability of the lessons on the server, a total of more than 20,000 accesses to the 30 lessons were recorded. The exact numbers of students accessing the lessons were not known as some students might have accessed each lesson for many times. At the end of 6 weeks though, just 288 students replied to the online questionnaire. Many students might have ignored or forgotten to reply to the online questionnaire after trial of the lessons, as it is the norm almost on any online survey. Those replied the questionnaire represented the population of university students. They were from various schools in the university from freshmen to seniors with various degrees of English proficiency. There were 151 males and 137 females who completed the survey, majority of whom from the Martin De Tours School of Economics and Management followed by the School of Arts. There were 203 Thai students, 41 Chinese, followed by Burmese, Vietnamese, and some students from Indian subcontinent.

The type of mobile devices used by students to tryout the mobile English learning experiment is as follows:

- iPhone: 87
- Android based phones: 9
- Blackberry: 19
- iPad: 43
- Android based tablets: 36
- Others: 8

One of the question in the survey asked participants to rank (1 to 10) the importance of the 8 factors in learning English using mobile devices. Figure 4 depicts the rankings. As shown in Figure 4, learning at any place, lecturer's pronunciation, and learning at any time are the factors that are most important for mobile English learning. Ease of use and learning at any pace are also two other factors.

Another question in the survey asked the participants to rank (1 to 10) their English proficiency skills before using the mobile lessons. Figure 5 shows the responses of the participants. This is just a self-perception of students about their English ability in areas of 'Reading Skill', 'Writing Skill', 'Listening Skill', 'Grammar', 'Conversation', and 'Pronunciation'. Though this self-perception of students about their own English proficiency may not be academically accurate, when compared with their own self-perception after the trying out the web based English learning gives a good picture how they thought the mobile learning has improved their English language skills.

Students were then asked to rank their knowledge of English skills after using and trying out the lessons for at least 4 weeks. Figure 6 shows the response of the participants. This Figure 6 should be compared with Figure 5 to assess how the students perceived their English have improved over the course of trying out the web based English lessons on their mobile device.

When figure 5 is compared with figure 6, participants felt improvements in all 6 levels of the English proficiency skills. The most improvement is in pronunciation and listening skills.

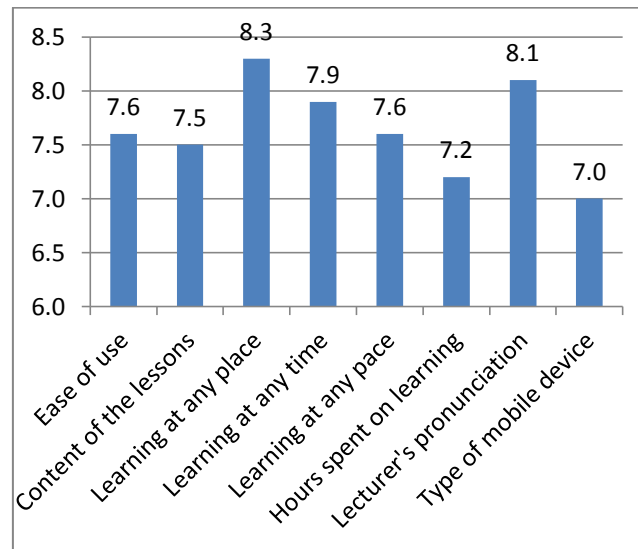


Figure 4: Ranking of factors for mobile English

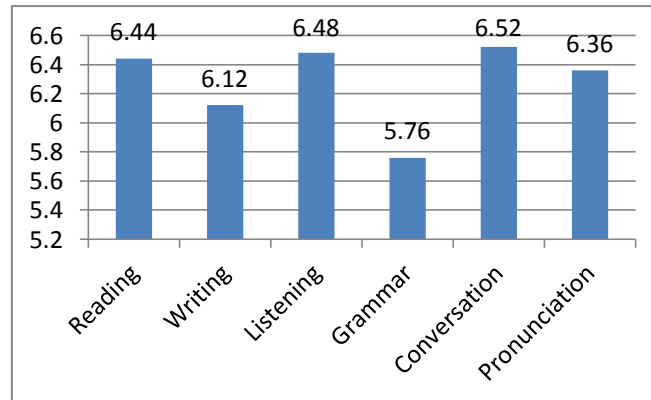


Figure 5: Ranking of English proficiency skills before trying out

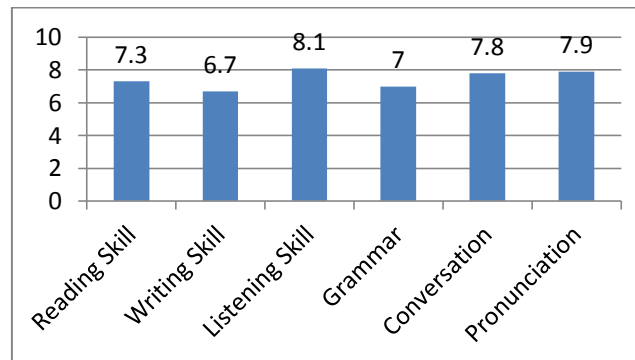


Figure 6: Ranking of English proficiency skills after trying out

In the survey participants were asked to rank (1-10) the impact of mobile learning on their English proficiency skills. Figure 7 depicts their responses.

As shown in figure 7, participants felt the most impact of mobile English learning has been on their pronunciation followed by listening skills and conversation. This is in agreement with the conclusion made when comparing figures 5 and 6 as stated earlier. Students perceived that there have been impacts in all levels of their English proficiency of English language.

One important feature of the web-based mobile learning system is its multimedia capability, i.e. users can read the text on their mobile devices screens while listening to the same text spoken by a native speaker. This researcher wanted to explore if this feature was useful to participants. One of the questions in the survey asked participants if this feature of

being able to read the text while listening was helpful to them. Figure 8 depicts their replies. Majority of students perceived that was helpful or very helpful to have this multimedia feature in learning English on their mobile devices.

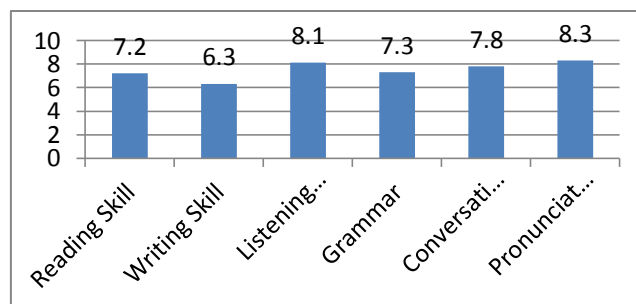


Figure 7: The impact of mobile English learning on participants

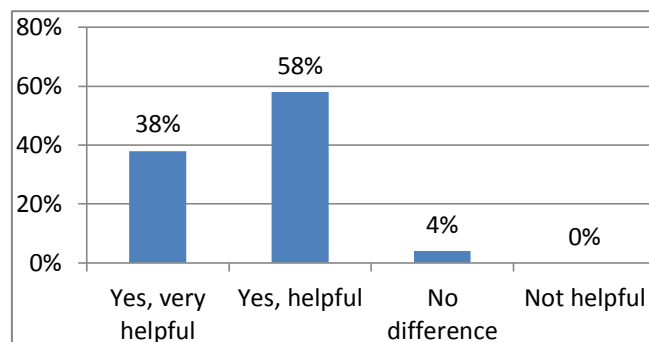


Figure 8: Multimedia feature helpful?

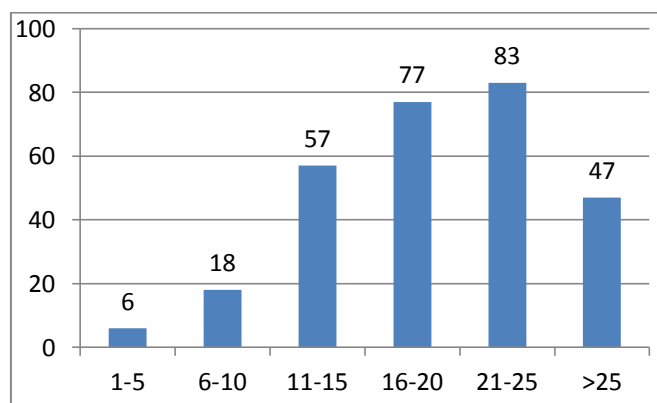


Figure 9: Frequency of usage

The next question was to explore how often students accessed the web and tried out each of the online lessons. Figure 9 depicts the frequency of accessing and trying out of each lesson.

It is apparent from figure 9 that most students tried out each lesson for more than 16 times, with the frequency range of 21-25 having the most number of students. This indicates that students enjoyed trying out lessons on their mobile devices to learn and improve their English skills.

Developing a web based learning system to teach English to students on mobile devices is a very time consuming process. Preparation of proper English lessons by professional English lecturers, converting the lessons into text and pictures suitable for small mobile screens, recording the voices of at least 2 native speakers, and converting the sound files to OGG and WebM all takes time and individuals involved expect to be compensated. This researcher wanted to know if students would pay to have more lessons for their mobile devices. The last question asked if the students would be willing to pay for additional lessons. 37% replied “Yes”, and another 52% replied “Yes, if price is reasonable”.

In the survey, there were 2 open ended questions to seek the opinions of participants as they wished to express it. One question asked participants to express their “likes” and another question about their “dislikes” of using the web-based mobile learning to learn English. Majority did not reply to these optional open ended questions, approximately 20% of students replied to these questions. Their likes included “convenience”, “effective”, “just-in-time learning”, “easy to

learn”, “technologically advanced”, and “good for listening and pronunciation improvements”. Their dislikes were “not having enough lessons”

CONCLUSIONS

The major findings of these research as follows:

- 1) Majority of students at Assumption University have a positive attitude towards mobile learning and are enthusiastic to learn English using their mobile devices. This could be true for students all over Thailand.
- 2) A Web-Based mobile learning system is best optimized with an audio bit rate of 64 Kbps and the use HTML5 and jQuery javascript library.
- 3) The same HTML5 based mobile learning system could be also utilized for learning other languages.
- 4) Smart mobile phones and Tablets could have a positive effect in learning English as a second language at all levels of English learning.
- 5) Multimedia features of mobile English learning are most effective in English pronunciation, listening and reading comprehension.
- 6) Convenience and just-in-time learning features of web based English learning makes it ideal for learning foreign languages.
- 7) The multimedia features of mLearning make language learning more effective.
- 8) Students are willing to pay for mobile lessons for their mobile lessons. This could be a good incentive for English lecturers and IT professionals to work together to develop and produce more English lessons for mobile devices.
- 9) Mobile English learning is at its best in a hybrid mode when supplemented with traditional English learning.
- 10) There is still much room for improvement in terms of technology and also preparing additional lessons to cover more areas of foreign language learning.
- 11) More precise results could be obtained if pre-test and post-test could be conducted to measure the improvements in students’ English proficiency.

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