A FLASH-BASED MOBILE LEARNING SYSTEM FOR ENGLISH AS A SECOND LANGUAGE

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Abstract

This paper explains the development of a Flash-Based mobile learning system for learning English as a second language (FML4ESL). Adobe Flash CS3 was used to develop this system which works on smart mobile phones and PDAs that support Adobe Flash Lite. Twelve English lessons were developed for this system. University students at Assumption University tried out this system using their mobile devices for a period of 4 weeks. A pretest, posttest, and surveys were used to evaluate the effectiveness and usability of this system.

INTRODUCTION

Learning and the lifelong pursuit of knowledge has become one of the most essential activities in the current knowledge-based economy. Whether seen in the guise of the information age, globalization, knowledge acquisition and transfer, or the information and communication technology revolution, this economy requires new methods of knowledge acquisition to convey new skills and tools [1].

Learning in such a context demands radical change. For example, people now often want or need to learn about a subject at a time and place convenient to them. Beyond this increased access, they want the learning to have minimal cost and to be directly applicable to their own environment and needs. Mobile technology has allowed the development of new approaches characterized by just-in-time (JIT) learning and learning on demand.

LITERATURE REVIEW

One of the first projects where mobile phones were used in language learning was

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developed by the Stanford Learning Lab in 2000 [2]. They basically developed Spanish language learning using both 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 [3]. 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 [4]. 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 period, as brief as 5 minutes. Another conclusion that was considered very

useful was to provide customization of learning material for individual or group needs and learning experience.

Flash-Based Mobile Learning System

The purpose of this research was to design and develop a flash-based mobile learning system for learning English as a second language using mobile devices capable of playing Adobe Flash Lite. 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. This researcher with the assistance from couple of professional ESL lecturers developed 12 mobile English lessons to be used by a sample population of students owning a Flash-based mobile phone or a PDA at Assumption University.

The objectives of the Flash-based English lessons for mobile devices were as follows:

– Flash programming allows full control of the mobile device and the lessons by the user.

– Students can listen to native speakers reading a passage or a lesson.

– While listening, students can see and read the text on the screen of their mobile device.

– Students can also learn spelling, grammar, and rules for conversation.

– There are exercises in each unit (lesson) asking students to practice what they have learned.

Development of FML4ESL

Very similar to the Learning Management System (LMS) for the Internet based eLearning systems, the Mobile Learning Systems (FML4ESL) 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 FML4ESL are presented and discussed.

The content material should be optimized for the small screens of mobile devices, usually between 2 to 3.5 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 make use of text and pictures to display the contents as learning material and the voice of native speaker for listening purpose. As the developed Flash-Based Mobile 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 resolution of most modern mobile devices is around 240x320 pixels. This researcher optimized the texts of all the English lessons for the resolution of 240x320 pixels. 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 1 displays how the content is optimized for a screen resolution of 240x320 pixels on Flash CS3 development platform.

The sound associated with the text is in MP3 format with a bit rate of 48 kilo bits per second (kbps) and the best quality available under Adobe Flash. The higher the bit rate, the larger the file size is; the quality does not affect the file size but it affects the loading time of the content into the mobile device. The 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.

The various combinations of bit rates and quality were tested among 11 participants to select the best combination of sound quality. The only limitation in this selection was the file size, as the researcher wanted to keep the file size for a lesson to be around 1 megabyte (MB) in order that the older mobile phones could play them the same as newer ones. Figure 2 shows the selection of sound quality for every slide.
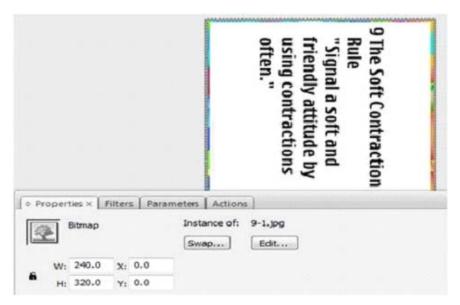
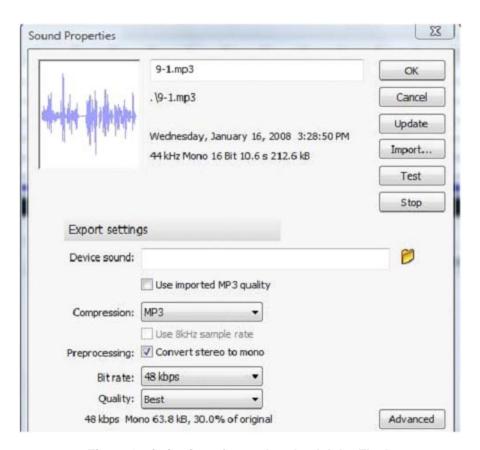**Fig. 1 Optimization of text under Adobe Flash**

Fig. 2 Optimization of sound under Adobe Flash

The Flash-Based Mobile Learning System has a component that controls the functions of a mobile device and the interfaces with the learner. To provide the best functionality and user interface to learners, the researcher consulted with ESL lecturer who provided the contents and also a couple of technology experts to find out the essential functions that needed to be provided. Below are some recommendations from experts.

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 op-

eration of the mobile device.

Based on the above recommendations, this researcher decided to divide a slide into 4 distinct layers as shown in figure 3.

As shown in figure 3, each slide of a lesson comprises 4 layers. The first layer, Layer p, holds the text and the picture of the content on any slide. The second layer, the s layer, contains the MP3 audio sound of the lesson which starts about 2 seconds after the text is displayed on the screen. The third layer, the layer e, is an action script which is executed at the end of each slide. This action script basically stops the slide from going further. The last layer, the layer c, is the control layer that controls the functionality of the knob on mobile device. The action script for this control layer is shown on figure 4.
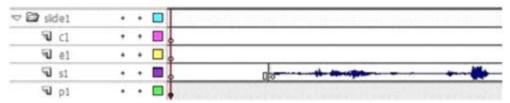
This action script controls the left and

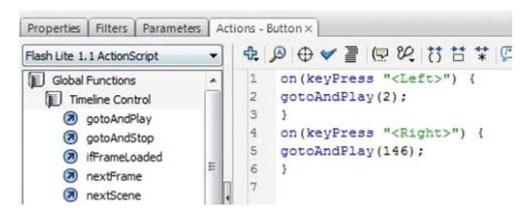**Fig. 3 The 4 layers of a slide in a unit (lesson)**

Fig. 4 Action script for the control layer for controlling the knob

the right movement of the knob on mobile devices. The left click causes the same slide to be replayed and the right click causes the next slide to be continued. All slides follow the same logic except the last slide in the lesson. The action script for the last slide is shown in figure 5.

The prototype system was developed using Adobe Flash CS3 package under Windows Vista operating System. The developed Flash Mobile Learning System for Learning English as a Second Language (FML4ESL) was in SWF file format which can be played on any computer, including PCs, Macintosh, Linux systems or any Flash enabled mobile devices. By limiting each lesson to 8-10 slides, the SWF are around 1 MB which could be played on most mobile devices. Figure 6 displays a slide of a lesson on a mobile device.
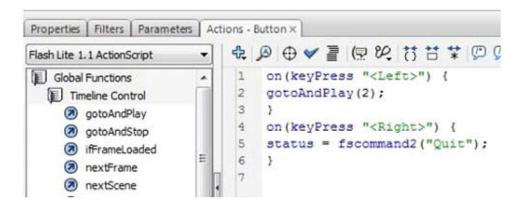

Fig. 5 Action script for the control layer for the last slide of a lesson

Fig. 6 A slide of a lesson on a mobile phone

Trying Out The FML4ESL

In order to conduct this research, the author designed an LMS website based on open source Moodle on one of the servers at the university. Information about this research and mobile English learning was provided on this LMS. Students could apply to join this research online. Pretest, pre-survey, posttest, post-survey were placed on this server.

To attract students to participate in this research, a banner was placed on the home page of the university website with a link to the Moodle site, and posters were placed at various schools at the university inviting students to join and to participate in this research. The requirement for participating in this research was to accomplish all the components of the research which included:

– Answering to a pre-survey

– Taking an online quiz (pretest) developed by the content expert which had 20 questions and a time limit of 20 minutes. Each question scored 1 point

– Downloading 3 lessons per week as provided and listening to these lessons as often as possible during the week for a total period of 4 weeks.

– Taking the same online quiz (posttest).

– Answering to a different survey (post-survey)

To encourage students to join and complete all the requirements of this research, 10 gift vouchers worth of approximately US$ 20 each were provided and later were given to 10 of the participants at random. A total of 182 students filled the online application to join the research and most of them answered the pre-survey and/or took the pretest. This researcher was in touch with the participants through the Moodle forum and provided necessary information and guidelines to them. Some students came to the office of the researcher to solve their technical problems, i.e. downloading or synchronizing problems of transferring the Flash lessons (swf) to their mobile devices. Some students needed help to install the Flash Lite to their mobile devices. Most questions were answered through the forum of the Moodle.

At the end of the 4 weeks, participants were requested to take the posttest and answer to the post-survey. Finally 76 of participants completed all the components of the research. This sample population represented the population of university students. They were from various schools in the university from freshmen to seniors with various degrees of English proficiency. Table 1 shows the descriptive data about the participants.

TABLE 1 Descriptive Data about participants

	N	Min.	Max.	Mean	Std. Dev.
Pretest	76	4.00	17.00	10.74	3.18
Pretime	76	08:00	19:45	12:31	02:24
Posttest	76	10.00	20.00	16.50	2.98
Posttime	76	06:17	17:01	11:01	02:03

The one-way repeated-measure Analysis of Variances (ANOVA) was used to test the data collected and to evaluate the effectiveness of the Flash-based mobile English learning. The standard univariate ANOVA indicates a significant time effect, $F(2,75) = 311.44$, $p < .01$. This indicates a significant improvement among all participants in this research.

Besides pretest and postest, there were a pre-survey and a post-survey to evaluate the students' attitude towards mobile English learning. One of the questions in the pre-survey asked participants to rank (1 to 10) the importance of the 8 factors in learning English using mobile devices. Figure 7 displays the rankings.

As shown in figure 7, 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 pre-survey asked the participants to rank (1 to 10) their English proficiency skills. Figure 8 shows the responses of the 76 participants who also finished the posttest and post-survey.
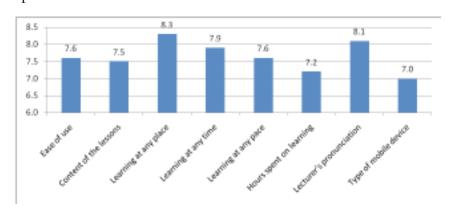

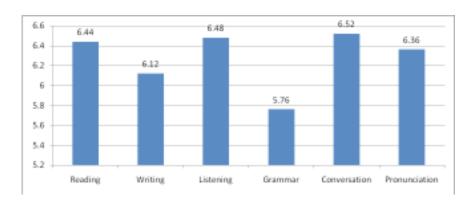**Fig. 7 Ranking of factors for mobile English learning**

Fig. 8 Ranking of English proficiency skills before trying out

After the 4-weeks of trying out of the lessons on their mobile devices, participants were asked the same question in the post-survey. Figure 9 shows the response of the same 76 who finished all the components of the research.

When figure 9 is compared with figure 8, participants felt improvements in all 6 levels of the English proficiency skills.

In the post-survey, they were asked to rank (1-10) the impact of Flash-based mobile learning on their English proficiency skills. Figure 10 displays their responses.

As shown in figure 10, participants felt the most significant impact of mobile English learning has been on their pronunciation followed by listening skills and conversation. There have been impacts on all levels of their English proficiency of participants.
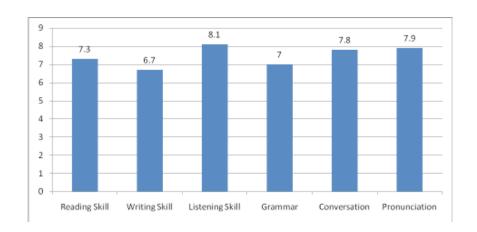

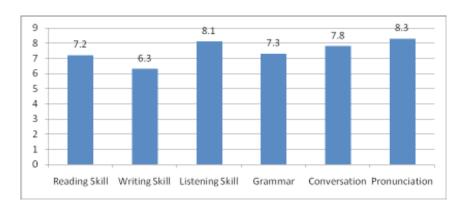**Fig. 9 Ranking of English proficiency skills after trying out**

Fig. 10 The impact of mobile English learning on participants

One important feature of the Flash-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 post-survey asked participants if this feature of being able to read the text while listening was helpful to them. Figure 11 displays their replies.

In the post-survey, there were 2 open-ended questions to seek the opinions of the participants. One question asked participants to express their "likes" and another question about their "dislikes" of using the Flash-based mobile learning to learn English. 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", "the Flash-based mobile learning was not available for all models of mobile de-

vices", and "not being able to record their voice on the mobile device to answer the questions".

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.
2) A Flash-Based mobile learning system is best optimized with an audio bit rate of 48 Kbps and the quality set to 'best'.
3) The same Flash-Based mobile learning system could be also utilized for learning other languages.
4) Smart mobile phones and PDAs could have a positive effect in learning English as a second language at all levels of English learning.
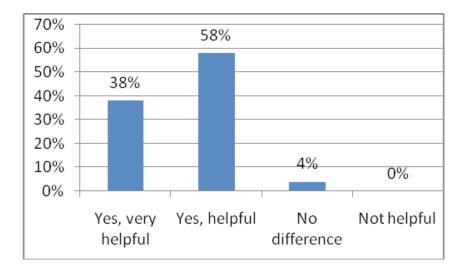

Fig. 11 Multimedia feature helpful?

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 mLearning make 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.

9) Mobile English learning is at its best in an hybrid mode when supplemented with traditional English learning.

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