

A Multimedia Offline Cell Phone System For English Language Learning

Osama Salameh

Faculty of Engineering & Information Technology, Arab American University-Jenin, Palestine

Abstract: *Among mobile computing devices, cell phones are the most wide spread devices and are available in the hands of almost every university student. Other than being portable phones, many are equipped with functionalities including internet access, mp3/mp4 player, digital camera video recorder etc. and can run multimedia content. These features make them attractive as educational tools as well. In this paper we present an offline Flash-based prototype system for English language learning using cell phones. The system consists of ten Learning Objects (LO) constructed using the multimedia approach. Initial testing demonstrated the efficiency of the system and it was extremely well received by students.*

Keywords: *Mobile learning, Flash Technology, Cell phone.*

Received August 30, 2009; Accepted May 9, 2010

1. Introduction

Among mobile computing devices, cell phones are the most wide spread devices and are available in the hands of almost every university student. Other than being portable phones, many are equipped with functionalities including internet access, mp3/mp4 player, digital camera, video recorder and many are Flash-enabled and/or Java-enabled and can run multimedia contents including audio and video.

Some cell phone manufacturers, bind learning software in their products to add extra value to attract customers [13]. The software includes e-dictionary, flash card software, quiz software and others. In our opinion, these products are not sufficient for learning in general because of its dependence on the cell phone manufacturer what makes the dissemination of learning material difficult. Also these products are not integrated into one system with clear pedagogic objectives. Further more, the user is forced to put extra effort to switch between programs while learning.

Based on a questionnaire, almost 100% of the Arab American University-Jenin students are cell phone owners. This is the primary reason for our interest to integrate cell phones into the educational process. Due to its deep penetration and its ubiquity the cell phone seems to be the ideal "anytime, anyplace" educational technology [6]. Our objective is to provide an efficient English as a second language (ESL) learning system through cell phones. This paper presents a system of ten Learning Objects (LO) for English language learning designed to run on cell phones. English language learning was chosen as a case study for the following reasons: on one hand, low level English language skills of students in general (This is evident from

university placement tests). On the other hand there are many obstacles when it comes to recruit native instructors. In addition, providing efficient ESL learning material would help a wide range of students since English is the language of instruction at the university. The place to test the system is the university English Language Centre (ELC).

This paper is organized as follows: in the next section we discuss some of the related work. Then we describe the proposed system. Section 4 evaluates the system and reports results of the user acceptance test. Finally, we will conclude and look ahead towards future enhancements.

2. Related Work

Several projects tried to integrate cell phones into language learning. The use of SMS to teach English language is reported in [14-16]. [16] focused on providing vocabulary instruction by SMS. Short mini-lessons emailed to students three times a day. Lessons defined five words per week. The results indicated that students receiving messages scored twice higher than students receiving their lessons on paper. Despite the fact that this teaching method was effective, it is limited to text only.

Audio clips have been used to help with pronunciation for English as a second language [9]. The results of this work indicated that the content should be in short units. Another study [17] used audio to help Japanese students distinguish phonemic contrasts in English language successfully. A new and better way to deliver audio clips are Podcasts [10]. Podcasts or audio blogs are downloadable broadcasts with really simple syndication (RSS) feeds which

allow listeners to subscribe. Subscribers automatically receive updates. It can be transferred to media player once downloaded from the Internet. Podcasts have been popular for language learning in the last few years. In [2] they have been created for teaching English for Japanese students. The study indicated that podcasts are successful learning material. Unfortunately, these methods lack interactivity with the content and rely mainly on audio.

Fewer research papers reported the use of video clips for language learning on cell phones when compared to the use of SMS and podcasts. Nevertheless, it has been reported that video clips can be used for language learning on mobile devices [13]. Unfortunately, the increased video file size and small screen discourage their use on cell phones.

Cell phones have been used to practice Irish language [4]. In this study students dial a specific number to access interactive voice response system. After finishing a login procedure, students respond verbally to ten randomly selected questions. Student responses are recorded and later evaluated. The main disadvantage of this method is the increased cost related to system infrastructure and dialup time.

More sophisticated language learning solutions are suggested in [12]; a client server system that enables real life language learning scenarios is described. The cell phone is one possible client along with PDA and others. The prototype system proposed suggest heavy online interaction. Such systems can't be applied to our needs because of the wireless connection cost as well as the absence of appropriate wireless infrastructure to support such systems.

An offline slide based solution is proposed in [1]. In this project each lesson contains several slides consisting of text combined with audio. These slides are targeting several aspects of language learning including listening, grammar and rules of conversation. In general, the results indicate that students English language skills are enhanced after using the system. A multimedia approach is adopted in constructing the lessons, which is an improvement when compared to some approaches previously mentioned that rely on one media only. Also the lessons work completely offline. This means that no dialup time cost or cost related to establishment of wireless system infrastructure. Despite these advantages, the system has some disadvantages. First, the lessons lack a testing part that would verify student knowledge after completing a lesson. Second, the proposed lessons don't comply with the instructional design guidelines in the sense that they overload the sensory system with additional irrelevant music and pictures. Thus, unjustifiably increase the lesson file size. Further more, the proposed system is not free. This project motivated us to construct our own system that would fit our needs on one hand and free of the above mentioned disadvantages on the other.

3. The Proposed Mobile Learning System

The purpose of this research is to design and develop a learning system for English language using cell phones. This researcher adopted the multimedia approach to develop the learning objects that would suit our students' needs. We worked with ELC professionals to create a sample of ten learning objects that complement what students go through in the classes. The objectives of the learning objects are:

- Enhance student's reading and listening skills. For example, he can listen to native speaker/s reading a passage or dialog. The text is displayed on the screen. This can be used to enhance conversation skills as well. In some cases a picture is displayed instead of text on a slide.
- Enhance comprehension skills. The student is asked to answer multiple choice questions after the passage. An immediate adaptive feedback based on his answer is displayed. This gives directions on weaknesses and how to avoid them.
- Student can learn grammar rules and spelling.

3.1. Learning Object Description

There are several approaches for LO modelling, and all of them contemplate the following characteristics: auto-contained, based on a prior instructional design, have feedback and assessment of student and use of technology so that it supports the educational objective [5]. The proposed LOs follow this model. Each learning object consists of several slides that end with multiple choice questions to test student understanding. Three main media types are used to implement the slides: text, picture and audio. Each slide contains one or more media types carefully selected to fulfil an educational objective of the LO. For example, in order to enhance the student comprehension, in one LO each slide contains text with narration (see Figure 1-a). The narration is read by native speaker word by word. A sample test question is shown in Figure 1-b. After each question, an immediate feed back is given to the student based on the answer (see Figure 1-c, 1-d). Most of the slides contain text with audio and the number of words that does not exceed 50 in each slide. Questions may be presented after displaying a picture on a slide. The duration of each object is about 5 minutes in order to facilitate learning on the move [11]. Navigation through slides of a LO is done using five-way scroll key with navigation buttons in four directions (left, right, up, down) and a selection button in the centre. The left button repeats a slide and the right button moves to the next one. A slide with narration must be read till the end in order to move in either directions except for the questions and answers. In this case a slide can be interrupted to move to the next slide. This allows the user to move faster when he knows the

correct answer. Using up, down and select buttons an answer can be selected in a multiple choice question.

The LOs are implemented in Adobe Flash CS3 environment and run using Flash Lite 1.1 player or higher. Action Script version 1 is used to control the LO. We targeted an earlier version player in order to cover wider number of cell phones.

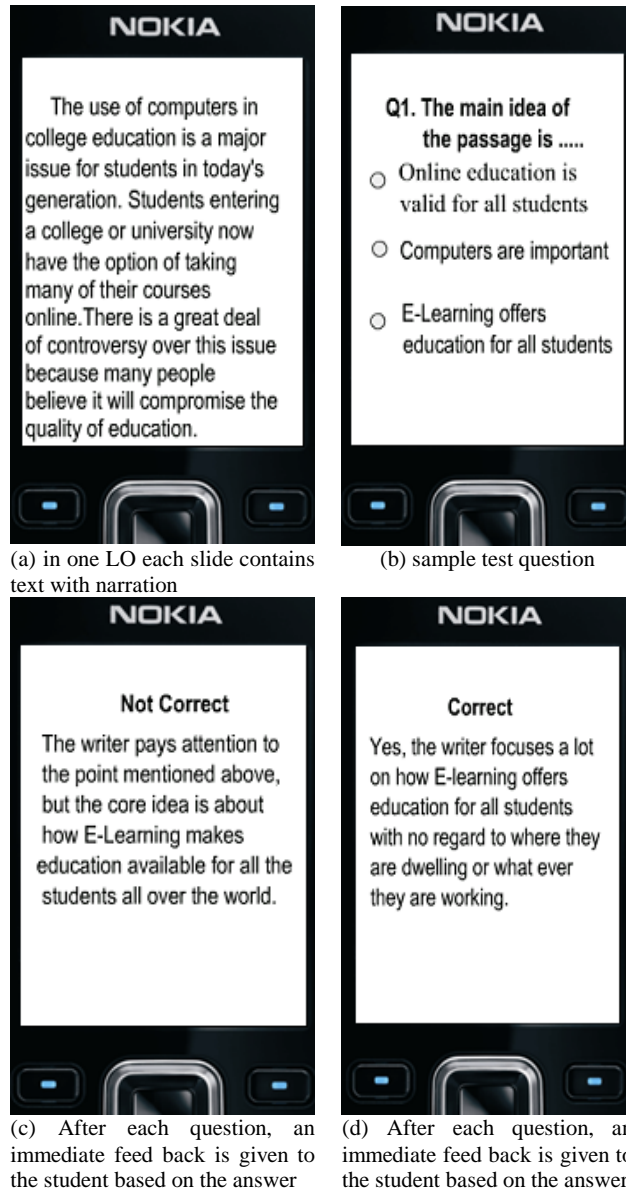


Figure 1. Typical slides of a LO.

3.2. Design Guidelines

Several principles for the design and implementation of mobile Learning applications are presented in [7]. We adopted some of the guidelines applicable to our LOs as follows:

- User analysis has been carried out. With the help of pedagogic experts each learning object satisfy particular objective. The users are advanced English course students at the university.

- The user interface has been designed to cover a wide range of devices rather than to be oriented to a specific device. For example, true type (scalable) fonts are considered that would suit devices with several resolutions.
- The interface is intuitive and the total number of interactions with the system kept low. We focus on the learning task rather than the application itself.
- Each slide is filled with useful information and no scrolling is used in order not to overload the user.
- The user is not distracted by lack or excessive use of a sensory system. No music and/or irrelevant pictures are used. Also colours and font styles are very moderately used.
- Given the limited capacity of many mobile devices and small screen size, videos are not used in our learning objects.
- The LO can be easily turned on and off.

3.3. Technical Issues

Some of the technical issues during development are:

- The file format is shock wave (.swf) that allows the content to be played on any computer including PC and Linux as well as any Flash enabled mobile device.
- Audio format is MP3. The bit rate is set to 16 kbps Mono.
- Among several fonts tried, Arial Narrow font with font size-15 looked best and was selected. It is important to note that this font is scalable. This allows readable text on even small screen resolution of 160 * 160 pixels.
- The text is optimized for small screen of cell phones and screen resolution of 320*240 pixels.
- The resulting average file size is 400 kb. This size is significantly smaller than the size of a typical LO described in [1] while increasing the slide number per LO. Minimizing the file size reduces its loading time. The average slide number is 15. Such files would easily run on older cell phones as well.
- Voice is recorded using Adobe Sound Booth version 1.0. The voice is cleaned then split according to slide content.
- When the text combined with voice, voice starts 2 seconds after the text is displayed. This allows to prepare the student to listen to new slides.
- The system is simple and consists of four layers: one contains text or picture and another for voice. A third layer contains the action script code that executes at the end of each slide and stops the slide from going further. The last layer controls the functionality of the five-way navigation key of the cell phone. This layer contains action script code that runs the needed slide based on the right and left buttons in

ordinary slides and on up, down and selection buttons in question slides.

- Static text component is used to display text. This component enables the text to appear uncut regardless of cell phone screen size.

4. Evaluation

By utilizing Flash technology to construct our LO, we have achieved one of our goals, which is providing large number of students with accessible cell phone English language learning material. This technology is supported by major manufacturers of cell phones. In a wide range of cell phone models this technology is built in and when it is not, relevant Flash player can still be installed for free or for small fee from the manufacturer site except for the very old models.

The user interface of the objects was designed to be easy to use and intuitive. They depend mainly on navigation buttons to scroll through the slides and smallest number of button click to answer a question. The interface is so primitive that there was almost no questions by students on how to use them.

The dissemination of LOs is done easily and quickly through Bluetooth Technology. In order to run Flash content some cell phone models require to place the files in a special folder on the phone or the installation of flash Lite player which might necessitate extra effort. The evaluation results reported below are based on simple dissemination of LOs between cell phones without any interference from the researcher.

The system was tested on 60 students enrolled in the Advanced English spring course 2009. Testing was conducted on two stages: first on Adobe Device Central Emulator version 1.0 when applicable, then on actual students cell phones. The results can be classified into three categories:

- The system worked correctly on 73% of students cell phones. The tested models include: Nokia N95, N93, N96, N82, N81, N78, N73, 6300, 6500, 6110, 6220, 5130, 7210, 3120, 5310, 6680. It is interesting to note that most popular cell phones are Nokia models N73 and 6300. Around 15% of tested students have them.
- The system worked incorrectly on 7% of students cell phones. Namely, on the following models: Nokia 6120, 6233, Samsung Z240 and F480. On these models either the voice was modified or no voice appeared at all while displaying corresponding text.
- The system didn't run on 20% of students cell phones. The models include: Nokia models – 6670, 2680, 2760, 2600, 6820, 6270 and Sony Ericsson k550i. It is important to note some of these model are old.

These results indicate that the students are ready for mobile learning from the technological point of view

since the majority of students own cell phones capable of running Flash Lite content.

User acceptance test was conducted to evaluate the developed objects by asking the targeted students to fill a questionnaire after using them. Results showed that the system is an efficient new way to enhance English language skills. Most of the students thought that the questions with adaptive feedback and the multimedia nature of the LO were the most useful features of the system. They demanded more LOs to be developed. Interestingly, around 50% of students with older cell phones expressed their readiness to purchase new devices to run the system. Also around 80% of all students tested expressed their willing to purchase such learning material in the future. In general, these results indicate positive attitude of university students towards using cell phones in language learning.

5. Conclusion

We have presented prototype learning system using Flash technology for learning English language through regular cell phones. The system is very useful in enhancing the language skills of the students and have the advantage of being accessible by large number of students through their regular cell phone. This encourages the employment of this concept to develop content for other areas. Such systems can be spread easily and quickly between students through Bluetooth technology.

The prototype system has proven its usefulness and feasibility. The next step would be to take them to full scale applications that would provide complete courses and related mobile learning content management system.

References

- [1] Anaraki, F., "A Flash-Based Mobile Learning System for Learning English as a Second Language," Proc. International Conference on Computer Engineering and Technology, Singapore, pp. 400-404, 2009.
- [2] Chartrand, R., Pellowe B., "ELTPodcast.com – a Podcast and Website for Students and Teachers of English", Proc. 2nd International Wireless Ready e-Proceedings –Podcasting Education and Mobile Assisted Language Learning, Nagoya, Japan, pp.66-72, 2007.
- [3] Chinnery G., "Emerging technologies Going to the MALL: Mobile Assisted Language Learning, *Language Learning & Technology*, vol. 10., no. 1, pp.9-16, 2006.
- [4] Cooney G., Keogh K., Use of Mobile Phones for Language Learning and Assessment for Learning, a Pilot Project, National Council for

- Curriculum and Assessment : Ireland (2007) available at:
<http://www.learnosity.com/files/learnosity-use-of-mobile-phones-for-language-learning-and-assessment-for-learning.pdf>
- [6] [Cruz-Flores R., López-Morteo G., "A model for collaborative learning objects based on mobile devices", Proc. 9th Mexican International Conference on Computer Science, Baja California, Mexico, pp.89-95, 2008.
- [7] Doering N., "The Mainstreaming of Mobile Learning at a German University", Proc 5th International Conference on Pervasive Computing and Communications workshops, New York, USA, pp.159-164, 2007.
- [8] Grasso A., Roselli T., "Guidelines for Designing and Developing Contents for Mobile Learning." Proc. IEEE International workshop on Wireless and Mobile Technology in education, Tokushima, Japan, pp.123-127, 2005.
- [9] Man Lee Liu, "From M-Learning to Learning-M" (From Mobile Learning to Mobile Programming Training), Proc. 3^d IADIS International Conference Mobile Learning, Lisbon, Portugal, pp.237-241,2007.
- [10] McNicol, T. "Language E-Learning on the Move", Japan Media Review, Available at: <http://www.ojr.org/japan/wireless/1080854640.php>, 2004.
- [11] McGreal R., et al., "Implementing Mobile environment using Learning Objects: The Athabasca University Digital Reading Room", Proc. IEEE International Workshop on Wireless and Mobile Technologies in education, Tokushima, Japan, pp.136-140, 2005.
- [12] McGreal R., "Learning objects: A practical definition," *international Journal of Instructional Technology & Distance Learning*, vol. 1, no. 9, Available at: http://www.itdl.org/Journal/Sep_04/article02.htm, 2004.
- [13] Petersen S. A., Markiewicz J. K., "PALLAS: Personalized language learning on mobile devices", Proc. 5th IEEE International conference on Wireless, Mobile and ubiquitous Technology in Education, Beijing, China, pp.52-59, 2008.
- [14] Qing Li, "Mobile Enhanced Learning: Application Model and Practice", Proc. International Conference on Computer Science and Software Engineering, vol. 5, Wuhan, China ,pp.694-697, 2008.
- [15] Thornton, P., & Houser, C. M-learning in transit. P. Lewis (Ed.), *The changing face of CALL: A Japanese prospective*. The Netherlands: Swets and Zeitlinger, pp. 229-243, 2002.
- [16] Thornton, P., & Houser, C., "Using mobile web and video phones in English language teaching: Projects with Japanese college students" In B. Morrison, C. Green, & G. Motteram (Eds.), *Directions in CALL: Experience, experiments & evaluation* Hong Kong: English Language Centre, Hong Kong Polytechnic University, pp. 207-224, 2003.
- [17] Thornton, P., Houser, C. "Using mobile phones in English Education in Japan", *Journal of Computer Assisted Learning*, vol. 21 ,no.3 , pp.217-228, 2005.
- [18] Uther M., et al., "Mobile Adaptive Call (MAC): A Case-study in Developing a Mobile Learning Application for Speech/Audio Language Training" , Proc. IEEE International Workshop on Wireless and Mobile Technologies in Education, Tokushima, Japan, pp.187-191, 2005.



Osama Salameh is an assistant Professor in the Faculty of Engineering and Information Technology at the Arab American University-Jenin, Palestine. He holds PhD degree in Computer Engineering from Odessa State Polytechnic University in 1996. His research interests include the use of mobile devices in education.