Abstract: - At present, mobile learning has increased popularity as it offers a better opportunity to leverage educational level. The major advantage of mobile learning is the ability to learn from anywhere at any time using the wireless internet access available in any learning settings. Language learning is a cumulative process; it needs an iterative process to enhance memory. Therefore, mobile learning is very suitable for learning language. This paper presents an e-learning application that can be used to learn Thai language via mobile phones. In this application, the lessons are classified into three sub-categories as basic knowledge, practicing and media to improve the skills of listening, pronunciation, reading and spelling with comprehensive exercises. It is therefore suitable for those who are interested in mobile applications industry and especially for foreign students who want to learn Thai language and learn how to use them correctly.

Key-Words: - m-Learning, Mobile Services Oriented Architecture (MSOA) framework, Web Services; Thai Language.

1 Introduction

It is obvious that nowadays mobile devices play an important role in human’s social life and communications. Many functions can be done via mobile phone devices such as updating contents on social networks, chatting with friends, watching online TV channels, playing online games and so on. The profound mobile’s advantages are catering convenience for human’s life. Nowadays, many people all around the world can have access to high-speed internet connections which is available through wireless network everywhere.

Kristine et, al, (2009), Michelle (2009) and Tsvetozar et, al (2004) described the meaning of m-Learning as teaching or Lessons (Instruction Package) which provides content and learning activities through wireless technology (wireless telecommunication network) and Internet technologies. Students can learn anywhere, anytime without using a cable connection. Students and teachers can use their portable devices to organize learning activities through a communication network without using cables in real-time such as Notebook Computer, Portable computer, Tablet PC or Cell Phones. M-Learning is an innovative way in teaching and learning purposes. Fig. 1 shows the development of m-Learning (Guy, 2010), which is the follow up of e-Learning and d-Learning as the combination of distance learning (d-Learning) and electronic learning (e-Learning) are illustrated in Fig. 1.

Fig. 1 The Trend of Learning: d-Learning, e-Learning and m-Learning (Guy, 2010).

The main focus of mobile learning (Norbert, 2009) is on mobility of the learner. However, m-Learning uses the wireless networks that enable mobility and allowing teaching and learning to extend to areas beyond the traditional classrooms. Mobile learning gives instructors and learners increased flexibility and new opportunities for better interaction. Mobile technologies support learning experiences that are collaborative, accessible, and integrated with the world beyond the classroom.

Currently there are a number of foreigners, who visit Thailand for different purposes such as doing business, travelling and internship students who aim to stay either short-term or long-term. Thai language is important for their daily life. They would find it beneficial to communicate with Thai people efficiently and effectively. As a matter of fact, Thai language is not too difficult to learn the basic conversation expressions in a short-time period.
Therefore, this study aims at developing m-learning that facilitates the mobile learners to gain more opportunities to study Thai language easily. The goal is to present a novel way to integrate various content-based resources to improve the performance of pronouncing, spelling, listening and understanding for anyone who is interested in Thai language. The rest of this paper is organized as follows: In Section 2, the related works are reviewed. In Section 3, we describe the characteristics of an architectural overview and operation processes of mobile application. Section 4, illustrates the implementation and finally, Section 5 we will have a general conclusion that is going to suggest some practical solutions to come over challenges and drawbacks of the current systems. Thus, this study can be useful as a basement and potential direction for future researches.

2 Literature Reviews

2.1 M-learning in Thailand Universities:
In Thailand, some universities, schools, high-schools, local governments and central governments provide m-learning for supporting their students to learn from anywhere at any time. Examples of universities where m-learning is applied: 1) Ramkhamhaeng University\(^1\) - RUMobileLearning, where m-learning not only helps students to save time and money but also provides another learning channel to students. There are more than six hundred thousand students utilizing the innovative technologies. Ramkhamhaeng University provides many course materials which mobile learners can select and download and enroll the course as zip files and extract into mobile device or PC. 2) Walailak University\(^2\) provides more than 900 contents cover in every faculty in both graduated and under graduated schools. The students must login to the m-learning system at Walailak website and download the course materials they enrolled in each semester. 3) Mahidol University\(^3\) indicates that teaching and learning through M - Learning combines advanced technology with more Audio and video. In particular, the 3G mobile phone which makes it easier for students to review the lessons at any time. At Siam University, we currently provide e-learning for students. M-learning is the promising tool in the future to offer new opportunities for interactive learning and communications to our students. This research is a pilot project that provides the course materials for teaching Thai language for foreign students, foreign lecturers and interested mobile learners.

2.2 Application of m-Learning in Learning Activities:
The technical challenges on mobile devices can be drawbacks of connectivity and battery life, screen size, key size, multiple operating systems, file size or less bandwidth etc. Several researchers or institutes try to solve and eliminate problems on mobile learning such as Nucharee et. al, (2006), they designed the text-to-speech application for learning Thai language that intended the learners could learn the correct pronunciation. Text-to-Speech synthesis could be coupled with computer aided learning system to provide a helpful tool to learn. Wichian et al. (2007), presents a method of form processing which can be used with any specific preprinted form and a hand-printed Thai character recognition algorithm to convert the image in these specific areas into text (automatically store them into a database). Nucharee et. al, (2002), Imran A. et al. (2006), they proposed the use of a game-based system to attack the first language interference problems for native Arab speakers learning English as a second language. Pablo Lavin Mera (2006), they applied Flash lite, which is the mobile version of the well-known application Adobe Flash for increasing much more mobile learners interest and included SMS systems and Web based system for supporting learners. Moreover, M. Kam (2006) designed videogames over cell phones to teach languages and safety knowledge in India. Zhou Hui (2009) carried out the study of a problem based m-learning technique which is also named by “Tang Sancai” in advertising specialties education at universities. Mercedes Rico(2008) proposed ways to examine the possibilities of creating a mobile language environment by the exploration of specific mobile devices in a field in which relatively little research has been conducted so far.

2.2 Application of mobile Learning theory to mobile Learning Activities:
In this paper, we extended the idea of several researches to include 3 new features: Mobile Services Oriented Architecture (MSOA) framework, RSS feed method and Bing speech API. The Mobile Services Oriented Architecture (MSOA) framework considers providers and consumers as a service. The

\(^1\) http://www.m-learning.ru.ac.th/
\(^2\) http://mlearning.wu.ac.th/moodle145/
RSS feed method is used to fetch updated contents across servers. Bing speech API is used to call the web services to support speech to text and text to speech for learners to gain more understanding. Eventually, with these three additional features, we believed that our proposed scheme will benefit the distance learners and increase the number of users who access knowledge from everywhere and all the times.

3 Mobile Learning Architectural

In this paper, we proposed a new framework (It is called “mobile-Learning for Siam University or m-LSU”) for mobile learning that can be applied for the international students. m-LSU system is the system that provides Thai language course for those students who are interested in learning Thai language as their second language. The system supports learners to easily study Thai language by using the common features that are already available on all mobile phones, such as; sound, screen, internet network and keyboard. Fig. 2 shows the m-LSU architectural overview.

As Fig. 2 illustrates, by using m-LSU, the mobile learners can connect to internet inside the university campus or any other area that supports internet connections. Therefore this system allows students to learn Thai language in any position that is more convenient to them, regardless of geographic location or limited local areas.

M-LSU consists of 7 components as following:

1. Community: The mobile learners who are interested in learning Thai language (via mobile devices) can join some collaborative connections in order to discuss and share ideas and comments in regard to their group activities.

2. Contents: The course materials such as documents, practices, exercises, mp3 and mp4 etc.

3. Services: The provider services such as services for Bing translator, Microsoft Text-to-Speech, Speech-to-Text and Microsoft Tablet PC etc.

4. Exercise: The exercise requires responses from the mobile learner that demonstrate comprehension and then it offers immediate feedback (report) whether the response is correct or not.

5. Evaluation: Quiz authoring tools allow teachers to create automated responses to a quiz.

6. Feedback: If the response is correct the program keeps on continuing the instructions, but if the directions were not followed, then the program suggests corrective action.

7. Plug-Ins: Our m-learning web site includes several services and functions that act as plug-ins method in our web site.

4 The Design and Implementation

In this section, we illustrate the basic design components as the following:

- Web services,
- RSS Feed Method, Course materials and screenshot of mobile application.
4.1 Web Services:
Integrating several web services into m-LSU system for supporting any learners who are interested in learning Thai language from basic to advanced levels. In this paper, we used Service Oriented Architecture (SOA) (Duane, 2007) as a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains and we tried to implement various technology stacks. The main component of SOA consists of: (A) Service provider, (B) Service Consumer and (C) optional Service Registry as shown in Fig. 3.

![Fig. 3 SOA request/response pattern with a service registry (Duane, 2007).](image)

Walisa et al. (2010) mentioned that Service provider presented all necessary services in the organization. Service consumer uses configured client software to issue and invoke request to a service provider. After that, an optional service registry can be used within the architecture to help the client automatically to configure certain aspects of its service client. When the service provider executes the changes in regard to service details of the registry -that consumer has subscribed already- then the service consumer is notified of these changes and can configure its service client to talk to the service.

In our primary function of web services that we developed for supporting audio conversion from Thai to English and English to Thai sounds; It has 3 sub-functions as following: 1) Convert text into English sound (Text to Speech). For example, when the users type the word "cat", it will convert text into the sound "cat." 2) Translate text from English to more than 30 foreign languages (Bing Translator Web Service). For example, if we type the Thai word “แมว”, Bing Translator Web Service will translate it into the English word and sends back the definition of "Cat". 3) Convert from sound into text (Speech to Text). For example, if we pronounce “Cat”, Bing Web services will convert the sound “Cat’ into the text.

4.2 RSS Feed Method:
Fetch new data or updated web contents as quickly as possible in web server and immediately send the updated contents to the mobile learner device.

![Fig. 4 RSS feed Module, (a) The 5 methods for RSS feed Management, (b) RSS feed Diagram.](image)

As Fig. 4 illustrates, RSS feed class (Tsvetozar, 2004) consists of 5 methods: Publish, Save (string, stream), Transform (XmlReader) into MemoryStream and Transform (XmlReader, string) as shown in Fig. 4 (a). Fig. 4 (b) displays the RSS feed Diagram and relationship between other interface classes.

**Pseudocode1. RSS Feed Module**
1: Create a list of all feed items
2: Create Database
3: Get the date of last item cached from Database
4: Check which items in my list have a date
5: Sort the returned filtered list by date the item was created
6: Add new items to the Database

Pseudocode1 illustrates the steps for fetching data from several web sites that recently have updated new web contents. We created the list of all items
that allow for feeding and then we obtained the last updated items from the database. After that, we checked the date and sorted the items created. Finally, we added new items to the database and we displayed the new updates to the mobile’s learners.

4.3 Course Materials for Thai language; we categorized it into 3 sub-categories as following:

4.3.1 Basic Knowledge:
In the beginning, we classified the Thai language into System, Structure and Usage. In this category, we showed the 44 Thai alphabets, name and meaning in English.

Fig. 5 Example of 12 consonants from 44 consonants in the Thai language.

As Fig. 5 illustrates, there are 44 consonants in the Thai language which are grouped into three different classes. Blue is low, green is middle and brown is high. It is important to remember the class that each consonant belongs in order to specify the proper tone to it. For example, in Gor Gai, "Gor" is the sound that letter makes and "Gai" is a chicken. Apparently a lot of letters have the same sound and finally there are only 21 sounds to learn about. However, some letters change their sound when they come at the end of a word. In total there are only eight final sounds. There are also some letters which we do not use much.

4.3.2 Basic Knowledge:
Practicing: we proposed the “practicing yourself" for mobile learners who are interested in improving their Thai language skills by offering a variety of self tests and games such as Matching Thai number 1-12, Matching Color and Matching Adverbs on Sounds, etc.

4.3.3 Media:
We provided the multimedia such as sound, VDO that mobile learners can play on windows mobile media player. The example of media such as important songs of Thailand, Thai national anthem and karaoke etc.

4.4 The Basis of Mobile Devices Requirements
Mobile Devices are characterized by the ability to learn through portable devices. Technology has continued to play a pivotal role in improvement of M-Learning training methods. Although mobile technologies and devices have their own share of advantages, the common characteristics of mobile devices in m-LSU requirement are as following:
- Support SMS whereby one can send or receive text messages of 160 characters and Multimedia Messaging Service – MMS as graphics (David, 2008).
- WAP/ WiFi/ Internet Explorer enabled mobile phones that can access the Internet through deploying protocol of international standard.
- Bluetooth facilitates PDA message sharing from one mobile device to another. For example, after a mobile user has successfully downloaded a zip file from the server and stored it on the device, other users in that vicinity also can share that file using the Bluetooth.
- More capacity of Memory and RAM.
- Includes Windows Media or Streaming Player

4.5 The Basis of Mobile Devices Requirements
We developed a program using Microsoft.NET 2008 (ASP.NET) for implementing the web applications, web services, RSS feed, Web Services and Database using Microsoft SQL Server 2008.

Fig. 6 First Screenshot for mobile application.

In Fig. 6, we designed the 9 icons on the start page consisting of: The first words, Food, Colors, Phrases, Body, Numbers, Time, Shopping and Countries. For the first time, the mobile learner must start at First Words for leaning the Thai language.
Fig. 7. Example phrase in Thai languages (a) Yes (in a very polite way) in Thai and (b) You are a special person for me.

As Fig. 7 illustrates, using the phrase icon, the mobile learners can learn the prepositional phrase, adjective phrase, adverb phrase, noun phrase such as “Hello” in Thai and “You are a special person to me”. The mobile learners can practice the 44 consonants and sentences in the Thai language by using window mobile media player for showing how to write Thai alphabet from start to end as shown in Fig. 8.

Fig. 8. The practices in Thai language on mobile devices.

As Fig. 8 illustrates, the mobile learners can click on the first alphabet and the video will show how to write it from start to end.

Fig. 9. Mobile Practices based on Songs and Karaoke for Thai Language.

As Fig. 9 illustrates, the mobile learners can use the song and karaoke to practice listening, pronouncing and spelling.

5. Conclusion
In this paper, we presented the mobile learning for foreign students and teachers as pilot project at Siam
University, namely “m-LSU”. “m-LSU” is an acronym for “mobile Learning for Siam University”. The proposed system supports several mobile learners who use mobile devices (PDAs, Cell phones and so on) to connect through the internet network. Our new services integrate m-learning from several providers (that allow access, preview and download files). The main advantages of m-LSU are: 1) only a single sign on to m-LSU, the learners to connect with several servers that joined m-LSU’s server. 2) Then the system updated the new course materials for supporting RSS feed to fetch data as quickly as possible in shortest time. 3) Then it uses Bing speech API from Microsoft that we call from web services to support speech to text and text to speech for the mobile learners to understand easily. The lessons in m-LSU are classified into two levels for the beginners and advanced learners who have different background of Thai language. Our future work will extend the m-LSU framework to support people with disabilities in educational environment and situations, because we have the web services available for both speech-to-text and text-to-speech functions.

References: