The MObile-Based Interactive Learning Environment (MOBILE) and A Case Study for Assisting Elementary School English Learning

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Abstract
This paper describes the architecture of our proposed mobile learning environment-MOBILE for assisting instruction and assessment in elementary school. The mobile learning system is used for managing all learning activities and the mobile learning tools (m-Tools) is used for executing learning activities that will be introduced. The proposed mobile learning environment developed is based on wireless and information technologies. Several planned to provide interesting mobile learning materials and activities in- or outside the classroom. English Learning materials and activities for elementary school will be illustrated here. We explore the influence of learning effects about students after apply experiments. And we expect that with the help of the MOBILE, the enhancements of students’ learning interest and motivation are promising.

1. Introduction
In order to promote the competitiveness of the country, many developed countries enforce relative e-learning projects in succession. In Taiwan, not exceptional, the government also drives the National Science and technology Program for e-Learning since 2002[1]. Without a doubt, the e-Learning will become an essential application in Internet.

At the same time, the advances of wireless technology create a new learning model, the mobile learning model, which has been approved effectively for the educational application in recent empirical studies [2-3]. In view of this, we attempt to explore the applicability and benefits of using mobile technology on learning activities, thereby enhancing the effects of instruction and assessment, and also increasing students’ learning interest and motivation. To achieve this goal, we propose to construct a mobile learning environment that consists of mobile learning servers and mobile learning tools to provide interesting learning activities.

2. System Overview
The diagrams of the proposed Mobile-Based Interactive Learning Environment (MOBILE) for activities inside and outside the classroom are respectively shown in Fig. 1a and Fig. 1b.

![Fig.1a Inside classroom](image)

![Fig.2b Outside classroom](image)

The Fig.2 shows the proposed architecture of the MOBILE. The mobile devices employed in the mobile
learning environment include Notebook and PDA. The digitized teaching materials and assessment are stored in the Learning Content Management System (LCMS).

Fig. 2 System Architecture

The MOBILE is designed for supporting learning instruction and activities between the teacher and students. Those activities can be conducted via wireless channel where a teacher controls the mobile learning system installed in a notebook computer and each student uses mobile learning tools installed in PDA.

2.1 The Mobile Learning System

The mobile learning system is installed in a notebook computer or TabletPC which composes the MMS, MAS, MIS and MLDB. The MMS provides functions including content management, assessment management, course management, resource searching, dictionaries and learning records. The MIS provides several learning activities that are material browsing, bulletin board, learning community, chat, quiz, notebook and FAQ. The MAS provides online assessments. Student can use PDA to receive learning material from the mobile learning system and returns message to the mobile learning server. Students’ learning statuses and records will be stored in mobile learning database (MLDB). The teacher can download the teaching and assessment materials from Learning Content Management System (LCMS) via Internet to the MLDB to conduct in- or outdoor activities.

2.2 The Mobile Learning Tools

Individual and interactive mobile learning tools aim to provide a self-motivated learning environment that is cheery and interesting. With those tools, students can learn anytime and anywhere. The m-Tools will record the student’s learning status for the student’s and teacher’s references.

In the following we describe the Mobile Learning Tools (m-Tools). The m-Tools are application tools built on PDA device to support students’ learning inside- or outside the classroom. The device has the following main functions:

1. m-Loader: The m-Loader can be used to download the learning materials from LCMS or MLDB to PDA and manage personal materials. After the student logins the MMS and go into one online course; the student will see his/her materials list about this course, and then he/she can query to download the materials he/she wanted. In the meantime, the m-Loader will store the materials into the device for off-line learning.

2. m-Reader: The m-Reader was used to browse HTML-based materials and to interact with the teacher or classmates via WLAN. A student can browse materials from LCMS in on-line learning or read the materials stored in the mobile device in off-line learning. After a student launches this tool; he/she will see the materials list and opens one material that he/she wants to read. After the learner has read the material, the m-Recorder will record the learning history.

3. m-Notes: The m-Notes provides the functions of bookmarker and notebook for the learner.

4. m-Scheduler: To remind students the deadline of homework, examination events, and related issues. After a student logins MLS and view his/her course bulletin; he/she can download the teacher’s poster (such as assignments or assessments) from the MLS to personal m-Scheduler. So that the student can manage his/her schedule any time.

5. m-DB: A mobile learning database is uses to store learning records and materials in learning device.

6. m-Recorder API: An interface that plays the role of the bridge between each tool and m-DB, use to build the learning portfolio.

3. The Example of Learning Materials
In our study, activities will be chosen for each topic to reduce teachers’ and students’ anxiety of using m-Tools. In the following, we will illustrate an English learning example with topics and vocabulary.

Example: Body Parts learning subject

The Fig.3 shows the Body Parts learning subject that will help students to recognize vocabulary of body parts, to listen/read/write vocabulary of body parts, and to match words with pictures of body parts through interesting activities. When a learner clicks the body parts, the device will pronounce the body part and show its’ word.

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**Fig.3 Body parts learning subject**

Below we describe some simple learning activities.

(a) The Fig.4a and Fig.4b show the body parts matching activity. The learner must match the pictures of body parts to their corresponding words by dragging and dropping icons. When a learner moves each icon, the PDA will pronounce the body part. After this is achieved, the learner will receive a reward.

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**Fig.4a Body parts matching activity.**

**Fig.4b A matching result**

(b) The creation of species is shown as Fig.5a and Fig.5b. First, the m-Tools will give body parts of various animals; may be given monkey hands, rabbit noses, and elephant ears. After students do with their creation, they can transmit their results to the teacher and students can see other groups’ results from the video projector and using their PDA to vote for the most creative, most amusing, and/or any other categories teachers and students would like to have. The activity is useful in motivating learner’s interest.

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**Fig.5a Creator of body parts.**

**Fig.5b Result of creator.**

The Fig.6 shows a teacher conducts an English course with MOBILE environment in Taipei City Zoo. The activity is useful in motivating learner’s interest.

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**Fig.6 A course in Taipei City Zoo**

4. Experimentation

In elementary school in Taiwan, a general classroom has a video projector and a LAN which can route to Internet. A teacher can use a notebook connected the video projector to assist instruction and learning activities with students each held a PDA via an access point.

We designed twelve examination papers, as the posttests, which has the 95% similar difficulty. We spend twelve weeks finishing the experiment in learning English as a Second Language; all courses were divided into two parts. In the first part, at the odd number of weeks, the teacher takes a posttest after he/she executes traditional instructions. In the second part, at the even number of weeks, the teacher takes a posttest after he/she executes the interactive learning activities via MOBILE. To avoid the experiment’s error occurred from the different learning ability of different student groups, we only apply assessments and comparison in the same group.
5. Questionnaire and Result

In our study, we took a questionnaire on students to realize the students' impression, the influence on students and the acceptance of students after teachers apply MOBILE to assist their instructions. The questionnaires were held at the last course, and a 5-point Likert-scale (1=very disagree,5=very agree) was used for all questions; the participants must choose a degree about each subject. The major questions of the questionnaires were described as following,

A1. I like to use the MOBILE for learning English.
A2. I hope the other courses also apply the MOBILE for assisting instructions.
B1. It’s easy for me to execute the learning activities with the teacher or classmates by using m-Tools on PDA.
B2. It’s easy for me to execute self-study by using the reader or browser on PDA.
C1. Using MOBILE to execute activities and read materials can increase my interest and motivation in learning.
C2. Using MOBILE to execute activities and read materials can increase my efficiency in learning.

Twenty-three answers were received; one of them was invalid, twenty-two of them were valid. The statistic results were shown in the following Table1,

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std Dev</th>
<th>S.E.</th>
<th>point&gt;=4 percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>4.32</td>
<td>0.72</td>
<td>0.15</td>
<td>82.6%</td>
</tr>
<tr>
<td>A2</td>
<td>4.27</td>
<td>0.70</td>
<td>0.15</td>
<td>82.6%</td>
</tr>
<tr>
<td>B1</td>
<td>4.14</td>
<td>0.83</td>
<td>0.18</td>
<td>72.7%</td>
</tr>
<tr>
<td>B2</td>
<td>4.00</td>
<td>0.69</td>
<td>0.15</td>
<td>73.9%</td>
</tr>
<tr>
<td>C1</td>
<td>4.18</td>
<td>0.73</td>
<td>0.16</td>
<td>78.3%</td>
</tr>
<tr>
<td>C2</td>
<td>4.05</td>
<td>0.65</td>
<td>0.14</td>
<td>78.2%</td>
</tr>
</tbody>
</table>

N=22,Caronbach α=0.8031

Table 1. Mean and Standard deviation

The fifth column describes the percent of greater and equal to point 4. Responses to the first item indicated that most of the students like this MOBILE (m=4.2, 82.6%). The responses received for the second items indicated that most of the students recommend this learning model to other courses (m=4.27,82.6%). The third item indicated that using the MOBILE was easy for most students, but some students think it’s not easy to use (m=4.14,72.7%). The fourth item indicated that the MOBILE was easy for most students, but some students think it’s not proper for self-study (m=4.00, 73.9%). The fifth item indicated that the system can increase the learning interest and motivation (m=4.18, 78.3%). The sixth item indicated that the system can increase the performance in learning English (m=4.05, 78.2%).

6. Assessment Result

According to the average of students’ scores for each test, we draw the broken line graph shown as Fig.7 We found that the m-learning via MOBILE has a better efficiency than the legacy instruction in learning English.

7. Conclusions and Future Works

The results of questionnaires and tests have shown the interest and efficiency in learning English for elementary school students in Taiwan, by applying MOBILE. Currently, we will work with elementary school teachers and system administrators to conduct the full-scale studies and to investigate the practicality of this mobile learning in different elementary classroom contexts and adjust the MOBILE to adapt to individual learners’ needs.

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References