

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

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Abstract

This research develops a MOBILE-Based Interactive Learning Environment (MOBILE) for aiding elementary school English learning. The MOBILE consists of a mobile learning server and mobile learning tools, which is able to support in- or outdoor learning activities. Several theme-based mobile learning activities including body parts learning and creation of species are conducted. Experimental results obtained from posttests and questionnaire indicate that the MOBILE can significantly increase students' interest and effect in learning English as compared to the traditional manner.

1. Introduction

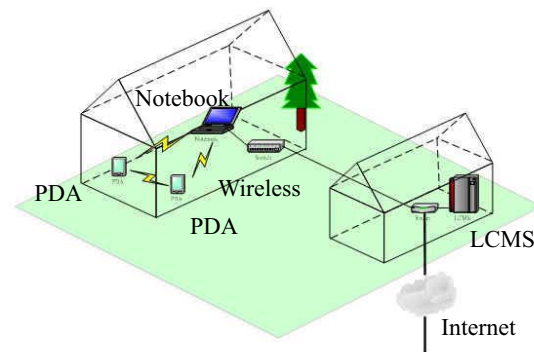
In order to promote the national competitiveness, many developed countries are doing their utmost to enforce e-learning projects. Also, Taiwan government has driven the National Science and Technology Program for e-Learning since 2002[1]. Without a doubt, the e-Learning is becoming one of the most important applications in Internet. Meanwhile, the advances of wireless technology create a new learning model, the mobile learning model, which has been approved effective to the educational application in recent empirical studies [2-4]. With the help of wireless technology and mobile devices, a ubiquitous learning environment can easily be constructed to support the goals of learning anywhere, anytime, and any form, which are not possible to achieve in conventional classroom learning. In other words, mobile learning further expands the scope of e-learning.

In view of this, we attempt to explore the applicability and benefits of mobile technology to elementary school English learning activities, thereby enhancing the effects of English instruction and assessment, and also increasing students' learning interest and motivation. To achieve this goal, a mobile learning environment that consists of

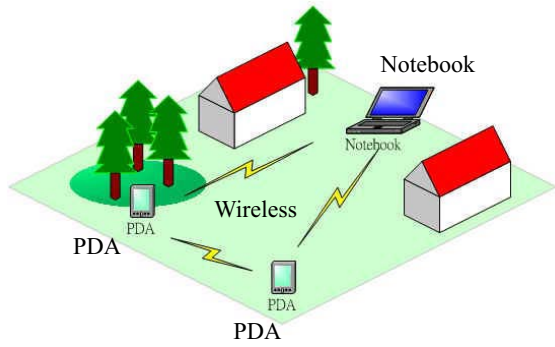
mobile learning server and mobile learning tools is developed with several theme-based learning activities. The rest of this paper is organized as follows. Section 2 presents the construction of the proposed MOBILE. Section 3 describes the activities of mobile learning and posttests. Section 4 illustrates the result of questionnaire. Finally, we conclude this research in Section 5.

2. The MOBILE-Based Interactive Learning Environment (MOBILE)

The diagrams of the proposed MOBILE-Based Interactive Learning Environment (MOBILE) for activities inside and outside classroom are respectively shown in Fig. 1(a) and Fig. 1(b). Fig. 2 presents the system structure of the MOBILE where mobile devices include notebook computer and PDA. The digitized teaching and assessment materials are stored in the learning content management system (LCMS). The learning activities can be conducted via wireless channel where a teacher controls the mobile learning system (a notebook computer) and each student holds a mobile learning tool (PDA).



(a)



(b)

Fig. 1 (a) Diagram of MOBILE for inside classroom.
(b) Diagram of MOBILE for outside classroom.

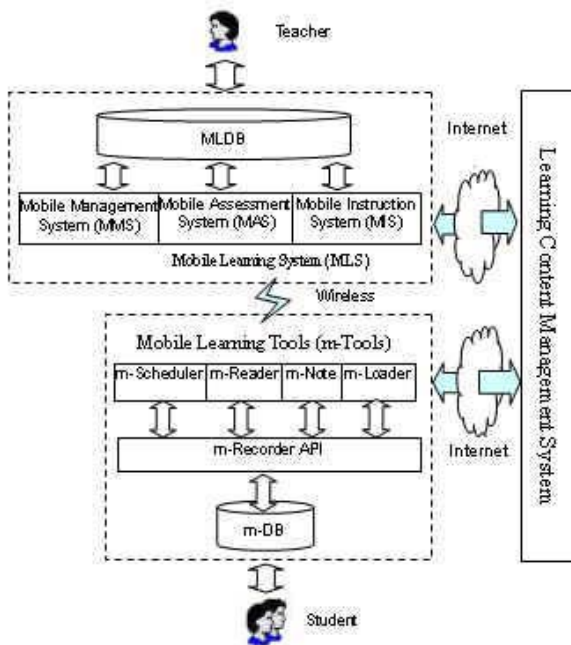


Fig. 2 The structure of MOBILE

2.1 The Mobile Learning System

The mobile learning system installed in the notebook computer is composed of the mobile management system (MMS), mobile assessment system (MAS), mobile instruction system (MIS), and mobile learning database (MLDB). The functions of MMS are content management, assessment management, course management, resource searching, dictionaries, and learning records. The MIS provides services including material browsing, bulletin board, learning community, chat, quiz, notebook, and FAQ.

The MAS supports online assessments. Student can use a PDA to receive/return learning contents from/to the mobile learning system. Students' learning statuses and records will be stored in MLDB. The teacher can download the teaching and assessment materials from the LCMS via Internet to the MLDB to conduct in- or outdoor activities.

2.2 The Mobile Learning Tools

The mobile learning tools (m-Tools) are application tools built on PDA for supporting activities in- or outside classroom. It can record student's learning status for teacher's and student's references. The main functions of the m-Tools are as follows:

1. m-Loader : The m-Loader allows students to download learning materials from LCMS or MLDB to PDA and to manage personal materials. Students can login the MMS and then enters one online course to view individual materials list related to this course and download the learning materials. The downloaded materials can be used for off-line learning.
2. m-Reader : The m-Reader allows users to browse HTML-based materials for diverse learning activities via WLAN. Students can browse materials from LCMS in on-line learning mode or read the materials stored in the mobile device in off-line learning mode. Student can see the material list after launching this tool, and then opens it to read. The m-Recorder will update the learning history after the material had been read.
3. m-Notes : The m-Notes provides users the functions of bookmarker and notebook.
4. m-Scheduler : To remind students the deadline of homework, examination events, and related issues. Student can download the teacher's poster (such as assignments or assessments) from the MLS to personal m-Scheduler after he/she entered the MLS and viewed the course bulletin. This allows student to arrange schedule at any time.
5. m-DB : The mobile learning database (m-DB) stored in m-Tool contains learning records and materials.
6. m-Recorder API : An interface that plays the role of a bridge between each tool and m-DB for building the learning portfolio.

3. Mobile Learning Activities and Posttests

Many elementary school classrooms in Taiwan have a video projector and a LAN which can route to Internet. A teacher can use a notebook computer to connect the video projector to conduct learning activities with students each held a PDA via an access point. In the following, we will illustrate several theme-based learning activities suggested by [5, 6].

Example 1 Body parts learning activity

Fig. 3 shows the scenario of body parts learning activity. The activity aims to help students recognize words related to body parts such as face, nose, eyes, and so on. The functions of listening, reading, and writing are provided. For example, when a learner clicks the icon of one body part, the device will pronounce the word of this body part and show its spelling. Fig. 4(a) and Fig. 4(b) show the body parts matching activity. The learner must match the pictures of body parts to their corresponding words by dragging and dropping icons. The learner will receive a reward if this activity can be successfully carried out.



Fig. 3 The scenario of body parts learning activity.

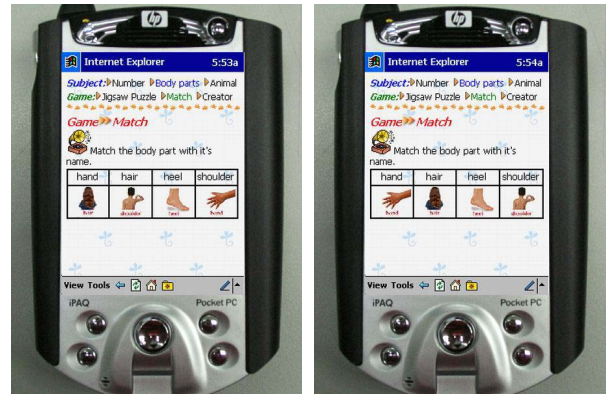


Fig. 4 (a)Body parts matching activity, (b)A matching result.

Example 2 Creation of species

The activity for creation of species is shown in Fig. 5. First, the m-Tools will be randomly assigned body parts of various animals from mobile learning system, for example, monkey's hand, rabbit's nose, and elephant's ears. Then students can create some new species by using the assigned body parts. After students have done their creation, they can transmit the results to the video projector to share with classmates. Then students may use their PDA to vote for the most creative one.

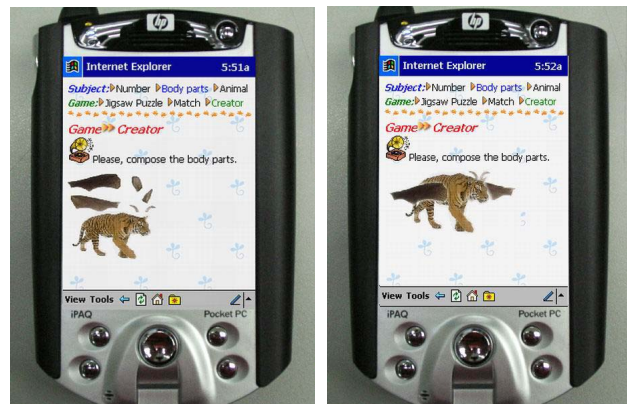


Fig. 5 (a)Species creation, (b)Result of creation.

Fig. 6 shows an English course conducted by a teacher for creation of species with the MOBILE in Taipei City Zoo.



(a)



(b)

Fig. 6 (a)(b) A course conducted in Taipei City Zoo.

The posttests were performed after the above activities had been done. Twelve examination papers with a similar level were designed for the posttests. We spend 12 weeks to conduct the experiment in learning English as a second language; all courses were divided into two parts. The first part is with the odd-numbered weeks, in which the teacher performed a posttest after the traditional instruction had been completed. In the second part, the even-numbered weeks, the teacher performed a posttest after the MOBILE-based learning activities had been accomplished. To avoid the bias occurred from the diverse learning abilities of different student groups, we only performed assessment and made comparison to the same group.

Fig.7 is the broken line graph drawn according to the students' average scores obtained from each test. We found that the effect of learning via MOBILE is better than that of the traditional one.

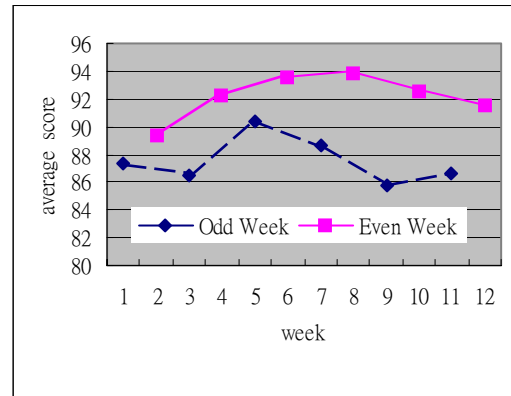


Fig. 7 The average score of posttests

4. Questionnaire and Result

We examine the effectiveness of MOBILE on students' learning by utilizing student questionnaire. The questionnaires were issued at the last class, and a 5-point Likert-scale (1 stands for very disagree, 5 stands for very agree) was used for all questions; the participants must choose a degree for each subject.

The questions listed in the questionnaires are described as follows:

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

Twenty-three answers were received; one of them was invalid, twenty-two of them were valid. The statistical results were presented in Table1.

The 5th column describes the percentage of points that are greater or equal to 4. Responses to the first item indicate that most students like to use the MOBILE (m=4.32, 82.6%). The responses received for the 2nd item indicate that most students recommend to apply this learning model to other courses (m=4.27, 82.6%). The 3rd item indicates that the MOBILE is easy to use for most students (m=4.14, 72.7%) to join the learning activities. The 4th item indicates that the MOBILE is easy to use for

most students to do self-study (m=4.00, 73.9%). The 5th item indicates that the system can increase the learning interest and motivation (m=4.18, 78.3%). The 6th item indicates that the system can increase the performance in learning English (m=4.05, 78.2%).

Table 1 Questionnaire result

Item	Mean	Stand Deviation	S.E. Mean	Point >=4
A1	4.32	0.72	0.15	82.6%
A2	4.27	0.70	0.15	82.6%
B1	4.14	0.83	0.18	72.7%
B2	4.00	0.69	0.15	73.9%
C1	4.18	0.73	0.16	78.3%
C2	4.05	0.65	0.14	78.2%
N=22, Caronbach α =0.8031				

5. Conclusions

This study has constructed a MOBILE-Based Interactive Learning Environment (MOBILE) for aiding elementary school English learning. Several theme-based mobile learning activities have been conducted. Experimental result obtained from posttests indicates that the effect of learning via MOBILE is better than that of the traditional manner. Besides, the student questionnaire result also shows that most students like to use the MOBILE to learn English as well as other courses since it is easy to use and can increase learning interest and effect.

Acknowledgment

This work was supported in part by the National Science Council, R.O.C. under Grant NSC92-2524-S-027-002. The authors would like to thank Prof. Yueh-Kuei Hsu, Prof. Pei-Chun Che, and Prof. Chieh-Yue Yeh for their valuable suggestions in planning the theme-based learning activities.

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