Mobile Learning Supported by Learning Passport

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Abstract

Learning passport is a self-maintained record of learning achievements at different levels, which may serve as a goal-setter, guide, and motivation sustainer for learning. This paper describes a framework for mobile learning supported by learning passport. This framework emphasizes using the items in the learning passport to motivate and guide students to move and explore the answers at outdoors with mobile devices. The study also designed a system, and conducted an experiment, where 32 elementary school students used PDAs (personal digital assistants) to explore the woody plants in the school garden, according to the directions of the items in the learning passport shown on PDAs. The results of a questionnaire reveal that students are interested in the system and think it can enhance their learning achievement.

Keywords—mobile learning, learning passport, PDA

1. Introduction

Mobile learning refers to a "service or facility that supplies a learner with general electronic information and educational content that aids in acquisition of knowledge regardless of location and time" [1]. The mobile learning not only makes information available to people at any time, at any place, and in any form, but specially makes learning available at the right time, at the right place and in the right way [2]. However, where is the right place? From the learners' viewpoint, it is a place that can make learning efficient. Some scholars argue that learning should occur in the real world [3, 4, 5]. Knowledge is in part a product of the activity, context, and culture in which it is developed and used [4]. Therefore, supported by mobile devices and mobile technology, students can learn in diverse physical locations outside with high feasibility [6].

However, Heading to the real learning environment, do students have the motivation to learn and know what to learn? Learning passport provides a mechanism for experiencing learning and authentic assessment [7]. It may motivate and guide students to learn. Therefore, the study proposed a framework for learners with mobile devices to conduct learning interacting with a real environment guided by the items in the learning passport. Furthermore, the study conducted a preliminary evaluation.

2. Mobile learning within real learning environments

To make difference from traditional instruction in the classroom, computers must be mobile, palm-accessible and within arm's reach like its predecessors—the pencil, paper, and calculator [8]. Therefore, more and more researchers envision that in a near future one-on-one (1:1) educational computing, that means that every student has a computing device with wireless capability used as indispensably as a pencil, will lead deep and far reaching changes in education [9]. Having their personal own mobile handheld (even palmheld, see [10]) devices and supported by mobile technology, students can learn in diverse physical locations outside classrooms with high feasibility [6]. That is, students can conduct mobile learning in class. Essential elements of mobile learning are mobile equipments, communications technology and user interfaces [6].

Dewey claimed that it is a great waste that the students are unable to apply in daily life what they are learning in school [11]. Besides, from the viewpoint of Constructivism, Piaget believes that the learner must be active to be engaged in real learning [12]. Learning becomes active when students are able to connect new knowledge with their prior understanding. Constructivists argue that a meaningful context, which brings the real world into the classroom learning

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environment, is key for promoting learning [4]. Learning is a process of interacting with the outside world, and continually reanalyzing and reinterpreting new information and its relation to the real world [4, 5]. Authentic learning provides practical experiences and activities enabling learners to obtain new knowledge and skills rather than abstract symbols or logic [13, 14].

Therefore, to increase the learning efficiency, besides making learning available all the time at different places or on the move, mobile learning must allow an interaction with the real world, including social content, natural environment, etc. Mobile learning interacting with a real learning environment is helpful for enriching the content of traditional classroom learning and promoting the active and interactive learning. From the educational point of view, the main characteristics of mobile learning within learning environment include Expediency, Immediacy, Interactivity, Authenticity, Accessibility, Efficiency, and Convenience [16, 17, and 18].

3. Mobile learning based on learning passport

Mobile learning interacting with a real learning environment could make learning more widely {noun/verb}. However, practically conducting mobile learning would encounter two problems. On one hand, in a real information-rich environment, such as a botanical garden or a museum, do students have motivation to learn, know what to learn and how to learn? Especially for pupils, would they deeply explore in the content, or just look around? On the other hand, the traditional criterion-reference test is insufficient for mobile learning. Therefore, the study applied the learning passport to trigger students to conduct mobile learning.

Learning passport refers to "a certificate of assessed competence and/or a self-maintained record of formal and experiential learning achievements" [21]. A learning passport records a series of learner's personal competence certificates and growing processes. [7]. To acquire a certain certificate a learner must pass the assessment of the learning passport. An assessment of a learning passport, commonly, contains a series of levels that comprise a lot of items. The student is guided to learn by the directions of the items. That is, the learning is generally leaded by the assessment and embedded in its process. Besides, usually the learning is authentic and experiential, such as visiting a museum or hearing a concert. Therefore, the learning passport plays the role to motivate and guide students to learn, to assess students' learning outcome, and to verify the learner's assessed competence. The support of learning passport for mobile learning is described as follows [7].

1) Learning guide and goal setter

Generally, every assessment in a learning passport consists of a series of levels that identify the learning structure and competence indicators. Therefore, learning passports provides a student with an improved planning of his/her learning needs. The difficulties and learning capacities of every level are designed in advance; it is suitable for the student. Additionally, the student can use the learning structure to facilitate the setting of the personal learning goal or schedule.

As for an item, it is a question or a mission, which leads the student to do an action to explore for the answer. The student is drawn to conduct mobile learning in the process of assessing through the guide of the items. Therefore, a learning passport can lead a student to conduct mobile learning, without losing his learning directions.

2) Assessment and verification of competence

A learning passport is an authentic assessment to examine whether the student has the competence or can practically conduct the learning activity. The assessment makes the student understand his/her learning outcome in the mobile learning. Simultaneously, this information provides a reference to the teacher for his/her instruction.

A personal learning passport records a series of certificates of assessed competence. Every certificate is the demonstration for the competence and process of ability growth, and it will accompany the student forever.

3) Motivation sustainer

The certificates not only award and acknowledge the competence, but also motivate a student to learn. For a student, every level of assessment in a learning passport is a blockade, like a round in a game. The blockade can motivate him to keep on challenging the assessment. To overcome the blockade, the student learns the content in the process. Consequently, a learning passport is the motivation sustainer for mobile learning.

4. MLP system

4.1 System description

There are several elementary schools in Taiwan that set up school gardens to provide a place where the students can obtain knowledge about plants and animals, such as botanical gardens, small ponds, etc. Additionally, most schools hold field trips and

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educational excursions for students. However, a common problem was encountered: when faced with the learning environment, some students could not actively learn or did not know what they needed to learn in detail. Therefore, the study implemented the Mobile Learning Passport (MLP) system to engage the students' attention to learn.

The system provides an authoring interface for the teacher to design his/her learning passport. Therefore, s/he can design his/her own assessment content, such as knowledge about dinosaurs or aquatic plants, etc., according to the instruction requirements for challenging the students. In the experiment, we focus on the knowledge about the school garden's plants. The assessment comprises two levels; every level has 5 items. The items shown on the PDA screen guides students to look for a certain plant in the garden and seek the answer. The answer may be acquired from the explanation board on the plant, or from the plant itself. The types of items include multiple, fill-in, and photo-taking questions. For photo-taking questions, the student must identify the plant first, and then take a picture with the camera embedded in the PDA (see Figure 1). That is, in the activity a student explores knowledge via authentic action interacting with a real environment. After passing any level, he would gain a certificate from the system as award.

Figure 1: Scene of taking photos using the embedded camera

4.2 System structure

The web-based system is designed to support students in conducting mobile learning. All functions were developed on the server, and each student had a PDA and an embedded camera. The system comprised five modules described as follows.

1) Authoring module

Before conducting the mobile learning activities, a teacher may design the content of assessment and learning. The authoring module provides interfaces that allow a teacher to design items online. She can create items by herself or modify the items created by other teachers if permitted. Therefore, teachers can share ideas with each other. Additionally, the system provides two approaches for designing items, including step-by-step design and importing existing item files. The types of items include multiple choice, blank filling and open questions, photo-taking, and so on. The module allows a teacher to design items with various media, including text, pictures, audio and animation.

2) Assessment module

The assessment module provides a mechanism for assessment and a game-based interface (see Figure 2). A student's personal PDA presents items transmitted from the server via wireless. Generally, a learning guide accompanies the question. The student follows the directions to move to the right place, such as to a certain plant, animal or learning target, seeks the answer with the PDA, and then responds to the item on his PDA. Answering approaches could include selecting an appropriate answer from among several choices, writing a free-form answer, filling in a blank, drawing a picture, or even taking a picture using the camera embedded in the PDA.

Figure 2: The assessment interface on PDA

3) Scoring module

This module is responsible for scoring the students' responses. Most of the responses can be automatically scored by the system if the question could be assessed using a single absolute standard, like true-false questions, multiple choice questions, and so on. The others may need to be scored by teachers on line, for example the sketch-typed or the photo-taking questions.

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4) Management module

The module presents the teacher with a summarized learning outcome, learning portfolio of the whole class and the learning outcome of individual students in detail. This module thus enables teachers to realize the whole class learning state, while also monitoring the progress of specific students. Based on this information, the teacher can decide to teach new material and conduct class discussions, while also providing individual remedial teaching for students who failed the assessment.

5) Statistics module

This module comprises honor boards and personal data. The honor boards list outstanding students who had achieved more certificates, completed the test fast, etc. The personal data includes the student's personal information and learning portfolio.

4.3 Instruction Flow

The MLP system conducted instruction includes the following phases.

1) Preparation

Learning activities and assessment play a major role in situated learning. Teachers must design the learning activities, assessment levels and items before the class, for the students to follow and answer.

2) Mission introduction

The course begins with a mission introduction in the classroom. First, a teacher explains the unit and mission purpose to the students. Then the teacher introduces the learning environments, such as a garden or a museum, and the MLP system.

3) Activities of learning and assessment

The assessment of mobile learning should focus on learning processes and outcomes. McLellan [20] contends that learning and assessment are simultaneous. Students begin conducting their exploration activities following the explanations of the teachers. The learning activity guide and assessment are presented on the personal PDA. Students sought the questions' answers in the real learning environment, and then responded to the questions on the PDA. For example, if the screen of the PDA presented "Please find a kind of plant in the campus garden which petals are red and leaves are opposite" (see Figure 2), the students must move based on the direction to find the plant, examine it and reply. Additionally, using a PDA with an embedded camera, students can identify specific plants and take a picture as requested.

4) Presentation of outcomes and discussion

Following learning and assessment activities, the teacher can present the assessment outcomes of all the students using a PDA and a projector. The assessment outcome can be an overall picture of the whole class, a single student, or even a group. Subsequently, the teacher can discuss the assessment results with the students, correct their misconceptions and provide them with conclusions.

5. Experiment and Evaluation

To evaluate the MLP system, the authors arranged a class with 32 fifth-grade students at an elementary school. The students are 16 boys and 16 girls.

The experiment comprises three phases: training, pilot study, and formal experiment. During the training phase, the students were taught to use the PDA to surf the Internet and practice typing for two periods (each one of 40 minutes). In the pilot study, the students were taught to use the embedded camera and the MLP system. Simultaneously, the stability of the system and the network flow were examined as a reference for further modification. Totally, it takes two periods for the formal experiment phase. Two students couldn't participate in the formal experiment, because of personal reasons. The phases of formal experiment include lecture about woody plants, introduction to the campus garden environment, mobile learning based on learning passport (see Figure 3), and discussion about the students' assessment outcomes.

Figure 3: Scene of the experiment with MLP system

After the experimentation, they took a questionnaire, of 14 five-point Likert scale items. This questionnaire consists of four categories including learning achievement, user interface, learning motivation, and learning attitude. Five points indicate strong agreement and one point indicates strong disagreement. The results are shown in Table 1.

According to the results in the category of learning achievement, we can infer that the users agree that the system can enhance their learning achievement. The score of user interface category is kind of low

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compared with other categories', yet the score is higher.

Table 1: Result of questionnaire

Item No.	Category	Ave.	S.D.
Q1, 5, 9	learning achievement	4.68	0.59
Q2, 6, 10 ,13	user interface	4.41	0.79
Q3, 7, 11	learning motivation	4.70	0.64
Q4, 8, 12, 14	learning attitude	4.65	0.65

This reveals the interface needs to be refined and simplified. In terms of learning motivation and learning attitude, the results show that this system can motivate students to learn actively and the learning attitude is very positive. Therefore, we found out that this system is very useful for conducting mobile learning based on the learning passport.

6. Conclusion

In the lifelong-learning age, experiential learning and authentic learning are particularly important. With the mobile devices, wireless technology and guide from the learning passport, students can conduct mobile learning with a real learning environment.

The study describes a framework for mobile learning based on a learning passport. The proposed system used the items in the learning passport shown on PDA to motivate and guide students to move and explore the answers in school gardens. The experiment results reveal that students were interested in the system and thought it can enhance their learning achievement. In the near future, the authors will do further experiment to examine the impact of the frame and the system. Besides, the authors will design more content for other subjects in the system.

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