Dashboard for Analyzing Ubiquitous Learning Log

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ABSTRACT

Mobile and ubiquitous technologies have been applied to a wide range of learning fields such as science, social science, history and language learning. Many researchers have been investigating the development of ubiquitous learning environments; nevertheless, to date, there have not been enough research works related to the reflection, analysis and traces of learners’ activities in the history of ubiquitous learning environment. Therefore this paper presents a research on the design and development of a dashboard function which proposes new opportunity for ubiquitous learning. The dashboard captures, analyzes and visualizes traces of learning activities in order to promote awareness and enables learners to reflect on their own activity and helps to recall what they have learned. An initial evaluation has been conducted with 14 international students. Results indicate that the dashboard is a useful tool for self-reflection on activities and recall what learners have learned by repeated quizzes.

KEYWORDS
Dashboard, Language Learning, Learning Analytics, Memory, Reflection, Ubiquitous Learning

1. INTRODUCTION

In the past decade, the development of mobile and ubiquitous technologies (e.g., smart mobile devices, personal digital assistance and wireless sensor networks) have offered an opportunity to learn anytime and anywhere. By using such kind of mobile learning tools, learners can immediately access to their learning system via online wherever they are such as at home, library or on the road. Many researchers report the advantages of applying mobile and ubiquitous technologies to the learning activities of different courses, including science, history, sports and language courses (Chu, 2014; Hoppe, Joiner, & Sharples, 2003; Hwang, Tsai, & Yang, 2008; Ogata & Yano, 2004; Sharples, Taylor, & Vavoula, 2007; Wu, Hwang, & Chai, 2013; Wong & Looi, 2001). For example, Chiou et al. report their ubiquitous learning system that the learners can study the features of butterflies using a PDA (Personal Digital Assistance) at a butterfly museum natural science course in Taiwan (Chiou, Tseng, Hwang, & Heller, 2010). Moreover Ogata and his colleagues propose a system called JAMIOLAS that utilizes the environment data to support Japanese learner to master the Japanese mimetic words and onomatopoeia (Ogata, Miyata, Bin, & Yano, 2010). In this way, most of the research projects on ubiquitous learning offer an advantage in association with the real world objects.
On the other hand, the former system called SCROLL (Ogata et al., 2011), which stands for System for Capturing and Reminding of Learning Log, was designed originally to acquire ubiquitous learning logs and to access and to share the learning logs for retrieving the learners’ learning experiences with photos, videos and sensor data. Each recorded object in SCROLL is called ubiquitous learning log object (ULLO). The target learners of SCROLL are overseas students who studies Japanese language in Japan. A main goal of SCROLL is to help learners, who are learning second language, to recall and to remember effectively what they have learned. A quiz function is mainly designed to play these roles (Li, Ogata, Hou, Uosaki, & Yano, 2011). Moreover the quiz function, which makes use of the context data of learning log such as place, time, text, and picture, helps learners to recall and to remember the knowledge. Three types of quizzes can be generated automatically by the system: including yes/no quiz, text-based multiple-choice quiz and image-added multiple-choice quiz. These quizzes are interesting and attractive method for learning. For example, “quiz with image” is designed to ask learners to choose a word in order to describe images given by the system. The system immediately checks whether the answer provided by the learner is correct or not (Ogata et al., 2011).

However, when a learner works on the quiz by using the quiz function, the original SCROLL system randomly chooses a learning log from numerous learning logs and sends the choices. Thus, for learners, it’s impossible to know on which learning logs s/he answered incorrectly. Moreover, learners often forget words even if they worked on them before. For example, when learners are studying Japanese language, they occasionally can’t remember the pronunciation, usage or meaning of the Japanese kanji letter or character.

An original quiz function lacks adaptation, whereas a new function offers a set of quiz which includes the incorrectly answered learning logs and gives an opportunity to retrieve the previous learning logs (Lkhagvasuren, Matsuura, Mouri, & Ogata, 2014). Therefore learners are able to concentrate on the words answered incorrectly by recalling and practicing based on the new function. Besides it, the second language learners acquire vocabulary permanently from their environment. However, they usually don’t look back and practice them again. As a result, their study becomes less effective. Thus in order to help the learners, a learning log analytics dashboard (L2D) is described, which is a new proposal with SCROLL. L2D visualizes the learner’s progress which enables learners to reflect on their own activity and recall what they have learned. A dashboard of a car plays a main role in the car driving process. Similarly, L2D is used by learners to successfully work on their learning activity.

The rest of this paper is organized as follows. Section 2 describes related works; section 3 explains the proposed learning log analytics dashboard in detail; section 4 gives the evaluation and results; section 5 presents the discussion and conclusion of this study.

2. RELATED WORKS

The approach is focused on how to reuse learning logs and how to track and analyze traces and reflection of the learner’s activity in ubiquitous learning environment. There are many studies about learning activity with the help of learning tools based and supported by context-aware learning (Chiou et al., 2010; Hwang et al., 2008; Hwang, Chu, Shih, Huang, & Tsai, 2010; Chu, 2014). Nevertheless these studies were limited to gathering the learners’ learning histories. Moreover there haven’t been enough research works related with reflection of learners’ and analysis of ubiquitous learning histories in ubiquitous learning environment.

Ogata et al. (2014) report that it is important for learners to recognize what and how they have learned by analyzing and visualizing past ubiquitous learning logs, so that they can improve their learning (Ogata et al., 2014). Similarly, Aljohani and Davis (2012) describe learning analytics called Ubiquitous Learning Analytics (ULA) in order to analyze enormous learning data including contextual information (Aljohani & Davis, 2012). One of issues of ULA is how to visualize, analyze, recommend and trace learners–to-context and learners-to-context-based learning logs interactions. To tackle these
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