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Implementing a Web-Based Peer grading System and Experiment the Learning Effect

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Abstract. The popularity of mobile devices and online edcation technology seems to increase much interests on online education tools. Traditional class education could be very effective with online education tools which enable students to increase interaction between students and teachers. In this research, we designed and implement a web-based peer grading system which facilitated idea-sharing among students. The experimental results showed that the education effective of the system was positive, especially in knowledge construction.

Keywords: Online education system, Java Server Page, Peer evaluation system, Tomcat server

1 Introduction

Faster computer network and social media provide us new communication ways and learning methods. The amount of information became much bigger and the exchange speed became much faster. Web 2.0 technology also has the potential which can innovate current on-line learning [1]. Many researchers claimed that these social networking tools could result in a big shift in the way students learn, consume, and produce new knowledge [2]. Since many peoples acquire various knowledge through the internet, social learning became one of major trends for learning in the twenty-first century. The basic principle of social learning is chaining the cognition and behavior by sharing knowledge and information [3].

Originally social learning takes place at a wider scale than individual or group learning through social interaction between peers. It may lead to a change in attitudes and behavior. With the advent of the computer and network technology, various and faster communication channels have been provided between peers. Social learning could be interpreted as learning with social media. Social learning through open

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platforms like Facebook or Wikipedia is growing rapidly. Closed platforms like Corporate Social Learning Network is also growing up rapidly [4]. There are many media examples which can be used for social learnings. User generated contents like YouTube or Pop-casts could be used for learning on demand. The set of learners and the set of teachers in social learning cannot be disjoint. It is an evolving peer learning process in which learners acquire, master, and then distribute their knowledge to others over time. This type of social network for learning is called social learning network (SLN).

In our research, we designed and implemented a social learning tool which was a peer homework review system. The system was used for uploading and grading operating system assignments. The purposes of this paper are to implement a web-based peer review system and to enhance the education effect. The peer review system also provides idea sharing among learners. A learner can view other's homework and evaluate the grades. This system is different from existing systems. We show the feedback between learners bring positive learning effect.

2 Background Knowledge

Social learning has a long history. In 1960's, Bandura insisted that learning is a cognitive process that takes place in a social context and can occur purely through observation or direct instruction, even in the absence of motor reproduction or direct reinforcement [5]. Bandura insisted that individuals can learn through the observation of rewards and penalties which is widely known as vicarious reinforcement. The theory expands on traditional behavioral theories, in which behavior is affected solely by reinforcements, by emphasis on the roles of various internal processes in the learning individual [6].

The objective of peer review is that of "responding to one another's writing for the purpose of improving writing" [7]. Fitzpatrick researched on peer review in an online technical writing course. She analyzed peer review activities and their outcomes with multiple sections of a course and their outcomes within multiple sections of a course taught online using the same template and course management system [8].

Korean college students are not used to interact with professors or instructors. They are accustomed to absorb what they are taught and hardly express their own ideas. Most Korean students keep passive learning habits even in Universities. This research to enhance the learning effect exploiting interactions between peers, which is totally different from the existing one-way learning.

3 System design and implementation

3.1 Platform and tools for implementation

In this research, we designed and implemented a peer review system with Java Server Page and Tomcat Webserver. A computer system with Microsoft window was used. JSP(Java Server Page) and Tomcat 6 were used for server-side. HTML5 and JavaScript were used for client-side. For user convenience, an android smartphone

app was also implemented. We also adapted MySQL database for storing students' assignments. Students can upload their homework and review others' homework through the system. Though students could not upload file to the system with their smartphones, they can check the public notice with smartphones. Platform and Programming languages used for the implementation are shown in Table 1. The System structure is depicted in Fig. 1.

Table 1. Platform and Tools.

Tool Type	Tool Used
Operating System	Window 7 Android 4.0
Client	HTML5, JavaScript
Sever	Java Server Page, Tomcat 6
Data Base	MySQL 5.0

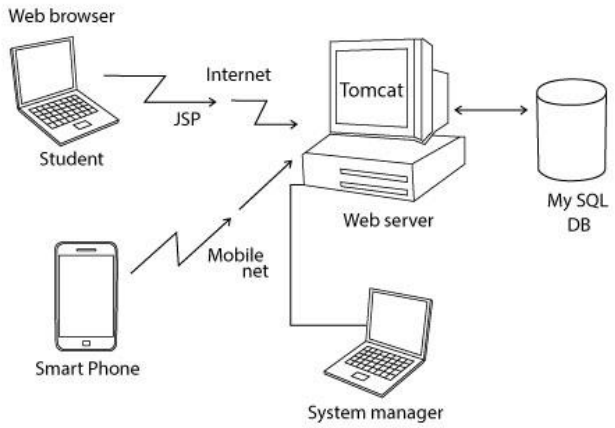

Fig. 1. Peer review System Structure

3.2 Peer Review

Computer science major students in Hansung University were chosen for this experiment in 2014. We tested three different types of assignment: programming assignment, essay, and problem solving. Students have the responsibility to upload their homework to the system before the deadline. Every student could view others' homework through the system. Name and other identifications were hidden in a homework. Each student was required to review and to grade ten assignments, which are randomly selected. The minimum grade was 1 and the maximum grade was 5 and the interval was 1. The average of each student grade was normalized to 3. After grading a homework, each student has to leave comments. The grader identification was also hidden.

3.3 Experiment Procedure

The peer review experiment was proceeded as follows:
- o Every student needs to finish homework on time and upload to the system.
- o After the deadline passed, each student has to review and grade 10 assignments.
- o Peer review grades are reported to each student.
- o The professor gives a similar assignment and compare the previous work.
- o Compare the experiment results of the three types of assignment.

Another experiment was about the effect of peer review. There were two student groups. The first group's assignments were graded as the traditional way. The second group was told that their assignment would be reviewed by peers. The assignment qualities of two groups were compared.

4 The Experiment results

In the beginning, each student finished homework with his own ability and style. From the second assignment, more and more students tried to improve the assignment quality. Many student learned from imitating the other assignments. For programming assignments, the interface and the function were improved comparing with the previous assignments. For essay, many students improved their expression skill. They had begun to use clearer and more definite expressions. For problem solving assignments, some students seemed to understand the problem solutions more easily and clearly. These positive education effects could not be fulfilled in traditional assignment grading systems. More experiment and clearer results will be given in further researches.

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