XOOPS: A Rapid Tool for Developing Problem Based Learning Environment for Teachers

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Abstract: This paper applies the *Problem-Based Learning* theory to a *Science* course in the Junior High Schools in Taiwan. According to the instructional process of the *PBL method*, several steps are used to achieve effective use of Internet technology. A rapid tool, XOOPS, is chosen for developing a *Problem-Based Learning* environment for teachers. By using XOOPS every teacher could establish an online learning system quickly to match the requirements in the instructional process of the *PBL* such as *Brainstorm Map, Group Discussion* and *Collecting Data* without neither Information Technology knowledge nor experts' assistance. We expect that there will be more and more courses to emerge based on the *PBL* theory in the near future that utilizes some sort of rapid tools' help, like XOOPS introduced in this paper.

Introduction

In traditional classrooms although teachers can complete their curriculum easily and efficiently, there is still too much content and insufficient time so students only learn by rote memorization of factual details. They cannot apply what they learn to the real world. The Ministry of Education has identified the problem, and decided on an innovation of education focusing on the curricula "1st-9th Grades Curriculum Alignment". The three key features must be present in the curricula: "opened education, coherence, integrating knowledge. It stipulates that education must cultivate students independent thinking, problem solving skills, and life-long learning abilities" (The Ministry of Education, 2000). The goal is the same with the "Science for All Americans, Project 2061". The structure of new curriculum wants to cultivate three areas of scientific literacy: understanding basic science concepts, understanding the process of science, and understanding the impact of science on society (Gallagher, Sher, Stepien, & Workman, 1995).

The best way for students to learn science is to experience life and to inquire into authentic problems. "Technology can be integrated easily with other subjects when students investigate real-world problems" (Sage, 2000). Learning from students confronting with problems is a teaching approach called problem-based learning (PBL). According to Barrows (1996), there are six characteristics in PBL, including student-centered, small group, teachers are facilitators or guides, starting with problems *etc.* The goal is to transform the teacher's role from lecturers into facilitators and students' role from passive observers into active participants in the learning process (Ahern-Rindell, 1999).

In this pilot study, there are two aims. Firstly, we hope to find the improvement of problem-solving ability in students. Secondly, we wish to emphasize communication skills when working in groups. PBL can easily use technology as a tool for locating, organizing and presenting information (Sage, 2000). Therrfore, what products are powerful and useful instruments for teachers so that they can develop such a *PBL* strategy based learning environment. An application, XOOPS, which is free and easy to use is taken into our consideration. These features owned by XOOPS making XOOPS as an ideal tool for developing small community website rapidly. Because of its rapid installation process, free-using, account management, and easy maintenance, it is an appropriate tool for most non-CS junior high school teachers who spend most of time in teaching students can setup a *PBL* based learning website easily.

Research Method

Sample

Taoyuan city junior high school students, including 39 students (boys: 19 & girls: 20). They are normal distribution of classes. They divide into six tutorless groups with 6-7 students per group. For the sake of heterologous group, I use their k7 average scores to assign boys from 1 to 6 and girls from 6 to 1. With semi-structured interviews, try to understand what differences between pre- and post-teaching after the instructional method of PBL.

Instructional model (Fig. 1)

There are two steps in the model of PBL as shown in Figure 1 where Internet technology is used for students.

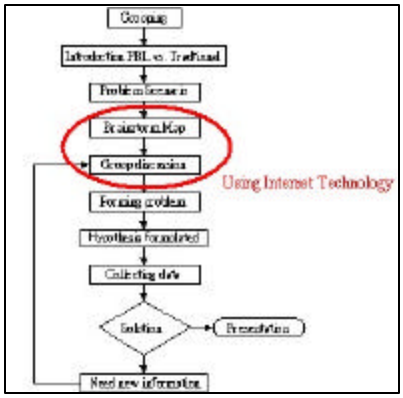

Figure 1: Teaching Process

Figure 2: System Administrator Menu

XOOPS: A Rapid Tool

When starting to install XOOPS there are several steps should be followed.

1. Install the Apache web server, PHP interpreter and mySQL database.
2. Unzip the "TWXOOPS2" file and put all files in the **html** folder to the home directory of web server.
3. Open the browser and type the "**http://your machine/install.php**", after a while, a learning website is ready.

Teachers can then manage the XOOPS with "**System Administrator Menu**" as shown in Figures 2 and 3.

Figure 3: Process of starting the Discussion Board module

After that, students can login to the system and go to the specific discussion board which has been constructed for

their group to share their learning findings (as the stage 5 in the instructional model of *PBL* described in Fig. 1 above). Students can share their findings by using "**Post New Article**" in the "**Discussion Board**" module. Besides the *Group Discussion* stage, the brainstorm map created in the *Brainstorm Map* stage could be also pasted by using the "**Upload**" module provided by XOOPS. Students can click the "**IMG**" button and enter the URL of the *Brainstorm Map* uploaded in advance to share with others in the same group as Fig. 4 shown below.

Course Arrangement

This pilot study was implemented in the summer vacation. The format of the course consisted of two forty-five-minute lecture sessions and one ninety-minute laboratory session per week. To reinforce their prior knowledge, a videotape of the 'application of force' is played first. The unit takes advantage of daily life encountered problems of force. Then they are encouraged to think about what is force really and its underlying principles. Within a brainstorm map in Fig. 4, they can produce their thoughts of what they already know and what they need to know. After that, a chart proposed by Delisle (1997) is written down by students as shown Fig, 5 below.

Every member in the same group is responsible for presenting a portion of the group's activities. Their day-to-day interactions while working in their groups emphasize the need for good communication and encourage cooperation. Group discussions provide them with a formal setting in which they must express their thoughts and ideas. After four weeks, each group gives a presentation to the class discussing their solution and its outcomes. At the end of the course, students were asked to reflect on their experiences, to do self- and peer-assessment, and write their responses to the course.

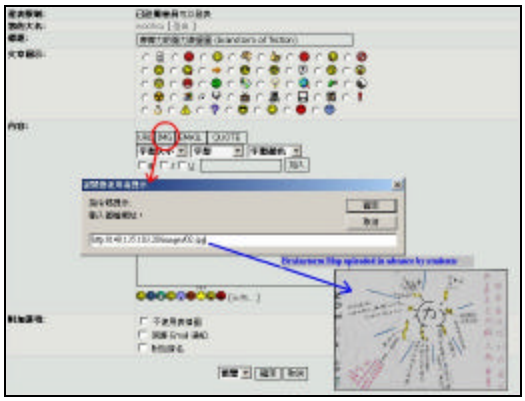

Figure 4: Process of sharing *Brainstorm Map* with other students in the same group

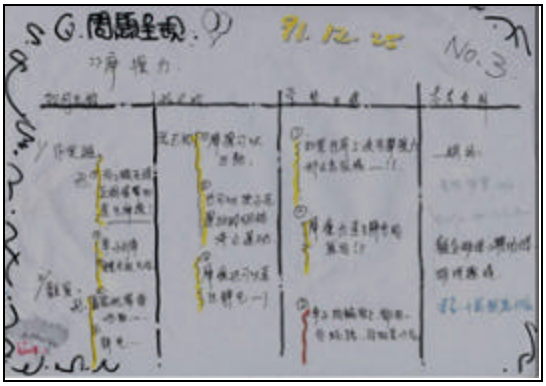

Figure 5: Forming Problem

Results & Discussion

In this pilot study, there are some problem students in small group. They are defined as non-participating, or ill-prepared. No matter what you do to encourage them, they just do not listen. They do not take the groups' efforts seriously and are uninterested in group activities or in their fellow students. (Note: they do not seek help when needed). On the contrary, in the first group, a boy tries to take over the group and controls it. Whatever he does, group members only can follow him. He was responsible more than the others in leading group members toward the topic of discussion. Even in the final presentation, he is the only one who speaks on the platform. Why? Maybe he has high scores of learning achievement.

All students think that collecting information needs a lot of time and is a hard task mainly because they lack the skills to locate information. They are used to the textbooks rather than computer networks. Confronted with ill-structured problems they feel daunted by the task. They must therefore change their ways and try to spend more time searching a variety of resources in order to solve the problem. In fact, they are not used to provide personal

ideas. Most of them use Web search information, but there are still 10 students who have no computers.

In the traditional course, teachers need to modify students' taken-for-granted thoughts. All of them assume their teacher as the main disseminator of knowledge. After the implementation of PBL, it is easy to alter the students' thoughts of "Why should we learn this information? What is the correct answer that the teacher expects to hear from me", instead of "What concepts and theories should be applied to explain the issue? Do I understand them or should I study more in order to solve the problem? Can I explain to my peers and teacher the reasons that lead to solution of the problem?"

With technology we can save teachers' time and give them capabilities to build a *PBL* based learning environment which leads teachers to get the benefits brought by the instructional model of *PBL*. The advantages of using XOOPS are that it is not only easy to install but there are numerous powerful modules designed by IT experts around the world bundled with it. It is convenient to get the appropriate module to fit the teachers' needs. It does not require neither further understanding about programming nor database management. In summary, XOOPS is a rapid tool for teachers to establish a *PBL* based learning website to help them build the *PBL* course quickly without any pain.

References

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