

Design and Implementation of Self-Organized Flipped Learning System

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Abstract: This study is intended for the development of the system for successful flipped learning in educational sites in which a teacher is able to apply the principle of self-organized learning to make pre-learning materials of flipped learning. Additionally, in this system, a teacher is able to post diverse types of pre-learning materials for flipped learning and a student is able to post the content or materials generated through the understanding of the pre-learning materials and achieve self-organized learning. This study designed and implemented the server-level service structure and the system of the end user's process in order to provide self-organized flipped learning system.

Key words: Flipped learning platform, self-organized learning, system, process, post

INTRODUCTION

As part of a new learning method, Flipped Learning Method draws a lot of attention these days. Flipped Learning Method is an inverse-concept based learning method to help to obtain knowledge through pre-learning ways like video lecturing at home and apply such knowledge to school class. Flipped learning is a new trend for cooperative learning and teaching method improvement (Strayer, 2012), helps to change students' learning habits and improve their concentration and can implement learner-based class through the enhancement of peer teaching and the activation of learned knowledge. Flipped Learning Method has two main components: deliver instructional content outside of the classroom (typically online) and move active learning into the classroom. In flipped learning, pre-learning whose typical example is video learning is considered important. However, the key to flipped learning is to change class learning from the passive learning environments that focus on teacher-centered knowledge conveyance to the self-organized learning and customized learning through learner-based active inquiry activities for solving problems. Nevertheless, the reason why pre-learning is emphasized is that the starting point of Flipped Learning Method enabling students to go into the essence of learning is pre-learning. In other words, successful execution of pre-learning can guarantee the effectiveness of flipped learning. However, it was found that teachers who perform flipped learning have difficulty building learning environments where they are able to prepare materials to create videos for pre-learning and upload the materials effectively. In addition by pre-learning in the

place without teachers' interference, students can have the opportunity to avoid an inefficient waste of time and excess preparation for they have different learning abilities and there are different learning characteristics and situations. The problem is considered to be a limitation on the application of flipped learning to actual classrooms. Previous studies failed to develop the flipped learning support system for teachers and to look into pre-learning task solutions reflecting students' abilities and characteristics and environments. Therefore, in order for successful execution of flipped learning, this study tries to develop the system for pre-learning task organization, the first step of flipped learning. To achieve that it enables teachers to provide pre-learning tasks for flipped learning conveniently through their various devices and then suggests the space where students rightly build up the knowledge about pre-learning tasks through their self-organized learning on the basis of teachers' pre-learning tasks. When pre-learning tasks are efficiently provided and students increase their understanding, it will be possible to improve students' participation and achievements more in class which are the key to flipped learning. Therefore, the purpose of this study is to establish the flipped learning system based on self-organized learning principle and thereby to support efficient flipped learning.

Flipped learning: The term 'flipped learning' was first used by Jonatha Bergmann and Aron Sams. It is referred to as an educational model that reverses the elements of typical lecture and homework—a type of home learning-in one course. Flipped learning allows learners to learn concepts at home through their pre-learning to do

activities of applying the obtained content to class such as discussion, problem-solving and project performance and to make self-evaluation and mutual evaluation of peers and it enables teachers to monitor and evaluate all processes of students' obtaining knowledge in continuous and diversified ways and to give a notice of the next class learning and the next task (Ji-Youn and Young-Hwan, 2014). Maher suggested the following three strengths of flipped learning: first by learning relevant knowledge prior to class, it is possible to increase learners' self-confidence in class learning; secondly, class learning is focused on learners' activities; thirdly by repeating or omitting basic knowledge according to their learning level, learners are able to control their learning on their own. Given all, for successful execution of flipped learning, it is required for learners to understand their pre-learning tasks. Therefore, a systemized suggestion of pre-learning and students' sufficient understanding are needed.

Self-organized learning: The principle of self-organized learning was suggested by Sugata Mitra, a professor of University of New Castle. According to his argument, education is a self-structured system and learning is an emergent phenomenon. Self-structured system always shows the phenomenon of emergency which means that a certain system begins to do something not present in its original design (Costa, 2014). He views a learner's voluntary learning on the basis of interests as education and supports student-centered learning by building Self Organized Learning Environment (SOLE) (Mitra and Dangwal, 2010). Students' motivation is triggered by the interests and choices that they share with their friends and self-directed learning helps to make learning sustainable. In addition, it is considered that students socially learn knowledge before internalizing them and that learning together with a group of others helps to bring back their memories and develop their social skills. All students have marvelous and innate senses so that they establish the understanding of a new concept related to something that they already know. On balance, learning is the result of educational self-organization and occurs in itself. Therefore, teachers need to prepare for the accomplishment of the process and to look into the occurrence of learning by taking a step back. Teachers' question to help students find answers directly, instead of their activities of memorizing facts, serves as a critical role. Mitra and Dangwal (2010) named the question Big Question. Asking an interesting and relevant question is the thing that fires children's imaginations and curiosity. As shown above, for self-organized learning, it is necessary for teachers to prepare for the course

of the learning. Based on the preparation, students are able to learn organizationally and thereby to accomplish self-directed and sustainable learning.

LITERATURE REVIEW

Ji-Youn and Young-Hwan (2014) divided the execution procedure of flipped learning into pre-learning, main learning and post-learning and restructured detailed activities and main principles of design. According to the researcher, for pre-learning step, the website opened for interaction between teachers and students should have minimum functions implemented and focus on easy access to materials and easy application. Strayer (2012) defined the core elements of flipped learning as 'technology' and 'learning by activities' which were found to influence the learning environments of flipped learning critically. In addition, according to the researcher by minimizing the difference in learners' preparation that is made by different technology conditions, it is possible to prevent cumulated learning deficiency and induce fair competition of learning.

Mitra and Dangwal (2010) had conducted various experiments in India, Bhutan and Central African Republic. According to the experiments, students were able to make self-organized learning through web without teachers. The research revealed that student-centered learning helped to increase students' interests and their potentials. Although, flipped learning includes diverse strengths as a learning method, its pre-learning scheme and actual class learning scheme need to be improved. Maher said that drawback of online instruction is that watching video is a solitary activity. And they believe that the 'shared watching experience' in small groups of 5-10 students creates a more intimate and less intimidating forum for discussion around educational videos. The previous studies prove that self-organized learning principle of flipped learning is an effective teaching strategy to improve students' understanding of tasks in pre-learning step.

System design: Therefore, based on the theoretical backgrounds of 'self-oriented learning' and 'shared learning experience' this study designed the system as follows:

More specifically, this study built the teacher-by-teacher lecture opening system in which teachers are able to photograph directly pre-learning materials of flipped learning and upload them or to collect diverse web materials and upload a lecture and established pre-learning self-organized wiki page that

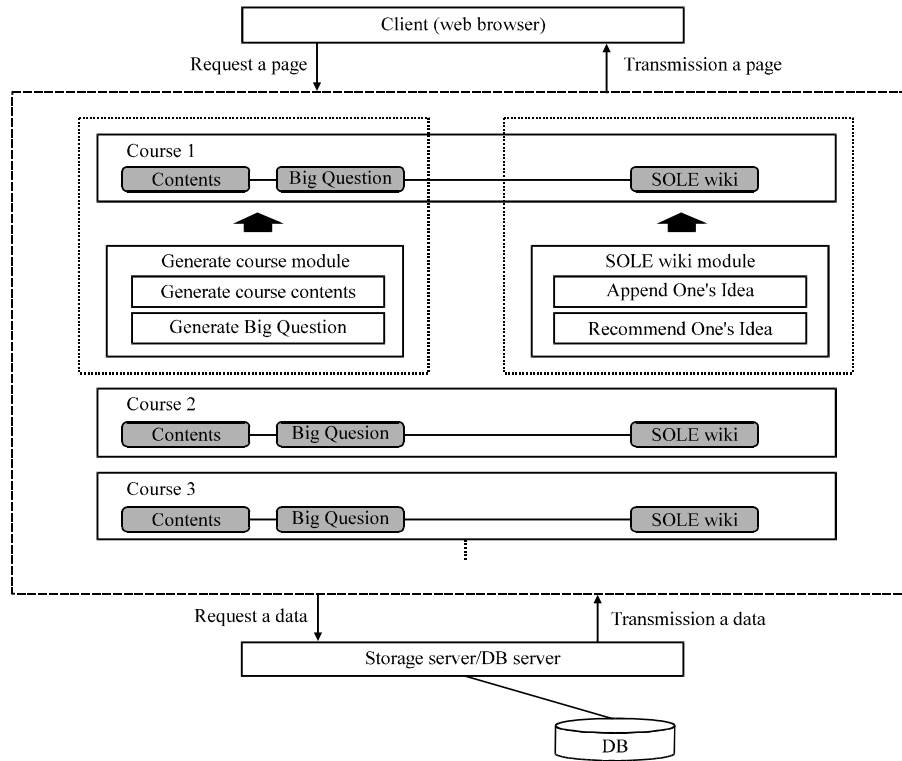


Fig. 1: Design of the system

learners to do self-organized learning in their pre-learning of a lecture. The design is illustrated in Fig. 1. More details about the design are presented as follows:

First, course creation module can create course contents and Big Question. The contents creation menu of the course creation module supports pre-learning, a step of flipped learning. In the menu, it is possible to upload videos, documents and other types of materials. This system supports mobile web driving so that materials can be uploaded in diverse devices. In particular with the use of a camera built in a device, it is possible to photograph and upload a lecture easily. Big Question menu plays a decisive role in leading self-organized learning. Big Question allows students to learn pre-learning tasks of flipped learning in a self-organized way.

Secondly, SOLE (Self-Organized Learning Environment) wiki module enables students to add their self-organized thinking. Clark and Mason (2008) said that a wiki is a kind of website that one can simply and quickly edit using a typical web browser. This study introduced the concept of the wiki into SOLE. Students are able to use Append One's Idea menu of SOLE wiki module to post their self-organized knowledge on the basis of Big Question content of pre-learning, suggested by a teacher. In the process of finding the error of the posed content,

writing the question of learning content and answering the question, it is possible to accomplish interaction between teachers and students and between students and students and make deep-understanding of learning content. Based on the content drawn from the menu, the learning range and depth of the main learning central to flipped learning can be expanded. In Recommend One's Idea menu, others' opinions or questions can be evaluated. In other words, the menu serves the scaling function to evaluate the quality of knowledge and question.

Process of teacher account: User account of this system is classified into teacher and student. Figure 2 illustrates the flowchart of the system use process of a user with teacher account. After user authentication, the user with teacher account accesses the course, the space to create a pre-learning task. In the case of course, the user can choose either one of two menus: Make Course and Select Course. After choosing it, the user can newly register a pre-learning material. After the registration, the user can write and publish Big Question for students' self-organized learning to complete the process of pre-learning task creation.

The pre-learning task after the publish operation can be identified in the student account registered in class. A user with student account performs pre-learning on the

basis of the published task, make knowledge in its self-organized way and write knowledge, questions and answers. Such activities can be identified by a user with teacher account. In main learning, students' activities can be used for the expansion of class learning.

Process of student account: Figure 3 shows the flowchart of the system use process of a user with student account. After user authentication, the user with student account

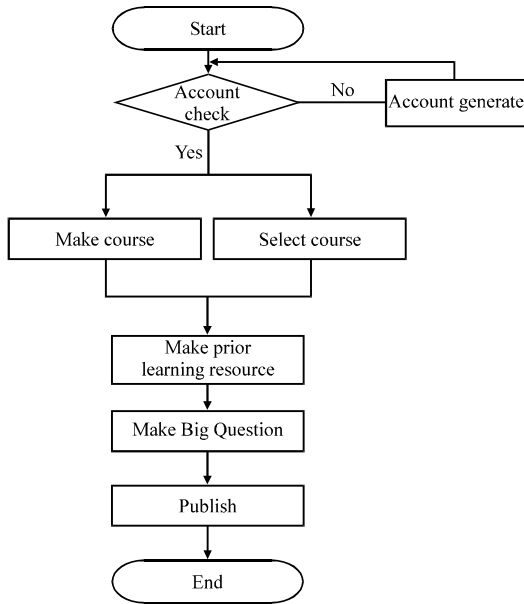


Fig. 2: The process of teacher account

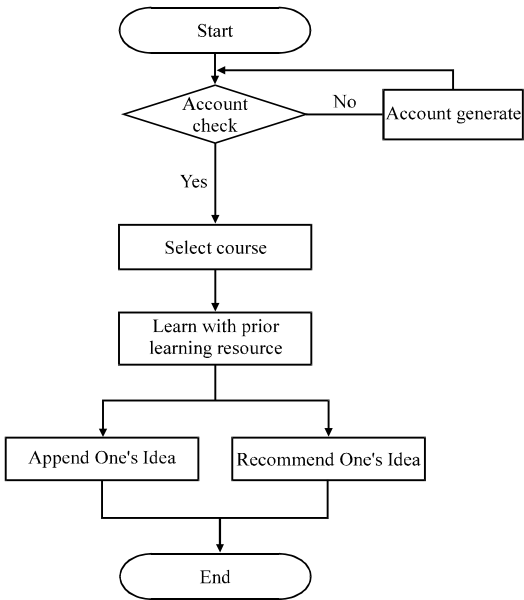


Fig. 3: The process of student account

accesses the course, the space to learn a pre-learning task. The student user first learns the pre-learning task and then adds the self-organized learning content of a teacher's Big Question with the use of Append One's Idea menu. At this time, there is no limitation to the content to append. The content includes the materials suggested by a teacher, websites or materials relevant to a theme that the student searched and found, questions about learning content, answers to other students' questions, opinions about the error of materials and correction to the error. Aside from that the student user can use Recommend One's Idea menu to do cooperative learning activities such as recommendation of other students' opinions.

System implementation: The development environment of this system has PHP, Apache Web Server and SQLite3. The screen of the implemented flipped learning system based on self-organized learning principle is presented in Fig. 4. As shown in the figure, teachers have the right to open diverse courses.

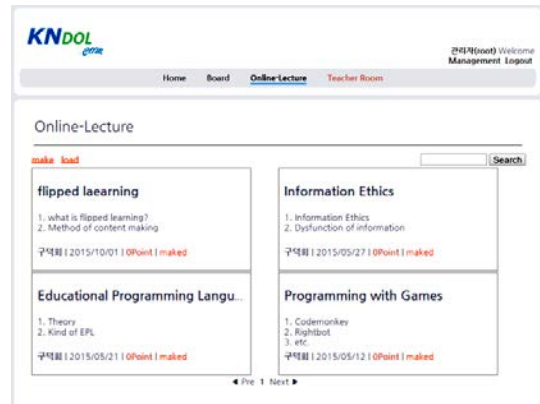


Fig. 4: Registering subject

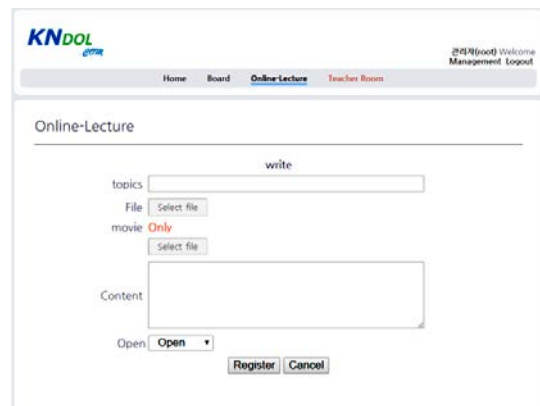


Fig. 5: Registering lecture



Fig. 6: Main page of lecture

As shown in Fig. 5, the system includes Lecture Uploading function and Big Idea Suggestion function. In addition, SOLE wiki module to support students' self-organized learning is implemented as shown in Fig. 6. The implemented module has the function of writing questions about lecture content and the understanding of Big Idea and the function of recommending peers' opinions for evaluation.

CONCLUSION

The purpose of this study is to design and develop the flipped learning support system based on self-organized learning principle. Flipped learning is aimed at enabling students to take diverse intellectual interactions as content experts in class activities through their pre-learning. However, it was hard to suggest pre-learning tasks which are required to perform flipped learning and it was difficult for students to do pre-learning tasks successfully. As a result, it was necessary to discuss its methodologies. In order to solve the problem and execute flipped learning successfully,

this study designed and implemented a flipped learning support system. More specifically, the teacher-by-teacher lecture opening system to make pre-learning materials of flipped learning and pre-learning wiki page to accomplish learners' self-organized learning through the pre-learning of each opened lecture were established.

The system developed in this study will help teachers alleviate their burden of suggesting pre-learning tasks and will change students' learning pattern from their simple confirmation of knowledge to their self-organization and sharing of knowledge and their cooperative learning. Ultimately, it is expected that the activation of flipped learning will make it possible to avoid typical knowledge-conveyance centered school environments and change class learning.

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