The Design of Learning Activity in Flipped Classroom Based on Deep Learning Theory

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Abstract. Flipped classroom as learn first and guide later for the new teaching mode, it needs to integrate with deep learning and realize the organic integration and critical understanding of learning content, to achieve the connection and migration of knowledge, to make learning from edge to the kernel. Based on the reflection of the current flipped classroom practice, the article analyzes the existing problems of flipped classroom, states the fusion of deep learning and flipped classroom from the comparison of deep learning and surface learning. This paper puts forward the idea of transformation to the teaching design paradigm of the flipped classroom, designs the model of learning activity in flipped classroom based on deep learning theory.

1. Introduction

With the depth of integration for information technology and education, the education form focus on students learning was born, flipped classroom is one of them. But after entering the deep water area of the flipped classroom study, many scholars believe that the effect of flipped teaching in our country is not ideal. For the reasons, the implementation of flipped classroom has two parts: first, in pre-class students learn new knowledge through the teaching video, which is provided by teachers; second, in the course students are deeply explored and internalized through participating in learning activity organized by teachers. Therefore, the factors of the learning effect of flipped classroom depend mainly on the quality of video design and learning activity design. On the one hand, the production of "micro-class" is too excessive in pursuit of skills, but it still follows the traditional teaching style (teacher teaching + PPT courseware). On the other hand, the quality of independent learning based on micro class cannot be guaranteed. In practice, teachers worried about the quality of study before class, because it's difficult to keep learning motivation in self-learning based on watching micro video and lack deep thinking. The lack of design to promote students' deep learning can not lead to the material optimization of students' learning. In fact, as a teaching reform mode, flipped classroom is not only transform the teaching time and space, but also redefine the relationship between the teaching and learning, the final purpose is to promote students’ deep learning and complete understanding, application and migration of knowledge.

Therefore, this paper will be guided by the theory of deep learning, studies on the design of flipped classroom learning activities, proposes the basic flow of flipped classroom learning activities based on deep learning theory.

2. The concept and connotation of deep learning

American scholar Ferran Marton and Roger Saljč Joint published the essential difference between learning: results and processes, and put forward the word of “Deep Learning” after an experiment of students reading academic articles. It emphasizes actively Learning, skilled use of knowledge to solve practical problems. In China, research on deep learning started late, and mainly focuses on the concept and characteristic etc. In 2005, professor Jihou Li, a Chinese scholar, pointed out in the article "Promoting Student Deep Learning": on the basis of the understanding of deep learning, learners will
be able to critically learning new ideas and facts, and put them into the original cognitive structure, can communicate between many ideas, and be able to existing knowledge migration to the new situation, make decisions and solve the problem[1]. This definition is more acceptable to domestic scholars.

3. Purport to deep learning of flipped classroom -- the transformation of teaching design paradigm

There is no denying that the teaching reform of flipped classroom, whether the self-study arrangement before class, or micro video recording mode, most teachers still use traditional mode to carry out teaching. The first-line teachers said: "the preview of using micro video is only to shorten the teaching time on the surface, but it does not really improve the students' learning level."

The purpose of deep learning is to practice, which is to solve the problem as the deep inquiry learning for the kernel, so it is the process of application and innovation of acquisition knowledge. Specific performance: (1) Emphasize the foundation of experience before class. The so-called empirical basis, on the one hand, refers to the students' knowledge and experience background, on the other hand, they pay more attention to the students' experience in the context of problems, tasks and projects. (2) Emphasize the thought-provoking scaffold design. The role of the scaffold is to provide a frame of reference for students to solve problems, to help students form the appropriate cognitive structure. (3) Emphasize learners reach the depth of thinking through communication and interaction. (4) Emphasize variable learning and schema construction in multiple contexts to promote learning transfer.

In terms of specific design: under the teaching target, we can arrange the teaching and learning activities in class and overall class, and choice the media and teaching strategies, and design consistent teaching and learning activities.

4. Design model of flipped classroom learning activity based on deep learning theory

A flipped classroom based on deep learning should jump out of the inherent framework, and try to advocate the problems, tasks, and project learning by deep learning.

![Diagram of Flipped Classroom Learning Activity Based on Deep Learning Theory]

Figure 1. Design model of learning activity in flipped classroom based on deep learning theory.

The overall design is carried out around the improvement of students' knowledge level and thinking ability. We can call this learning pattern as problem learning. Their common characteristic is put knowledge in a theme, tasks, projects, the carrier to issue for mediation to the student thought guidance, help them to take the initiative to acquire knowledge, improve thinking.
4.1 Study activity design before class -- the combination of students' self-study and teacher's guidance

Before the class, students rely on their own knowledge and experience, and help themselves by resources provided by teachers. Follow the problem/task/project learning ideas, we advocate to question/task driven to optimize the design of learning activities. According to the characteristics of the students' learning, we can design a reasonable and feasible task; and provide the learning resources (teaching materials, micro class, and other learning resources) needed to complete the tasks in order to guide students to solve problems and complete tasks or projects. Then, the students' learning behavior and process can be diagnosed by formative assessment, so as to provide basis for subsequent learning activities.

4.1.1 Design of learning problem/task

It is an important principle to carry out independent study with the problem/task in flipped classroom. Here, the problem/task refers to the learning activities that guide students to form understanding and interpretation under the problem situation. To issue/task at the head of the class design, can achieve complex knowledge, not a well-structured knowledge, even between disciplines knowledge integration, at the same time, also can help us to focus on students' learning activity and the corresponding design resources.

4.1.2 Learning resources - design of micro class

In the design of pre-class learning activities, micro class plays an important role, which is the learning resource to help students acquire knowledge. Micro class types are: the tuitional, solving questions, answering questions, experimental and activities, etc. Based on the deep learning of micro class should not only traditional teaching, it should be diverse according to the kinds of questions and tasks. In addition, improving students' learning input, micro class design should pay attention to arouse students' more interaction and avoid students' passive learning. For example, after describing a phenomenon or problem, ask students to pause video to make assumptions, and predict results, and ask questions.

4.1.3 Design of learning list

In the pre-class learning activity, the learning list assumes the role of scaffolding and anchor for students to learn. Its design should embody the characteristics of the thinking modeling tool to list, flowcharts, mind mapping and other auxiliary tool of thinking to guide students gradually to achieve the critical thinking and creative thinking. As a result, learning list should be single with questions/tasks/projects and cooperate with micro class resources for solving the students’ problem.

4.2 Design of learning activity during class -- enhance deep thinking ability

4.2.1 Create situations and Raise questions

The purpose of deep learning is to practice, which is to solve the problem as the deep inquiry learning of the kernel, so it is the process of application and innovation of acquisition knowledge. The deep learning mode in flipped classroom takes place in real and critical situations, which is reflected in discussion stage of the class. For flipped classroom, the purpose of learning is to cultivate students' interest and interest in learning. This requires teachers to enrich the learning activities in a variety of situations, to spend a lot of time designing and organizing classes. Teachers' participation in the system, the duplication of tasks and the sustainability of the project are the application and penetration processes of "alternate" and "regenerative"[2]. It guides students to study independently or cooperatively to realize knowledge construction and migration to achieve deep learning.

4.2.2 Self-exploration and Collaborative learning

The improvement of thinking requires not only the guidance of the problem, but also the explicit knowledge of the students. The students need cooperation, communication, communication with companion, further thinking, judgment, and constantly improve their own knowledge structure and cognitive. The prerequisite for collaborative learning is to establish a certain degree of
self-exploration in the group, and after a certain understanding of the knowledge background, it is possible to carry out more effective collaborative learning.

Lev Vygotsky believes that all knowledge begins with visual social interaction. Therefore, the face-to-face learning environment determines that the teaching design should give full play to the advantages of communication for teachers between students, students between students. With the active interaction with the complex and changeable situation, the students' understanding of knowledge is more real, and the understanding of the problem can be further deepened[3].

4.2.3 Results exchange, feedback evaluation

Deep learning evaluation focuses on formative assessment, this kind of feedback on the process of learning more than academic achievements, realize the students about their learning process and result of reflection, stimulate students' critical ability, greatly promote the students' learning process and improve its ability to deep thinking. The critical process is an active learning process, which makes the learning objects present and also forms the students' value position and cognitive structure[4].

4.3 Design of after-class learning activities -- summary, reinforcement and application development

In the design of learning activities after class, the learning results can be tested to check for the missing. It can summarize the content of this section through the completion of tasks and the presentation of project works. It can also be used to enhance knowledge migration through outreach tasks associated with real life. Evaluation is not terminated at the end of the course, set up challenging tasks to critically absorb the knowledge before and after class, after class always evaluate student learning is the complement and development. The student's knowledge system is also constantly reflected and reacquainted, and has been repeatedly tempered and constructed.

5. Conclusion

In essence, the problem with technology and education is to find the proper integration technology to solve the problems of teaching and learning. If the flipped classroom is only used for the formal education transformation instead of hitting the education core problem, such a problem is at least incomplete. In this sense, redesigning flipped classroom based on deep learning is not only a technical problem, but also involves a profound change of teaching culture.

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References


