

A blended collaborative learning model aiming to deep learning

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Abstract. To solve the problem of mechanized blending and low-level cooperation in Blended Cooperative Learning, this paper proposes a Blended Cooperative Learning Model aiming to Deep Learning, which including the definition, key features and its framework. Through the application in the course of Radar Maintenance Engineering and Performance Parameters Measurement, our teaching practice shows that the students' practical skills and scientific teamwork ability are significantly improved.

1 Introduction

Since the 21st century, Cooperative Learning and Blended Learning have gradually integrated into Blended Cooperative Learning (BCL)[1-2]. With the promotion of Internet plus education and China's top-level planning for higher education reform, BCL as a new teaching model has become an effective way to improve quality and efficiency and achieve teaching innovation in higher education.

However, in the teaching practice of BCL, we can often see the phenomenon of mechanized blending and low-level cooperation. Some simply and rudely moved some teaching contents from offline to online. Some lack the guidance and supervision of teachers in the teaching process. Some directly equate collaborative learning with group discussions. Some discussion topics or collaborative tasks are well-structured curriculum issues and lack the potential for in-depth exploration[3].

Deep learning in the field of education was first proposed by Ferenc Marton and Roger Sarjo. It's a learning orientation corresponding to superficial learning, which means "on the basis of understanding, the learner critically learn new ideas and facts, integrate them into the original cognitive structure, connect many ideas, and transfer knowledge into new situations, so as to make decisions and solve problems." After that, many scholars carried out Research on deep learning[4].

According to Bloom's cognitive classification point of view, when students use low-level cognitive behaviors such as memory or simple comprehension, knowledge construction is superficial learning, and superficial learning focuses on the cultivation of students' knowledge; The learning strategies of abstract knowledge construction and knowledge transfer in higher-order cognitive behaviors such as analysis, evaluation, and

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creation belong to deep learning, and deep learning is oriented to the cultivation of students' abilities[5].

The "Deep Learning General Project Team" of the Ministry of Education of China defines deep learning as "under the guidance of teachers, students focus on challenging learning themes, actively participate in, experience success, and gain meaningful learning process."

It can be seen that deep learning is in line with the top-level planning of China's higher education teaching reform. Aims to deep learning helps to eliminate low-level courses. Therefore, this paper proposes a blended collaborative learning model aiming to deep learning.

2 Definition and application framework

2.1 Definition

The blended collaborative learning model aiming to deep learning refers to the goal of improving students' high-level comprehensive ability such as analysis, evaluation, and creation. In the context of blended learning, this model extensively carrying out challenging cooperative exploration or collaboration Practical tasks. In college courses, it is more suitable for professional courses or comprehensive practice courses integrating theory and practice.

The defining characteristics of this model are as follows:

(1) Online learning must be included, and during the online period, students can independently control the time, place or progress of learning to a certain extent.

(2) It must include offline teaching, i.e. teaching activities that are carried out in the classroom or within the laboratory as arranged by the teacher.

(3) Learners must work in groups or teams. they cooperate around common goals or tasks to improve individual and group performance.

(4) It must form a highly participatory integrated learning experience, fully mobilize the learner's learning polarity and enthusiasm, highlight the realization of high-level cognitive processing and knowledge transfer in multiple scenarios in collaborative tasks, and improve students' analysis and evaluation, creation and other advanced comprehensive ability and quality.

Among the above features, (1) (2) is the definition of blended learning; (3) is the definition cooperative learning; (4) is the goal of teaching model construction, that is, to promote students' deep learning as the goal, constitute An integrated learning experience that enhances the advanced, innovative and challenging nature of the course, rather than the simple superposition of online learning, traditional classrooms, and group discussions.

2.2 Framework

Following the above definition, this paper constructs a blended collaborative learning model aim to deep learning framework, and carries out practical application in the course of "Radar Maintenance Engineering and Performance Parameter Measurement" in our institute, as shown in Figure 1.

2.2.1 Teaching analysis

Teaching analysis include teaching problems analysis, learning characteristics analysis, the

determine of the core objective of the curriculum, the stratification and classification of the core objective.

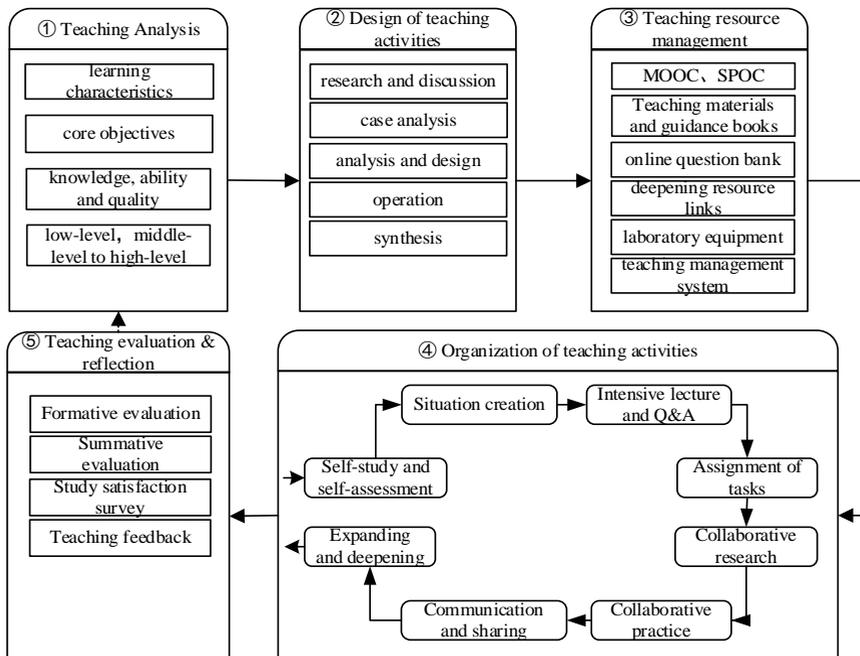


Fig. 1. The framework of the blended collaborative learning model aim to deep learning.

2.2.2 Design of teaching activities

Teaching activity design refers to the activities or tasks arranged and designed for the whole course or several topics around the achievement of the core objectives of the course. This kind of activity is aimed at the cultivation of students' comprehensive ability, and involves the comprehensive application of the whole course or part of the subject knowledge, so as to promote students to achieve high-level cognitive processing and knowledge transfer in multiple scenarios. The design of teaching activities should focus on what is the state of the learner's zone of proximal development? What learning activities can help learners effectively achieve the core objectives of the course? Theoretical teaching activities may include research and discussion, case analysis and other activities; practical teaching activities may include analysis and design, operation and application, synthesis, etc. Practical activities, etc.

2.2.3 Teaching resource management

In order to effectively support the development of various learning activities, it is necessary to build, manage and update teaching resources which are include online and offline, virtual and real, theory and practice teaching resources. Among them, online resources include MOOC, SPOC, online question bank, expanding and deepening resource links, etc. offline resources include teaching materials, teaching aids, cases, simulation training platforms, practice platforms, laboratory equipment, etc. at the same time, in order to improve The quality and efficiency of classroom teaching, a classroom or laboratory with a teaching management system is conducive to real-time and efficient teaching interaction and dynamic accumulation of learning data.

2.2.4 Organization of teaching activities

Teaching activity organization refers to the comprehensive use of problem-solving, task-driven, case-based and other teaching methods, combined with the advantages of online and offline teaching, to carry out the organization and implementation of teaching. this paper divides a complete blended learning process into 8 parts. Among them, online Learning focuses on the self-construction of students' knowledge and resource support for deep learning; offline learning focuses on promoting the socialized construction of higher-order abilities through knowledge conflicts in research discussions or knowledge transfer problems arising from project-based tasks.

(1) Self learning and self-assessment: an objective question self-test was completed with online self-learning via MOOC or SPOC. Teachers utilized the web platform to statistics student performance and adjust their teaching focus.

(2) Situation creation: Create suspense and raise questions through real cases, news reports, real problems, etc.in order to promote students' learning interests.

(3) Lecture and Q&A: teachers dynamically adapt teaching priorities based on students' pretest data, lecture the pedagogical content framework and relationships, interspersed with short 1 ~ 5-minute discussions that answer questions posed by students to form a preparation zone from low - to intermediate - and high-level objectives.

(4) Assignment of tasks: Follow the principle of online learning and offline exercise (research, discussion, and practice), assign collaborative exploration or collaborative practice tasks with a certain depth. The tasks at this stage can be the overall design of teaching activities, also can be the detailed tasks decomposed by the whole activities into a certain class.

(5) Collaborative research: For theoretical problem research, students take the group as a unit and follow the steps of self-determining the division of labor within the group, preparing for individual research, and summarizing group discussions. Among them, the division of labor within the group is usually performed by the group leader according to the characteristics of the members; personal research preparation means that students use MOOC, textbooks and other resources to consolidate the required knowledge, and independently research on the problems; group discussion's goal is to form a solution within the group. During the whole process, teachers should be interspersed with each group to guide and help the group leader to constrain the topic of discussion, control the rhythm of the discussion, and ensure that the research and discussion are in-depth step by step.

(6) Collaborative practice: For practical tasks such as analysis and design, operation and application, and comprehensive practice, students take the group as a unit and implement it according to the steps of independently determining the division of labor within the group, individual preparation, division of labor practice, and task achievement. Among them, personal preparation focuses on cultivating students' skills in completing tasks through simulation training and practical operation. collaboration requires the construction of a real work or production environment in combination with course-related occupational requirements. Students work in groups and under the organization of the group leader.

(7)Communication and sharing: For the theoretical and practical tasks completed by each group, according to the characteristics of the task, carry out the reporting, communication, questioning, discussion, debate, summary, etc. of the learning results between the groups. At the same time, organize mutual evaluation and self-evaluation between groups, and put forward suggestions for optimization, improvement, expansion and deepening of the research and practice tasks of each group.

(9)Expanding and deepening: Based on the exchange and sharing results, each group conducts expanding and deepening research and practice for the main problems existing in

collaborative exploration and collaborative practice, and forms and submits the optimized report as the basis for post-testing.

2.2.5 Teaching evaluation and reflection

In the blended collaborative learning model aim to deep learning, teaching evaluation methods that combine online, offline, individual, team, formative evaluation and summative evaluation should be adopted.

In addition, teaching reflection is an indispensable and important part of this model. It is necessary to obtain students' opinions and suggestions on the teaching process to modifying the teaching design and optimizing the course teaching.

3 Application effect and precautions

Through the teaching practice in the course of "Radar Maintenance Engineering and Performance Parameter Measurement" in our college, it is shown that using this model, students' learning satisfaction is high, and their practical skills and teamwork ability are significantly improved. However, in the process of using this teaching model, we should focus that Whether for the construction of theoretical knowledge or the cultivation of practical ability, the play of the leading role of teachers is the key to realize the transformation from superficial learning to deep learning. Among them, in the process of exploring theoretical issues, teachers' answering questions, determining group members, selecting discussion topics, and consciously promoting students to create cognitive conflicts during the discussion process are the main factors that correctly point to the depth. Similarly, in the cultivation of practical ability, teachers' guidance on cooperation methods, supervision of the cooperation process, and even demonstration of the practical process are important measures to ensure the achievement of high-level capabilities and avoid the illusion of cooperation.

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