

Research on Blended Teaching Design Based on Deep Learning

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Abstract: In recent years, the blended teaching model in Chinese universities has developed rapidly, breaking through the time and space constraints of the teaching process and enriching teaching resources. The emergence of different teaching platforms has also actively promoted the modern development of education. However, there is still room for continuous optimization and development of blended learning, and issues such as some students' inability to effectively utilize online resources, inability to conduct in-depth learning, lack of thinking training, and insufficient ability cultivation and improvement require resolution. This article fully utilizes the basic concepts of deep learning in the existing blended teaching mode, proposes a blended teaching design based on deep learning, and enriches the existing student assessment and evaluation methods, thereby improving the teaching effectiveness of existing blended teaching, deepening the achievements of teaching reform, and improving teaching quality.

Keywords: Blended teaching; Deep learning; Evaluation method

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Introduction

With the continuous development of internet technology, blended learning has been vigorously promoted in China in recent years to improve the quality of classroom teaching in universities. Blended teaching is a teaching method that utilizes the advantages of digital technology to combine offline and online learning, achieving a shift from teacher-led to student-centered learning, and meeting students' personalized learning needs^[1]. Compared to traditional classroom teaching models, blended learning breaks through the time and space limitations of the teaching process, allowing students to flexibly select course content and obtain rich and diverse learning resources. However, some blended learning methods fail to effectively promote students' deep learning, thinking, and exploration, and there is no gradual upward training for students' thinking. Therefore, the cultivation and improvement of students' abilities are insufficient^[2].

Using blended learning to optimize teaching strategies, provide effective teaching support, and promote students' deep learning is the key to promoting the high-quality development of classroom teaching in China. Based on this, this article takes the "Intermediate Microeconomics" course as an example, with the teaching

purpose of promoting students' deep learning, carries out research on blended teaching design, and explores the research inspiration of deep blended teaching, in order to provide a complementary path for teachers and students to teach and learn deeply in blended teaching, and improve the quality of curriculum teaching in Chinese universities.

2. The necessity of blended teaching in universities

In April 2018, the Ministry of Education released the Education Informatization 2.0 Action Plan, which proposed to actively promote the construction of a new model of talent training under the condition of "Internet +," develop a new model of education services based on the Internet, explore a new model of education governance in the information age, deepen the innovative integration of education and teaching and information technology, establish and improve the sustainable development mechanism of education informatization, and support and lead the development of education modernization.

2.1. The necessity of implementing blended teaching in universities

With the development of internet technology and the continuous progress of modern education technology, online education resources are gradually enriched and a large number of online education platforms have emerged. China University MOOC (Massive Open Online Course) is an online education platform jointly launched by NetEase and the Higher Education Society in 2014. It has hosted over 10,000 open courses and over 1,400 national high-quality courses. It has collaborated with 803 universities and has become the largest Chinese language MOOC platform. Under the new situation, universities are gradually promoting the blended teaching model to improve the quality of classroom teaching. Blended teaching is a teaching method that utilizes the advantages of digital technology to combine offline and online learning, achieving a shift from teacher-led to student-centered learning, and meeting students' personalized learning needs^[3]. Compared to traditional classroom teaching models, blended learning breaks through the time and space constraints of the teaching process, allowing students to flexibly choose course content and obtain rich and diverse learning resources.

2.2. Main problems in blended teaching in universities

2.2.1. Unclear core objectives of blended teaching design

The core of blended teaching design remains knowledge-based content, with a focus on systematic unit teaching and knowledge-based skills rather than transferable skills. Compared with traditional classroom teaching methods, the advantages are subtle. Teaching design is still content-oriented rather than goal-oriented, and the role positioning of online learning and offline teaching is not designed based on students' abilities. This leads to a lack of in-depth integration of online learning outcomes in classroom teaching during the three stages of pre-class, in-class, and post-class. Classroom teaching has become a parallel extension of online learning rather than a deep integration and promotion.

2.2.2. Ineffective blended teaching

Some courses have not effectively promoted students' in-depth learning, thinking, and exploration, and there is no gradual upward training for students' thinking. The cultivation and improvement of students' abilities are insufficient. For example, although some students have invested time and energy in online and offline learning, they primarily rely on mechanical memory and lack deep thinking processing, making it difficult to transfer and

apply the knowledge they have learned.

2.2.3. Imperfect teaching evaluation system

The existing blended teaching utilizes the evaluation method of traditional teaching effectiveness. Firstly, whether it is online or offline assessment, the evaluation basis for teaching evaluation is still quantifiable scores, emphasizing the accuracy of knowledge acquisition while diluting students' creativity and ability acquisition. It cannot provide comprehensive and effective feedback on teaching and learning outcomes, which is not conducive to fully mobilizing students' learning enthusiasm. Secondly, teaching evaluation focuses more on summative evaluation. Although there is assessment in the learning process, the lack of timely feedback leads to inadequate supervision, regulation, and motivation in the teaching process. Students may not receive timely guidance due to accumulated problems or may not have a timely understanding of their own situation, resulting in a loss of interest and motivation in learning.

Establishing clear teaching objectives, utilizing blended learning to optimize teaching strategies, providing effective teaching support, and promoting students' deep learning are the keys to promoting the high-quality development of classroom teaching in China.

3. Design of blended teaching courses based on deep learning

3.1. The essence of deep learning

Deep learning is a form of self-directed learning that learners engage in due to their interest in exploring and researching the problem itself. Deep learning is a type of learning in which students can pursue the improvement of their transferable skills based on their understanding of knowledge-based content^[4]. Hale *et al.* found that deep learning involves reconstructing the qualitative relationships between information, enabling recall and association, and achieving a deep understanding of the learning content. It is a full display of human higher-order thinking skills^[5].

To improve the quality of teaching in universities, attention should be paid to helping students smoothly realize the process from mechanical memory of knowledge to deep understanding and then transfer and apply it. The focus and objectives of teaching should shift from imparting basic knowledge to the more challenging aspects of knowledge transfer, application, and skills development for students. Teachers' deep teaching has a positive promoting effect on students' deep learning, and students' true deep learning needs to be built on the foundation of teachers' deep inspiration and guidance.

3.2. Design of blended teaching curriculum based on deep learning

The design of a blended teaching curriculum based on deep learning is mainly based on systematic unit teaching, holistic framework structure design, and open online learning resources^[6]. The online teaching design of teachers revolves around basic knowledge of the subject and is constructed with knowledge acquisition as the main teaching objective. The offline teaching design mainly revolves around students' deep understanding and transferable application based on a good grasp of basic knowledge, with skills development as the main teaching objective.

Teachers can divide the teaching process into three phases: pre-class, in-class, and post-class, as shown in **Table 1**. Before class, teachers should focus on setting teaching tasks for each chapter of the course content on the basis of fully grasping the learning situation. Basic knowledge should be mainly previewed and self-learned by students, and key and difficult knowledge should be examined through exercises, case analysis, and other methods to assess students' mastery. In class, teachers mainly rely on the pre-class for students to grasp

the situation, and focus on key and difficult points. They teach from shallow to deep through various methods such as classroom discussions, case studies, simulated classrooms, and event analysis. Students understand the application of key and difficult points through numerous cases and events. After class, students consolidate their knowledge points and enhance their ability to analyze and solve problems through reviewing and discussing assignments.

Table 1. Design process of blended teaching curriculum based on deep learning

Phase	Core content	Teachers' tasks	Students' tasks
Pre-class	The teacher arranges pre-class learning tasks	Mastering the learning situation Teaching according to one's aptitude Developing tasks, quizzes, discussions	Previewing knowledge Grasping the key points Summarizing questions
In-class	Teacher's offline guidance on knowledge application and skills development	Explanation of key and difficult points, etc.	Answering questions and participating in quizzes Participating in discussions and resolving doubts
Post-class	Student cognitive formation	Arranging open-ended assignments Summarizing teaching experience	After-class reflection homework Reviewing key points

4. Blended teaching assessment method based on deep learning

In the traditional classroom model, the assessment of academic performance is mainly based on the final exam results, and the exam time is generally 2 hours. The exam questions are divided into subjective and objective questions, mainly assessing students' mastery of knowledge-based content. Under the blended teaching method based on deep learning, teachers cannot assess students based on the traditional two-hour final exam results. The core of the investigation is no longer knowledge-based content, but mainly based on transferable skills.

At present, most universities that carry out blended learning have full process assessment awareness, but the challenges of course assessment are different. Policies are divided into two categories: one is composed of online learning scores, face-to-face classes (seminar classes), and final exam scores. The final exam can be online or offline exams (accounting for 25%). Secondly, it is necessary to participate in offline exams, and the online and offline scores are composed in proportion (accounting for 45%). However, in the assessment content, subject content knowledge accounts for the highest proportion. Under the teaching method based on deep learning, assessment can be divided into knowledge-based content assessment and transferable skills assessment. As shown in **Table 2**, the basic knowledge of online learning for students can be mainly assessed through content-based assessment, but the key and difficult points explained by the teacher in class should be provided to students through relevant case studies and event analysis, and should be assessed openly. Students can independently choose topics or knowledge points of interest, select topic discussions or case content arranged by the teacher, collect information, and write academic papers or research reports, or provide specific and feasible solutions.

Table 2. Blended teaching evaluation methods based on deep learning

Teaching methods	Evaluation method
Traditional teaching methods	Daily performance and final exam results
Blended learning	Online assessments such as quizzes, discussions, Q&A, and offline final exams
Blended teaching based on deep learning	Online assessments such as quizzes, discussion questions, Q&A, and offline submission of report plans

5. Conclusion

Blended teaching is a new teaching mode that integrates traditional classroom teaching and internet information technology. The essential purpose of the new mode is to establish a livelier classroom. It should fully utilize both offline and online teaching methods, achieve a mixture of teaching resources and tools, and improve the quality of classroom teaching^[7]. In course design, starting from the three stages of pre-class, in-class, and post-class, comprehensive consideration, comprehensive evaluation, reasonable setting of teaching content and assessment methods, students' enthusiasm for online learning of knowledge content can be mobilized and students' initiative in offline participation in practical application such as key and difficult explanations and case discussions can be stimulated. The traditional 2-hour final exam is transformed into a simultaneous online and offline exam, gradually transitioning the assessment content from knowledge-based content to transferable skills^[8]. The effective implementation of the blended teaching mode requires teachers to have the teaching and research abilities to carry out blended teaching, build a good teaching team, and rely on the effective supervision of university policy knowledge and teaching management departments^[9]. Only by coordinating and handling the key elements of blended teaching mentioned above can we truly improve the quality of teaching.

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