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Reform Research and Practice of Blended Project-Based Teaching under the Background of Educational Large Models

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ABSTRACT
With the rise of educational large models, new opportunities and challenges have emerged for curriculum teaching reform. This study focuses on the course "Theory and Application of Databases" to explore practical approaches for implementing blended project-based teaching reform under the background of educational large models. By analyzing the problems in traditional teaching of this course and integrating the advantages of educational large models, a new teaching model is constructed that combines online and offline learning with project-driven approaches. In practice, course knowledge points are integrated into specific project tasks, and educational large models are used to assist students in knowledge learning, question answering, and project practice guidance. Through multi-dimensional evaluation and analysis of students' learning effects, project completion, and competency development, it is found that this blended project-based teaching reform can effectively improve students' learning enthusiasm, practical skills, and comprehensive knowledge application abilities. It also provides useful references for relevant courses to promote teaching reform using educational large models.

KEYWORDS
Educational large models; Blended teaching; Project-based learning; Personalized learning

1 Introduction

Blended teaching can be considered as a combination of online learning and face-to-face teaching. Since the late 1990s, blended teaching has gradually entered the classrooms, experiencing approximately three development stages: simple integration of face-to-face teaching and online learning; blended teaching with a clear proportion of online teaching content (30%-70%); blended teaching in the context of the Internet and smart devices[1-3]. The project-based teaching method can be traced back to the second half of the 16th century. By the mid to late 20th century, in the context of industrial and information societies, there was a global wave of educational reform, and project-based teaching method received widespread attention[4-5]. Although single blended teaching or project-based teaching has achieved significant results in teaching research and reform, there are still relatively few research achievements based on the integration of blended and project-based teaching, and it faces many problems. Therefore, based on the course "Theory and Application of Databases" and with the background of the new technology educational large models, this article explores the reform path of blended project based teaching under the support of the educational large models, striving to solve the difficulties in teaching, meet the requirements of talent cultivation in the era of artificial intelligence and big data, explore personalized and systematic "precision" teaching models, and enhance students' comprehensive learning and practical abilities in classroom teaching[6-7].

2 Main Problems in Blended Project-Based Teaching

(1)The application of project-based teaching is not deep enough, with few practical class hours and a lack of top-level design methods. "Theory and Application of Databases" is a course with high practical operation requirements. As a fundamental course in computer science, it is the basis for learning and applying all software systems. Therefore, the cultivation of practical operation skills is very important. However, due to the numerous and fragmented knowledge points in the course, the training objectives cannot be achieved through scattered and non-systematic experimental designs, and students' practical abilities cannot be improved.

(2) Online teaching is merely a formality. Although some online teaching is currently combined in the class to achieve blended learning, due to the mismatch between online and offline resources and the difficulty of resource integration, making it difficult to form an organic whole to serve project-based needs. Learning materials from different sources lack overall planning in terms of knowledge coherence and difficulty progression, which can easily lead to fragmented learning for students. In addition, due to limitations in teachers' technical skills and inconsistent teaching platforms and tools, online teaching has become a formality and has not achieved the expected results. True blended learning is not simply about uploading courseware and textual materials to online learning platforms and scheduling a certain amount of time for students to learn independently. Instead, it involves closely connecting and mutually supporting all online and offline links, such as collecting teaching resources, designing teaching cases, and implementing teaching scenarios.

(3)Precision teaching is not precise enough. With the passage of time, the characteristics of college students have also changed significantly. For example, college students born after 2000 have more independent thinking and significant differences in study habits and actual needs compared to those born after 1990; In addition, with the development of information technology, online teaching, as a new teaching mode, is bound to better meet the different needs of students and be closely connected with offline teaching. However, from the actual teaching situation, online teaching is still not precise enough, and targeted and diversified resource sharing have not been fully utilized. Therefore, it is difficult to implement personalized teaching for students based on their differences.

(4) The management of the teaching process is complex. Blended learning involves both online self-directed learning and offline classroom interaction, and project-based learning requires students to collaborate in groups and deliver results in stages. Teachers not only need to monitor students' individual online learning progress, but also control the pace of group projects, which often leads to insufficient time and energy for them.

(5) The evaluation system is incomplete. The traditional exam based evaluation method cannot adapt to blended project-based teaching, making it difficult to comprehensively measure students' diverse abilities such as teamwork, problem-solving, and innovative thinking in project practice. The setting of process evaluation indicators and data collection are also difficult.

3 Reform Measures for Blended Project-Based Teaching

For the personalized development of students, it has become a new idea of new education reform at this stage to solve the precision teaching problem with the help of Internet technology, artificial intelligence technology and other emerging technologies. The specific reform ideas are shown in Figure 1.

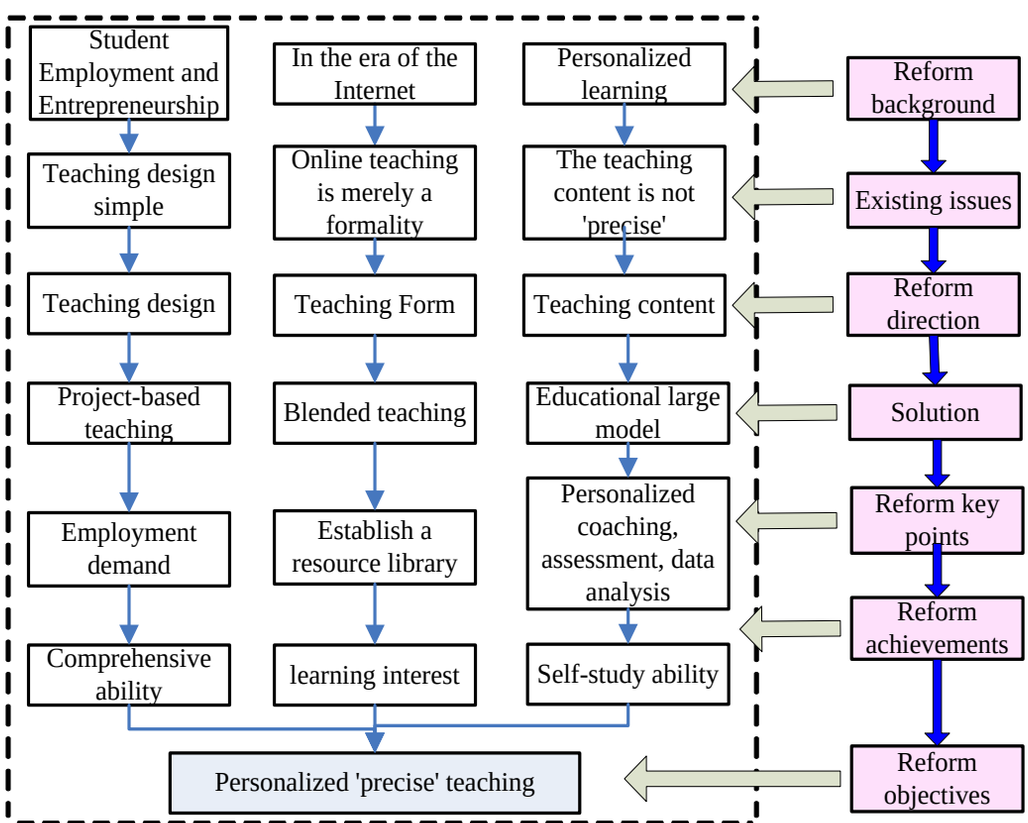

Figure 1 Overall framework of research and reform ideas

(1) Project-based teaching, in-depth teaching design. In order to enrich and strengthen the content of experimental teaching, project-based teaching is chosen for the course. The entire experimental content of the course will revolve around a project of creating and using a fully functional database for learning and practical application. This new teaching case - the project - will be more typical, systematic, and comprehensive, enhancing students' learning interest and practical operation ability. Through practice, it will deepen their understanding and application of theoretical knowledge, and improve students' comprehensive application ability.

(2) Establish an online learning resource library , enhance students' interest in learning. Research online teaching design, establish an online learning resource library, involving background knowledge of the course, course preview and

review content, solutions to common problems, online testing, online assignments, online questionnaires, and other content that are more suitable for students to engage in online self-directed learning. Pre-class task assignments and material push will be conducted through learning platforms such as Rain Classroom and Enterprise WeChat. If necessary, online discussions and Q&A will be organized through platforms such as Tencent Meeting to promptly solve students' problems, stimulate their learning interest, expand their thinking, improve classroom participation, and grasp their classroom learning situation.

(3) Meet the personalized needs of students' learning and teachers' teaching in the new era. Using the education model platform, such as ChatGPT, Kimi, Doubao, iFlytek Spark, ERNIE Bot, etc., to automatically set up learning plans for each student, customize personalized learning and coaching content, and consolidate students' classroom learning content. In addition, it can also help teachers generate teaching tasks and content tailored to individual needs, and assist teachers in automatically evaluating students' learning progress, monitoring their learning status, and providing more accurate learning feedback and suggestions, allowing teachers to better grasp the teaching situation. Therefore, with the help of the education model, the goal of "teaching according to students' aptitude" and "precise" teaching can be achieved.

4 Teaching Effects and Challenges

The following is a comparison of the teaching effectiveness of blended project-based teaching and traditional teaching mode in the database courses under the background of the educational large models. The data comes from the 2023 spring teaching class (115 students, traditional teaching mode) and the 2024 spring teaching class (113 students, blended project-based teaching under the background of the educational large models) of the Computer Science and Technology major in our college.

(1) The reform of teaching mode significantly improves teaching effectiveness. With the support of the educational large models, blended project-based teaching combines online learning with offline classrooms, driven by projects, guiding students to actively explore knowledge. Practice has shown that students have significantly improved their mastery of database theory knowledge and practical operational abilities. Through comprehensive evaluation of students' academic performance, practical works, and classroom performance, it was found that students participating in blended project-based teaching had significantly better abilities in database design, data processing, and system development than those under traditional teaching modes. Table 1 shows the comparative results of teaching effectiveness.

Table 1 The comparative results of teaching effectiveness

Evaluation dimensions	Blended project-based teaching under the background of the educational large models	Traditional teaching mode
Final exam	12 students are excellent, with an average score of 81.55 points.	2 students are excellent, with an average score of 73.33 points.
Performance improvement	The excellent rate has increased by 8.9%, and the average score has increased by 8.22%.	
Practical operational ability	More than 90% of students are able to independently or collaboratively complete experimental content.	About 70% of students can independently complete the experimental content.
Database design capability	The accuracy of database design has been improved, and the standardization level of E-R model and relational schema is high.	The process design is highly unreasonable, and the accuracy of the model design is low.
Class participation	The frequency of group discussions and proactive questioning has increased, and there is strong autonomy driven by projects.	Passive listening is the main focus, with a low rate of interactive participation.

(2) The educational large models support personalized learning. Based on students' learning data and behavior patterns, the educational large models provide personalized learning suggestions and resource push for students. In the course of "Theory and Application of Databases", students can choose the appropriate learning path and difficulty level content according to their own situation. For students with weaker foundations, the large models can provide more explanations and exercises of basic knowledge; For students who have spare capacity, more challenging expansion content is recommended. These personalized learning methods stimulate students' interest in learning and self-learning ability, which meeting the learning needs of different students. Figure 2 shows the students who used large models to solve learning problems in the spring 2024 course teaching process, where the total number represents the number of students who used large models, and other columns represent the types and numbers of large models used by students. From the figure, it can be seen that almost all students used large models to assist their own learning during the learning process.

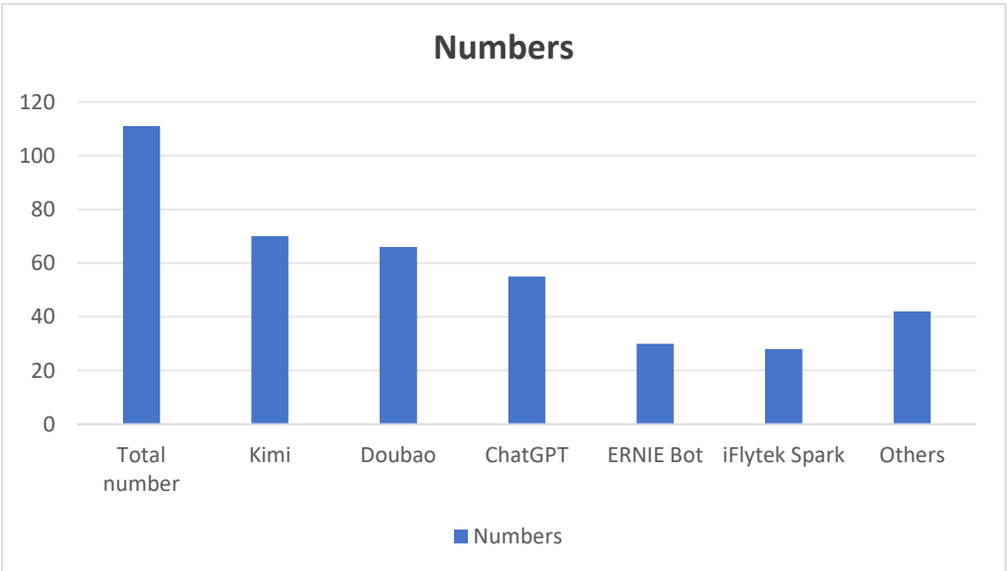

Figure 2 Number of students using the large models

(3) Developing students' comprehensive abilities. The blended project-based teaching model focuses on cultivating students' comprehensive abilities such as teamwork, problem-solving, and communication expression. During the project implementation process, students need to divide their work and collaborate to solve the problems encountered together. Through group discussions, presentations, and other activities, students' communication and expression skills have been exercised. At the same time, facing complex database project tasks, students' problem-solving abilities and innovative thinking have also been effectively improved. According to the survey, students who participated in the course generally believe that they have gained a lot in team collaboration and communication. For example, some students have improved their enthusiasm in subject competitions, graduation projects, etc., and have won multiple national first and second prizes, as well as honors such as excellent graduation projects.

(4) New requirements for teachers. The blended project-based teaching under the background of the educational large models pose new challenges to teachers' teaching ability and professional competence. Teachers should not only possess solid professional knowledge, but also be proficient in the use of educational models, and be able to design reasonable teaching activities based on teaching objectives and student needs. In addition, teachers also need to have good team guidance skills to guide students to fully utilize their strengths in projects. In the practical process, teachers continuously improve their teaching level by participating in training and self-learning to adapt to new teaching models.

(5) We have established an online resource library, making course resources more abundant. Through the online teaching platform - Rain Classroom, we have established a rich resource library, including courseware library, test paper library, exercise library, etc. Before, during, and after class, we send students preview, review, and course expansion materials , randomly select questions from the question bank for stage testing, greatly improving the teaching efficiency of teachers and the learning effectiveness of students, enriching the diversity of teaching and learning time, location, and methods.

5 Conclusion

This article explores and practices the application of blended project-based teaching mode in the context of the new technology educational large models. Taking the course "Theory and Application of Databases" as an example, through theoretical analysis, teaching practice and effectiveness evaluation, it is concluded that the reform of blended project-based teaching in the context of the educational large models have important practical significance and promotion value in curriculum teaching. By continuously improving and optimizing the teaching mode, it is expected to provide useful references and inspirations for the teaching reform of other courses, and promote the comprehensive improvement of education and teaching quality.

Although blended project-based teaching has achieved significant results in the course of "Theory and Application of Databases", there are also some problems. For example, the application of the educational large models are not deep enough, and some students rely too much on the large models, and their ability to think independently needs further improvement. In project-based teaching, there is a situation where individual students have low participation in group cooperation. Future research will focus on these issues to further optimize teaching models, improve the application effectiveness of educational models, and enhance the cultivation of students' self-learning and teamwork abilities.

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