Research on the Hybrid Teaching Mode Based on Ideological and Political Education and Problem Solving Model

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Abstract
Based on the goal of enabling education and the learning behavior data generated in the process of problem solving, this paper constructs a problem solving teaching model to promote the development of ability. In the programming course "database principle and application", this paper develops a design scheme based on problem-solving model to train learners to solve complex problems. The practical data shows that the problem-solving model effectively promotes the cultivation of students' problem-solving thinking, in which the capture of learning behavior data provides a reliable basis for the teaching design of hybrid ability, and students' teaching participation can effectively improve students' grades.

Keywords: *Engineering Education Certification, curriculum ideology and politics, Enabling education, Database principle and application.*

1 INTRODUCTION

General Secretary Xi Jinping pointed out at the National Conference on Ideological and Political Work for Colleges and the National Education Conference that "all courses should be well guarded and responsible fields planted so that all courses and ideological and political theory courses can work in the same direction and form synergies" [3]. "We should persist in taking moral education as the central link, and put ideological and political work through the whole process of education and teaching, so as to realize the whole process of education and all-round education, and strive to create a new situation in the development of China's higher education". The college stage is the key period for college students to form their theoretical thinking and realize the transformation from learning cognition to belief generation. It is particularly important to strengthen students' responsibility for their mission.

As one of the representative achievements of the development of science and technology, the IT industry has penetrated into all walks of life with all kinds of software and hardware applications. The implementation of the strategy of becoming a powerful country in science and technology cannot be separated from the cultivation of IT professional knowledge. However, while computers bring great convenience and timeliness to human beings, they also bring a series of problems such as network fraud and information security. Xiong Zhi et al. proposed that curriculum ideological and political teaching and mixed teaching should be integrated into the program design case, which has achieved the double-winning effect of cultivating students' thoughts and abilities [4]. Therefore, IT is necessary to carry out curriculum ideological and political construction comprehensively, deeply and effectively in IT majors.

Enabling education was first developed by Conger [1] Management, as proposed by et al., can promote individuals to discover their potential and actively participate in learning. Teachers' empowerment of students means that teachers provide students with teaching resources, guidance, technical support and help, stimulate students' internal motivation, motivate students to self-management, and encourage them to change their own learning behavior. However, the current engineering Education certification (Outcomes- Based Education, abbreviated as OBE) is a teaching model based on learning output, which emphasizes students' achievements and acquired abilities [2]. How to guarantee the achievement of engineering education certification is the key way to empower students.

B. Fox et al. (Eds.): IC-ICAIE 2022, AHCS 9, pp. 785-790, 2023.
https://doi.org/10.2991/978-94-6463-040-4_119

Therefore, it is a great responsibility for teachers to teach people to fish and empower students to learn for life.

Under the new situation of engineering education certification, database principle and Application requires students to master the steps and methods of practical problem demand analysis and system design. Combining with the characteristics of subject knowledge system and curriculum nature, how under the education idea of OBE to carry out the reform of teaching mode, in a "master professional knowledge, stimulate exploring spirit, improve the ability of innovation" and "emphasizes on the training of scientific thinking methods and scientific values shape", study and develop a new generation of Howard to fix, Howard has the first-class engineering science and technology talent. In this paper, how to train students to form correct three views and how to empower students in the course of database principle and application is put forward.

2 RESEARCH DIRECTION AND REFORM IDEAS

According to the dual requirements of curriculum ideological and political education and engineering education certification, the major emphasizes the cultivation of practical ability and engineering ability, with the cultivation of students' morality and cultivation of talents as the center, the empowerment education as the goal, the results-oriented, continuous improvement, namely, the ability of students Force obtained as evaluation results as the basis, continuously improve the quality of teaching the core values of continuous improvement, prompting students to set up the correct values, outlook on life, encourage students to find problems and understand the problem and the ability to solve complex problems, cultivate meet the demand of new industries, strong innovation ability, adaptability good technical personnel requirements. Optimize the teaching content of database courses and explore a new mode of ideological and political education and enabling education in the new situation. The specific reform ideas are shown in Figure 1.

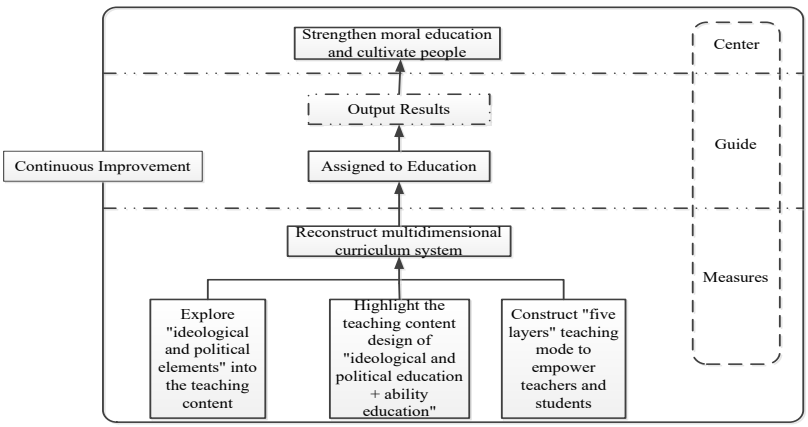

Figure 1: Database principle and application curriculum reform new mode

2.1 Explore "ideological and political elements" into the teaching content

The principle and Application of database is a professional course for computer majors. Combining the characteristics of this major and the course characteristics, the teaching content of this course is thoroughly sorted out in the teaching process, and the ideological and political elements of the course are organically integrated and mined to achieve the ideological and political goals of the course. In the process of imparting knowledge, it is connected with the engineering cultural background involved in the course, which makes the teaching content more comprehensive and richer, helps students better understand the knowledge system of the course and stimulates students' learning motivation. Through the introduction of database development and the development of database technology in China, it emphasizes the power of science and technology and the breakthrough of "bottleneck" technology; Through the analysis of system demand analysis, let students perceive the specific problem specific analysis; Through teaching the design and development of database management system, let students understand the relationship between theory and practice, craftsman spirit; Through the characteristics of storage management, let students learn the virtue of ecological civilization and resource saving; By explaining the integrity constraints of relational database, let students realize the importance of team and cultivate the spirit of cooperation; By explaining the security of database, let students understand that in addition to technology, professional ethics is an important guarantee to improve the security of database; Through the characteristics of database affairs, train students to do things persistently, never give up the spirit. In practice courses, through continuous code optimization, the craftsman spirit of excellence is formed by contrast; Prove the importance of engineering ethics

and professional ethics through error handling; Through the examination in the form of integrity examination room, let the students understand the socialist core values.

2.2 *Highlight the teaching design of "ideological and political education + enabling education"*

With the certification of engineering education as the guide, it is fundamental to cultivate students' morality, results-oriented, and focuses on the cultivation of students' problem-solving and innovation ability. According to the orientation of professional personnel training, ideological and political education and enabling education are combined, the talent training program is revised and the teaching content is divided into "step". Select the part that can realize the organic integration of knowledge, ability and quality, and have the ability to demand, analyse and study complex data modeling engineering problems, to highlight the "high order". At the same time, the course content should reflect the latest progress of database technology, have the ability to face new application fields, such as data management in the big data environment, and adopt advanced teaching methods to reflect "innovation". The course is required to be a certain degree of difficulty. Comprehensive or design experiments need to be set up to meet the "challenge" requirements. To realize the cultivation of engineering theory, political consciousness, scientific thinking and innovative thinking in ideological and political goals; In terms of ability goals, the transformation from knowledge goal to ability goal to value goal is realized.

2.3 *Build "five-layer" teaching mode to empower teachers and students*

The five-layer circular teaching mode of "pre-class - the first offline theory class-after-class - the second offline practice-class-after-class" is adopted. The specific implementation are shown in Figure 3. Level 1: before class, basic knowledge is mainly transferred to train students' self-learning ability. Level 2: the first offline theory class, teachers guide students to explore, think and analyze problems, emphasizing knowledge internalization. Level 3 -- extracurricular, individual learning, group learning, extensive learning, deep learning, to explore difficult problems; Level 4 -- the second practice class, the class discussed practical engineering database management system problems, students in the same group to learn from each other to improve the ability to participate in class; Level 5 - after class, radiation extends the relevant content of the course for the capable students to build the ladder.

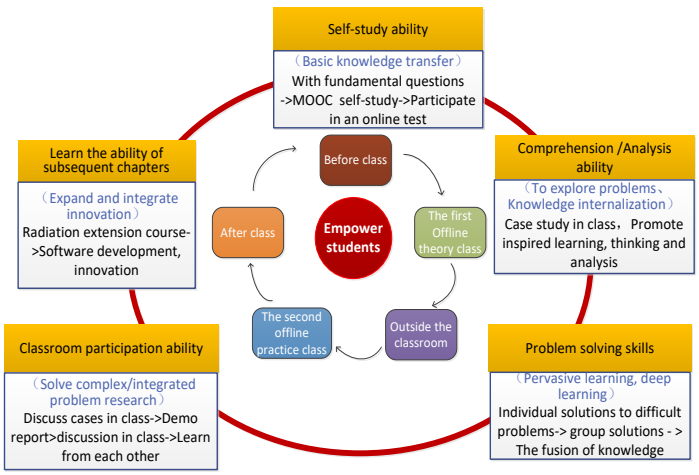

Figure 2: Five levels of teaching mode

2.3.1 Theoretical teaching mode

Before class, students watch MOOC videos to complete online learning tasks, consult relevant research materials, fill in group learning task lists, and learn knowledge points independently. In the first two days of class, the teacher collected the learning task list, sorted out, classified, screened, carefully do this "observation point", before the class on the students put forward the problems listed and sorted, with the problem into the classroom. In the classroom, teachers explain these common problems in depth, organize students to discuss in groups, and let student representatives on stage to answer difficult questions, through selection, discussion, answer, report, test, voting, questionnaire and other teaching methods, to help students internalize knowledge. Intelligent teaching tools were used to record the interactive teaching data of teachers and students in offline classroom teaching, including the progress of teachers' classroom teaching content and students' practice.

2.3.2 Practice teaching mode

Practice class is the application of theoretical knowledge learned and the deepening of theoretical understanding, is the main means to cultivate students' practical ability and innovation ability, is an important

link to improve the quality of talent training [5]. The second offline practice class adopts "1+X+Y", integrating the group teaching mode of "experts". 1 refers to one MOOC, X refers to X classes, and Y refers to the project team. The practice course is divided into two parts: verification experiment and optional database system subject. For confirmatory experiments, students can learn independently through answer analysis in rain class. For the part of self-selected research groups, the research groups with the same topic will be reorganized into "expert" groups, in-depth research on professional issues, mobilize individual enthusiasm, enhance individual participation. The students were at a loss to select topics, ask the way of the project, explore the way forward, the "experts" group to discuss the core issues, and then to the framework of the discussion, the project implementation test, to the final report and show the results. The practice content of the optional subject should be carried out synchronously with the content of the theoretical course.

3 TEACHING DESIGN BASED ON PROBLEM SOLVING MODEL

This section takes the database principle and the query section of the application course teaching as an example to implement the hybrid teaching design. The teaching organization of basic query statements is shown in Table 1. The teaching design is interlinked with the three links of pre-class, in-class and in-class, and the teaching method is combined with independent learning, teaching and discussion. Query statements adopt the computational thinking paradigm of problem decomposition. In the face of query requirements, the source of data is judged first, then the data is screened horizontally, and finally the data is screened vertically. Step by step experimental design, help students to establish a correct way of thinking.

Table 1: Inquire about blended instructional design

Learning period	learning task	learning form
Before class	1. Query a single table (1) Execute select * from table name and observe the execution result (2) Execute the select * from table name where query criteria and observe the execution results (3) Execute the select field name from table name where query criteria and observe the results (4) Thinking: the role of the from clause, the where clause, and the select clause 2. Query multiple tables (1) Execute select * from table 1, Table 2, observe the execution result, and record the number of records obtained by the query (2) Execute select * from table 1 and table 2 where the association conditions between table 1 and table 2, and observe the execution results (3) Thinking: what is the effect of executing the from clause in a multi table query? What is the role of the association condition between table 1 and table 2 in the where clause?	Autonomous learning
In the class	Discussion question: 1. functions of from, where and select 2. execution order of query statements 3.correspondence between from clause and Cartesian product 4. how to determine the association conditions of Table 1 and table 2? 5. query statement exercise for a given application scenario	Group discussion, Teacher's comment on
After class	Experiment Report：Query	Rain classroom online test

4.DATA STATISTICS AND ANALYSIS

(1) In terms of learning participation, 98 students participated in raising hands in class in teaching practice. The relationship between visits to MOOC teaching resources (VisITedResources) and participation in Discussion and Posting (Discussion) and students' final grade (class) is shown in the figure 3. In the figure, the blue line L describes the learning participation of low-grade students, the code M describes the learning participation of medium students, and H represents the learning participation of excellent students. From the data analysis in the figure, it can be seen that the learning participation rate of top students is very high, while the learning participation rate of students with poor performance is low, that is, the grade of students' performance is proportional to the classroom participation rate.

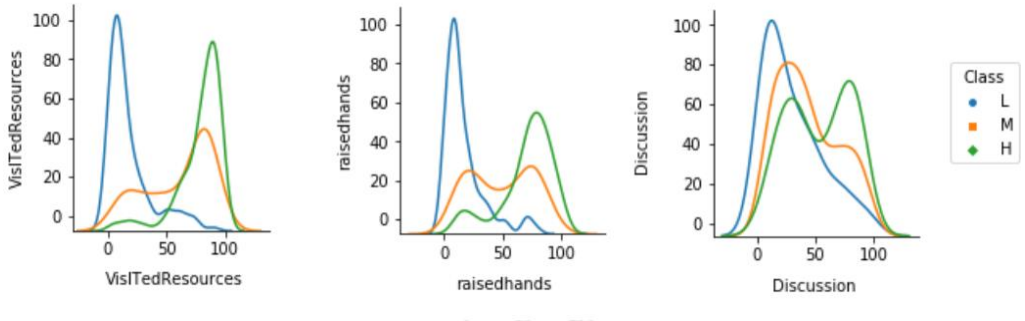

Figure 3: Graph of participation and achievement class

(2) Learning effect

In the last two semesters, three classes of Computer science and Technology (Grade 18) and three classes of soft engineering (grade 19) have implemented mixed teaching of database principle and application courses, while the rest of the classes have implemented traditional teaching. Practice has proved that the students' active degree and classroom participation can be improved obviously. The average score of the class with mixed teaching method is more than 5 points higher than the average score of the final examination of the parallel class with traditional teaching method. Although the final score is normally distributed, the proportion of excellent students is increased. The comparison of the average final scores of the hybrid parallel class and the traditional class in the last semester is shown in Figure 4.

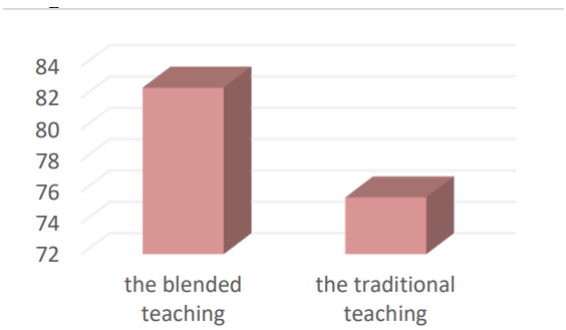

Figure 4: Comparison chart of final grade average

5 CONCLUSIONS

In view of China's higher education reform, under the new ecological course education and innovation ability training imminent problems, on how to set up scientific values and implement assigned to education, to improve students' political thought consciousness, innovative consciousness and innovative ability, puts forward course education combined with engineering education accreditation of the hybrid teaching reform. Practice has proved that the students' activity and participation in the class are significantly improved. Through the teaching reform, students have improved their self-study ability, systematic analytical thinking ability and the ability to solve complex problems to some extent.

ACKNOWLEDGEMENTS

Foundation Item: Quality Engineering Offline Course Project of Anhui Province (NO: 2020kfkc261); Quality Engineering Project of Anhui Province (NO:2020kcszjxtd37,2020zyrc075); Anhui Xinhua University University-level Quality Engineering Brand Professional Cultivation Project (NO:2018ppzyx03).

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