Teaching Reform of Database Course based on the Concept of Outcome-based Education

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Abstract: Outcome-based Education is a kind of ability-oriented education mode, which is oriented by social needs and focuses on cultivating students' ability to solve practical problems. All aspects of this education mode are designed and implemented closely around students. Taking the teaching of database principle and application course as an example, aiming at a series of problems existing in the current course teaching, taking OBE education concept as the main teaching reform guiding strategy, this paper puts forward a series of reform measures and solutions from the aspects of teaching goal formulation, teaching content optimization, teaching methods innovation, experimental design optimization, evaluation system innovation, etc.

OBE (outcome-based education) is a structural model that organizes, implements and evaluates education with the expected learning output as the center[1]. The connotation of this concept mainly includes output orientation, student-centered, and continuous improvement[2]. OBE concept is oriented by social needs and focuses on cultivating students' ability to solve practical problems. All aspects of education are designed and implemented closely around students. This concept is an important theoretical basis of engineering education quality certification index.

Database principle and application is a basic course for undergraduate computer related majors. It is a technical science based on database design theory, which uses programming, data manipulation language and other technologies to solve the problems of database application system design and implementation. Through the study of this course, students should be able to deeply understand and systematically master the basic principles and technologies of database system. The ultimate goal is to cultivate students' ability to use database technology to solve practical problems, and stimulate students' desire to continue learning and research in this field.

In order to improve the teaching quality of database course and the learning effect of students, it is of great practical significance to develop more effective teaching objectives and innovate teaching mode under the guidance of OBE concept in teaching, so as to improve students' engineering practice ability, cultivate students' autonomous learning consciousness and innovation ability.

1 The current situation and problems of database course teaching

First, the theoretical content of database course is complex, some of which are difficult, so students often feel boring in the learning process. Most of the teaching models still stay in the traditional teaching model, the teaching method is relatively single, lack of flexibility, cannot effectively mobilize the enthusiasm of students. Students' mastery of knowledge is low, and the learning effect is generally not ideal. In addition, the content of teaching materials is relatively backward, lacking the introduction of new database technology, which is not conducive to the cultivation of students' knowledge

and innovation ability.

Second, the teaching content of database course experiment mainly depends on the unit practice of specific knowledge points, and lacks the application of complete practical cases, which leads to the students' lack of the exercise of the overall comprehensive application ability of the project in the experiment. Therefore, the interest in database experiment is reduced and the learning effect is poor. In addition, in the course of experiment, students mainly rely on the guidance of teachers to complete related tasks step by step, lack of independent thinking and mutual discussion process, which will lead to the decline of students' autonomous learning ability.

Third, the traditional teaching method is mainly classroom teaching. In the teaching process, teachers are the center, while students are in a passive state. Therefore, students lack the process of active thinking and exploring knowledge. In the passive state, students often adopt a negative attitude, so that the teaching objectives cannot be effectively achieved. In addition, the teaching method is relatively single, which cannot fully mobilize students' interest in learning.

Fourth, learning evaluation mechanism is relatively old. The traditional assessment method is to combine the final paper score with the usual score composed of attendance, homework and experimental report, and convert the final score of the course according to the corresponding proportion. This single assessment mechanism ignores the objective evaluation of students' learning attitude, teamwork ability and expression ability. So that we can't evaluate the students' learning state and learning effect comprehensively, objectively and fairly.

2 Teaching reform design based on OBE

In order to solve the problems existing in the course teaching and realize the requirements of reverse design of teaching objectives in the OBE concept of student-centered and learning achievement oriented. In order to realize the fundamental change from teacher centered to student-centered education mode, the following reform measures are put forward.

2.1 Establishing reasonable training objectives and optimizing teaching content

Training objectives are the basis and premise of teaching activities, and are the necessary measures to ensure the quality of teaching. Therefore, in formulating the training objectives of the course, we must fully consider various factors, not only to meet the current needs, but also need to take into account the long-term needs, as well as the social needs of the industry personnel, so that the training objectives will be more scientific and reasonable.

Database course involves a lot of content, part of the theoretical content is more abstract and complex, so the selection of teaching content should fully consider the students' understanding ability and existing knowledge base. Under the guidance of OBE concept, starting from the course teaching objectives and taking the cultivation of students' ability as the starting point, the teaching contents are reasonably selected and the corresponding curriculum standards are set up. Make clear the content and degree of knowledge students need to master, so as to make the design of teaching activities more targeted. Then according to the teaching evaluation results and learning effect feedback of each stage, we can adjust the teaching content and methods in time, so as to continuously improve the teaching quality and achieve the purpose of ability training.

In terms of teaching content, the introduction of the latest database technology development can guide students to broaden their horizons and cultivate their initiative to explore new technologies. In addition, in order to better realize the cultivation of students' practical ability, practical cases are introduced into the theoretical knowledge explanation. The use of relevant knowledge to solve practical problems can make students better grasp the steps and methods to solve problems. In the process of solving practical problems, teachers can inspire students to use a variety of different strategies to solve the same problem, to achieve the purpose of developing thinking and improving learning ability.

2.2 Adopting reasonable and effective teaching methods

First of all, we can use task-driven teaching mode[3]. By combining the teaching objectives with task-driven teaching mode, we can decompose the knowledge points according to the task requirements, and make clear the teaching tasks, key points and difficulties of each unit. Teachers only play a guiding role, but students are the center of teaching. By

mobilizing the enthusiasm of students, students can become the masters of the classroom, while teachers only prompt, comment and summarize when necessary. For example, before class, teachers can inform students of the teaching objectives and tasks of this class, so that students can always be clear about what they need to learn in the whole learning process. Then, under the guidance of the teacher, through autonomous learning and team learning, students use their knowledge to solve practical problems or put forward ideas and methods to solve problems in the form of exploration and discussion. Through the task driven teaching mode, the knowledge points are integrated into the task, which can fully mobilize the enthusiasm of students and promote the students to master the knowledge points.

In addition, flipped classroom can also be used as an effective teaching method to realize the OBE concept, which is student-centered and gives full play to students' subjective initiative[4]. Before class teaching, students can learn in advance through learning resources such as teaching videos or PPT resources, fully preview the course content, and then return to the classroom for teacher-student communication. Finally, students submit their homework. Flipped classroom, as a new teaching mode, subverts the traditional classroom form. Students change from passive acceptance of knowledge to the master of the classroom. "Flipped classroom" teaching mode can accelerate the integration and application of teaching resources and teaching methods, which puts forward higher requirements and challenges for teachers. At the same time, "flipped classroom" can enhance the students' subjective consciousness, effectively improve the learning effect, break the restrictions of time and space.

2.3 Adopting blended teaching mode

In addition to offline teaching, with the support of information technology, we can increase online teaching channels, make use of blended teaching mode to let students control their own learning process, reasonably arrange their own learning time, improve the utilization efficiency of knowledge resources[5]. For example, the database course teaching can be combined with the application of information technology such as network teaching platform, MOOC system and teaching live software to establish the online teaching system of the course. The course notice, courseware, video courses, exercises and other course resources are released through the platform. Students can learn autonomously according to the requirements, and problems in learning can be solved by communicating with teachers through network teaching platform or QQ. Teachers can arrange time to interact with students through live software, explain the important knowledge points. After class, students can learn the video of the classroom content repeatedly, check the missing, complete and submit the homework. According to the students' learning record statistics and homework information feedback on the teaching platform, teachers can timely grasp the students' learning status and learning effect.

2.4 Optimization of experiment design

Problem-Based Learning strategy is introduced into the experiment of database principle and application course. The strategy emphasizes student-centered, and allows students to analyze, discuss and make decisions in the form of team cooperation according to the knowledge they have learned, so as to jointly solve complex problems and improve students' autonomous learning ability and team cooperation spirit.

When choosing the content of the experiment, we should not only have the practice of basic knowledge, but also include innovative content and comprehensive practical cases. Through the experiment, students can further deepen the understanding of basic knowledge points, and improve the ability to analyze and solve practical problems.

The implementation process of database principle and application Experimental Teaching: inform students of the learning objectives and experimental requirements of each experimental course before class, so that students can make clear the experimental tasks and expected learning results in the whole experimental process. In class, first of all, the teacher provides a number of experimental topics and task requirements, so that students can choose their own topics according to their own interests. For the more comprehensive experimental projects, students can be guided to work in teams of 3-5 people to complete the experimental tasks and goals through cooperation. After the task is completed, each group will reply, and finally the teacher will give guidance.

Through this way of learning, students' autonomous learning ability and team cooperation ability can be effectively improved.

2.5 Establish a scientific evaluation mechanism

The traditional teaching evaluation mechanism is mainly through the combination of examination results and usual results to determine the final score of students. Under the concept of OBE education, we should not only evaluate the test results, but also pay attention to the performance of students in the whole learning process. For example, students can be evaluated from different aspects according to the completion of each project and task, and the evaluation indicators can be increased, such as innovation, teamwork, etc. When evaluating the completion of students' tasks, we should also pay full attention to students' self-evaluation. At the end of the course, students are required to judge their learning achievements according to the evaluation criteria, so as to enhance students' self-monitoring of learning. In addition, group evaluation and teacher evaluation are introduced to give more comprehensive and objective evaluation results through multiple dimensions.

3 Classroom teaching practice based on OBE

In this paper, the application of OBE concept in practical teaching is demonstrated by taking the SQL query language chapter in the course of database principles and applications as a case.

First of all, we should make it clear that the teaching goal of this course is to let students master the syntax structure of standard SQL query statements, master the methods of simple query, linked table query and nested query, and be able to skillfully use all kinds of query statements in the specific database management system to complete the actual query task. Then, starting from this teaching goal, the key and difficult points of this chapter are classified, and the corresponding ability training standards are formulated for each knowledge point. For example, simple query and join query are frequently used in actual database operation, so students are required to master and apply these query sentences flexibly. However, some contents of nested query, such as multi-layer nesting, are relatively complex and only need to meet the ability standard of understanding and primary application.

In the process of teaching, in addition to the application of traditional courseware, the computer operation demonstration video of important knowledge points is also added. For example, the execution process of SQL statements of connection query and nested query is recorded in advance through video recording software, and then the above learning resources are released through network teaching platform or QQ group, so that students can preview and review through online teaching resources after class. Finally, students can consolidate and deepen their understanding of knowledge points by learning in class.

In addition, the database of student information management system is introduced as an actual case, and the practical application of SQL query in the database is taken as the goal. Through the task driven, students can apply the theoretical knowledge learned in the classroom to practice, which can better stimulate students' interest in learning, improve students' practical ability, and reflect the OBE concept of learning outcome-oriented goal. After the completion of the case operation, teachers can organize students to evaluate the results and exchange experience. Through students' self-evaluation and mutual evaluation, plus teachers' comments, students can better understand their mastery of the course.

4 Conclusion

In this paper, OBE concept is taken as the guiding strategy of database teaching reform. First of all, students' ability training is taken as the standard to select the appropriate teaching content, and the corresponding curriculum standards are set up. Through the introduction of new database technology and practical cases to expand students' horizons. Then the task driven method and flipped classroom mode are introduced to improve students' autonomous learning ability, expression ability and innovative thinking ability. In the teaching mode, through the application of new technology, the introduction of online blended teaching mode, so that students' learning style is more flexible and efficient. In the experimental teaching, problem-based learning strategy is adopted to better improve students' practical ability and cooperation ability. In the evaluation method, the introduction of multi-dimensional evaluation system can better stimulate students' learning motivation. The whole course

teaching reform is carried out from the aspects of teaching content, teaching design, teaching methods and evaluation methods to form a relatively perfect teaching system.

References

[1] Gu PH, Hu WL, Lin P, Bao NS, Lu XH, Xiong GJ, Chen Y. OBE engineering education model in Shantou University[J]. Research In Higher Education Of Engineering, 2014(1):27-37.

[2] Shi XQ. Design and implementation of course teaching based on the concept of outcome-based education[J]. Research in Higher Education of Engineering, 2018(5):154-160.

[3] Bi CM. The application of task-driven teaching model[J]. Journal of Shanxi Datong University(Natural Science), 2008(6):84-86.

[4] Zhang JL, Wang Y, Zhang BH. Introducing a new teaching model: flipped classroom[J]. Journal Of Distance Education, 2012(4):46-51.

[5] Feng XY, Wang RX, Wu YJ. A literature review on blended learning: based on analytical framework of blended learning[J]. Journal Of Distance Education, 2018(3):13-24.