International Journal of Social Sciences and Public Administration
ISSN: 3005-9836 (Print), ISSN: 3005-9585 (Online) | Volume 3, Number 1, Year 2024
DOI: https://doi.org/10.62051/ijsspa.v3n1.31
Journal homepage: https://wepub.org/index.php/IJSSPA/index

Study on Teaching Database Principles Course based on OBE Concepts

Lingyun Hu[1], Yanhong Zhao[1], Hongjun Yuan[2, *]

[1] School of Management Science and Engineering, Anhui University of Finance and Economics, Bengbu, Anhui 233030, China

[2] School of Statistics and Applied Mathematics, Anhui University of Finance and Economics, Bengbu, Anhui 233030, China

[*]Corresponding Author: 120081388@aufe.edu.cn

ABSTRACT

With the rapid development of information technology, database principles, as one of the core courses of computer science and technology majors, the quality of its teaching is directly related to the cultivation of students' practical work ability and innovation ability. However, the traditional teaching mode has problems such as emphasizing theory over practice, single assessment method and neglecting ability cultivation, which is difficult to meet the current social demand for high-quality technical talents. Therefore, this paper introduces the OBE (Outcome-Based Education) education concept into the teaching of "Principles of Database" course, and puts forward a series of teaching reform measures based on the OBE concept, including the formulation of specific teaching objectives, optimization of teaching content, innovative teaching methods, diversified course evaluation and assessment mechanism, etc., to realize the training of students' ability and innovation through the construction of student-centered and output-oriented teaching mode, and to realize the training of students' ability and innovation. By constructing a student-centered and output-oriented teaching mode, it realizes the enhancement of students' independent learning and innovation and practice ability, so as to make students become excellent talents of the new century with innovative consciousness and ability.

KEYWORDS

OBE Concept; Database Principles; Outcome-oriented; Pedagogical Reform; Self-directed Learning; Innovative Practical Skills.

1. INTRODUCTION

In today's increasingly developing information technology, database has become the core tool of information management, and the "Principles of Database" course, as one of the core courses of computer science and technology majors, plays a crucial role in the cultivation of professionalism and practical ability of students, and occupies a very important position in the undergraduate education of computer science majors. The course not only requires students to master the basic theory and knowledge of database, but also should cultivate students' ability to analyze and solve practical problems by applying what they have learned. However, traditional teaching methods often focus on the instillation of theoretical knowledge, but neglect the cultivation of students' ability and the application of knowledge, the training of practical skills and the stimulation of innovative ability, which leads to the difficulty of adapting to the rapidly changing needs of the work after the completion of their studies.The introduction of the OBE concept for the teaching of "Principles of Database"

provides a new perspective, which emphasizes that it is focused on the students' learning outcomes, and pays attention to the overall development of students' abilities.

2. OVERVIEW OF THE OBE EDUCATION PHILOSOPHY

OBE (Outcome-Based Education) education concept is an innovative education model first proposed by American educator William Spade at the end of the 20th century and rapidly emerging in North America, which is an education model centered on student learning outcomes. It emphasizes that educational activities should be designed, implemented and evaluated around expected learning outcomes. Under the OBE model, the goal of education is no longer simply to complete a certain amount of course instruction, but to ensure that students meet a set of pre-defined competency standards. These competency standards usually cover multiple dimensions such as knowledge acquisition, skill application, values and social adaptation, etc. The core of the OBE concept is to clarify the purpose, enhance the relevance and improve the effectiveness of education.

The OBE education philosophy has the following distinctive features: first, it is student-centered, focusing on each student's learning outcomes and personality development; second, it emphasizes flexibility and adaptability, where teaching content and methods can be adjusted according to the students' learning progress and feedback; third, it is results-oriented, where all teaching and learning activities are aimed at reaching the established learning outcomes; and lastly, it advocates continual improvement, whereby the teaching and learning process is optimized through the regular assessment of learning outcomes.

In foreign countries, the OBE education concept has been widely used in the education systems of several countries. For example, in countries such as the United States, the United Kingdom and Australia, the OBE concept has been widely applied to all levels of basic education, vocational education and higher education. By setting clear learning outcomes, adopting flexible and diversified teaching methods and implementing comprehensive outcome assessment,educational institutions in these countries have effectively enhanced the quality of education and the comprehensive ability of students.

In China, although the OBE education concept started late, it has gradually been paid attention to and emphasized by the education sector in recent years. Some colleges and educational institutions have begun to try to apply the OBE concept to curriculum design and teaching reform, especially in the fields of engineering education, medical education and teacher education. By introducing the OBE concept, these institutions are trying to build a more scientific and reasonable talent cultivation model, with a view to cultivating more high-quality talents that meet the needs of society.

3. ANALYSIS OF THE CURRENT STATUS OF THE "PRINCIPLES OF DATABASE" COURSE

The current teaching mode of "Principles of Database" course mainly adopts the traditional lecture method, in which teachers impart theoretical knowledge in the classroom, and students absorb and consolidate the knowledge by listening to the lectures and assignments after class. This model emphasizes the systematicity and completeness of theoretical knowledge, but often ignores the cultivation of students' practical skills and the enhancement of their innovation ability, and does not highlight the "student-centered". The contents of the courses are mostly textbook-centered and lack of case study and project practice combined with practical application. In addition, the assessment methods are mostly based on closed-book exams, which seldom involves the evaluation of students' practical skills and innovative design ability.

Under the existing teaching model, the "Principles of Database" course suffers from several major problems:

(1) The teaching method is single, and the teaching process is dominated by teachers' lectures and students' passive acceptance, neglecting the cultivation of students' independent learning and innovation ability, which is not conducive to the formation of lifelong learning habits and the ability of students to adapt to the development of the future society.

(2) Emphasis on theory, not on practice. In the teaching process, teachers emphasize the teaching of knowledge, and students focus on summarizing and organizing the knowledge gained, so that the practical aspects are not given enough attention, and students are unable to achieve a skilled combination of theory and practice, which makes it difficult for students to transform what they have learned into problem-solving ability in the actual work.

(3) The course content is not timely enough to keep pace with the rapid development of database technology, the current teaching process, all the teaching content arrangements are based on a pre-drafted teaching program to learn, ignoring the "learning outcomes" of this basic goal.

(4) A single assessment method cannot comprehensively evaluate the learning effectiveness of students, especially ignoring the investigation of students' ability to analyze and solve problems.

4. TEACHING REFORM OF “PRINCIPLES OF DATABASE” COURSE BASED ON OBE CONCEPTS

OBE education concept is student-centered, student learning output-oriented, combining the national and industrial career development needs, determining the training objectives and graduation requirements, determining the curriculum system according to the index points of graduation requirements, determining the teaching requirements and teaching content according to the curriculum system, and finally measuring the students' teaching achievement degree based on the teaching evaluation and evaluating the effect of the implementation of the course accordingly. Based on the concept of OBE education, we have carried out the following teaching reforms for the "Principles of Database" course.

4.1. Determination of Teaching Objectives of "Principles of Database" Course based on OBE Concepts

OBE education concept is goal-oriented teaching process design, the whole teaching process is designed closely around the goal, so the most core and basic step is the determination of teaching objectives. Teaching objectives for the "Principles of Database" course should focus on the specific competencies and knowledge levels that students are expected to achieve through the course. These teaching objectives should be measurable, matched with the needs of career development, and be able to guide the design of course content, the choice of teaching methods and the establishment of the evaluation system.

(1) Students should be able to master the core concepts of database systems, such as data model, database design, SQL language, etc.; be familiar with commonly used database systems, understand the features and advantages of different systems, and be able to select appropriate databases according to the application scenarios in practical work.

(2) Students should be proficient in query languages such as SQL for querying, updating and managing data; proficient in database operation skills, creating databases, tables, stored procedures and triggers.

(3) Students should have the ability to design effective databases and be able to construct databases from specific project requirements using the entity-relationship model and normalization theory.

(4) Students should be able to apply theoretical knowledge to real-world problems and improve their ability to solve real-world problems through project and case studies. Students should be able to analyze problems and propose reasonable solutions in the context of database systems.

4.2. Reform of the Teaching Content of the "Principles of Database" Course based on the Concept of OBE

"Principles of Database" course is a theoretical and practical course, the teaching of the more classic theoretical textbook "Introduction to Database Systems" (5th edition) and the more classic SQL Server database management system based on the SQL Server Practical Tutorial practice materials. "Principles of Database" course involves a lot of knowledge, in order to make students achieve the proposed teaching objectives within a limited range of hours, it is necessary to better integrate the knowledge modules of the course. According to the teaching objectives, the knowledge module is divided into seven modules, which are database basic theoretical knowledge, database SQL operation, database security, database integrity, relational data theory, database design, database management. In the course of teaching, in order to better cultivate students' ability of database design, the content of each module is explained according to the idea of database design.

Under the guidance of OBE education concept, oriented by students' learning effect, the teaching of theoretical knowledge is emphasized, and more attention should be paid to the application of theoretical knowledge in practice, fully combining theoretical knowledge and practical operation to improve students' hands-on ability. This requires that the design of experimental content should focus on solving complex engineering problems and improving practical application ability. Weekly completion of an experiment, each experiment is connected to each other, the content of the previous experiment for the subsequent experiments, and strive for students to solidly grasp each knowledge point, and the theory of teaching and experimental teaching organic combination. In addition to conventional verification experiments, should increase the proportion of design and comprehensive experiments, so that the experimental project can be from simple to complex, the task from shallow to deep, so that students in the completion of the course can carry out the development of small-scale information management systems, to integrate the theoretical knowledge of the principles of the database and its application of the knowledge system, to be able to convert the textbook into the practical application of the knowledge.

4.3. Teaching Mode Reform of "Principles of Database" Course based on OBE Concepts

The traditional teaching mode is centered on the teacher's lecture, and students passively accept knowledge, ignoring the individuality and autonomy of students, which is not conducive to stimulating students' interest in learning. And based on the OBE concept is to emphasize that teaching should be student-centered, focusing on how to achieve learning outcomes, improve the positive and active nature of student learning, and guide students to think independently for self-exploration, and improve the ability of independent innovation. Therefore, this course adopts blended teaching mode in the teaching process. Blended teaching can integrate online and offline teaching well, organic combination, complementary advantages, can make full use of the characteristics of digital and networked teaching, a useful supplement to the traditional teaching mode, and is conducive to enhancing the effectiveness of classroom teaching and students' learning enthusiasm.

"Principles of Database" blended teaching mode gives students more space to learn relevant development tools spontaneously, integrates the teaching content of related courses, and solves the problems existing in the teaching process of current database-related courses. The blended teaching mode, while fully realizing the personalized learning of students, makes them free from time and space constraints, and the variety of teaching forms is conducive to the organization and management of the teaching process, thus changing the teaching mode from teacher-centered to student-centered.

In addition, it can realize fragmented teaching, and teachers can make students participate at any time by refining the content of teaching videos, and online interaction is convenient, which greatly improves the efficiency of classroom teaching. Specifically, we divide the hybrid teaching mode implementation system of this course into three phases: before class, students' online group learning + teacher's Q&A; during class, project-driven + theoretical explanations; after class, flipped classroom + application practice.

Online pre-study for groups of students before class. Through online resources, such as micro-lesson videos, homework banks and test banks provided by StudyLink, students are helped to preview new knowledge in advance. After completing the pre-study, students can self-assess to understand the mastery of knowledge points, and can also utilize group learning to digest and solve small problems through mutual help and supervision among classmates, while difficult problems can be solved by seeking the teacher's answers in the subsequent lessons.

Project-driven instruction in the classroom. Project-driven teaching is a teaching method that utilizes constructivist learning theory to guide students to actively participate in the classroom. In the class, teachers and students in the pre-course study on the basis of focusing on the actual project to discuss and put forward specific solutions, which is conducive to solving practical problems while deepening the learning of theoretical knowledge. For example, the actual project of the student selection information management system was selected for the organization and promotion of teaching content, the project can provide strong support for the achievement of course teaching objectives. In the process of implementing the project case, students are guided to think independently and improve their practical operation ability through practical project operation.

After-class task-driven learning and extracurricular project practice. After class, the teacher assigns specific tasks to each learning group to stimulate students to take the initiative in collecting and organizing learning resources, encourages students to study independently under the classroom, and conducts seminars and learning in the classroom, which further brings into play the subjective initiative of students and stimulates their interest in learning. Through group independent learning in class, it improves independent inquiry ability, cultivates teamwork ability and enhances innovation and practice ability. In addition, students can freely choose to participate in various practical projects provided by the professional system outside the classroom, including competition projects, social projects, teachers' scientific researches and course cases; those with teachers' special guidance include competition guidance, entrepreneurship guidance, innovation guidance and scientific research guidance. After training in these programs, students' professional skills are greatly improved and their knowledge of the curriculum is also upgraded. After-school learning helps students to develop their ability to explore new knowledge alone and dare to forge ahead.

4.4. Reform of the Assessment Mechanism of the "Principles of Database" Course based on the Concept of OBE

The OBE concept emphasizes results-oriented learning output, and the verification of results should not be limited to a final examination. Under the guidance of this concept, the assessment method of "Principles of Database" course breaks the traditional "one-volume" assessment and establishes the assessment mechanism based on the learning platform. The new assessment mechanism includes: process assessment + project assessment + summative assessment. Among them, the process assessment reflects the performance of students in the learning process, mainly including platform unit tests, platform assignments, attendance, group discussions, video material learning hours, etc.; the project assessment is mainly to examine the practical ability of students, based on the writing of each experimental report and the acceptance of experiments, and the design of comprehensive experiments after the course is completed, so that students can independently carry out the development of small-scale information management systems. Summative assessment is mainly in the form of final examination paper to check students' mastery of the basic contents of the database.

The inclusion of process-oriented assessment in the assessment process can motivate students to change from passive acceptance of knowledge to active absorption of knowledge, improve students' self-learning ability, logical thinking ability, and really cultivate students' comprehensive ability and quality.

5. SUMMARY

Adopting OBE education concept in the teaching of database principle course can help deepen students' understanding of theoretical knowledge, exercise students' hands-on ability to flexibly apply theoretical knowledge to practice, fully explore students' personal potential, improve students' independent learning and innovation and practice ability, and enable students to become excellent talents of the new century with innovative consciousness and ability.

ACKNOWLEDGEMENTS

This paper is supported by the Undergraduate Teaching Research Project of Anhui University of Finance and Economics (Project number: acjyyb2022019) and the Research Project on Network Security and Informatization of Anhui University of Finance and Economics (Project number: acxxhyb2022005).

REFERENCES

[1] Wang Tianyou. Discussion on the teaching reform of the course Principles and Applications of Databases[J]. Education Teaching Forum, 2019, (46): 92-93.

[2] Guangna Bai. Research on OBE Engineering Talent Cultivation Mode in O2O Environment [D]. Harbin Institute of Technology, 2017.

[3] Wang Shichun. Research and Practice of Course Teaching under OBE Concept-Embedded Application Development as an Example [J]. Electronic Testing, 2019, (22): 123-124+120.

[4] Yao Kun,Song Yong. Project-based teaching reform and practice of living space design course based on outcome-oriented concept[J], Contemporary Educational Practice and Teaching Research, 2019, (23): 158-159.

[5] Cheng Linna,Xiao Meng,et al. Exploration of Talent Cultivation Mode of Applied Undergraduate Programs Based on OBE Concept--The Case of Railway Traffic Operation Management Major[J]. Education Modernization,2018, 5(53): 13-16.

[6] Li Zhiyi. Analyzing the outcome-oriented concept of engineering education professional certification[J]. China Higher Education, 2014(17): 7-10.

[7] Liu AH, Chen J. Research on seminar teaching of database course based on OBE concept[J]. Computer Education, 2018(9): 112-115.

[8] Wang Ya. Research and Practice on Teaching Reform of Database Principles and Applications Course Based on OBE Concept[J]. Research on Contemporary Educational Practice and Teaching,2020, (11): 179-180.

[9] Jiang Zongli. Cultivating Computer Science Students' Ability to Solve Complex Engineering Problems [M]. Beijing: Tsinghua University Press, 2018.

[10] Wang Xiaoyan, Zhang Zhongping, Chen Hemin. Exploration of database principle course teaching based on OBE education concept. China Education Informatization,2017, (17): 75-78.