

## Database Principles and Application Courses Oriented to Engineering Application Ability Exploration of Teaching Reform

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**Abstract:** The database principle and application course, as the core course of computer-related majors, is an important cornerstone for developing database application systems and improving engineering application capabilities. Actively carry out the construction of the curriculum framework based on key knowledge points, the optimization of the curriculum content chain, the driving of project case teaching, the implementation of mixed teaching, and the construction of diversified assessment system. Teaching reform and research are important for improving students' engineering application ability. It is of great significance to realize the shift from subject-oriented to industrial demand-oriented.

### 1. Introduction

With the continuous in-depth development of big data, cloud computing, and artificial intelligence, the society urgently needs database system development and application talents, and there are not many graduates working in database management and application system development positions. There is a supply and demand for talents between schools and enterprises. Contradiction. The reason for the inquiry is due to the students' lack of practical database system development experience and practical ability, and insufficient social adaptability and innovation ability. Therefore, "New Engineering" proposes that colleges and universities should update the existing curriculum system, teaching content, teaching methods and teaching methods according to the development trend of the industry<sup>[1]</sup>. How to enable students to deeply understand and master the basic principles and basic operations, fully mobilize the subjective initiative of students, enhance the awareness of project team collaboration, clarify the position and role of database principles and application courses in the computer professional curriculum chain, and train students to meet the needs of enterprises This is a question that teachers of independent colleges and universities database courses need to discuss together.

### 2. The Teaching Status and Existing Problems of Database Principles and Application Courses

In the traditional teaching mode, the course content is basically based on the basic theory of relational database, the standard language of relational database system SQL, database design, database programmable objects, database protection, which explain theoretical content, design experimental tasks, and the final assessment content is lacking Effective evaluation methods make it difficult for students to deeply understand and grasp the knowledge points. Practical classes are taught purely in accordance with verification and decentralized experiments, but there are few comprehensive experiments that can really train students' engineering abilities. This kind of teaching mode has caused the phenomenon that knowledge transfer and the result of training applied and engineering talents deviate from each other. In addition, there are often dislocations between the theoretical links in teaching and the practical links. When students are learning theoretical knowledge, they cannot really appreciate when these theories are available, where they should be used, and how to apply them. These problems make students' feedback on the course: abstract, boring, and difficult to understand, which directly lead to students' low interest in learning, poor learning effects, and fail to meet the requirements of modern enterprise jobs for professional

quality and vocational skills. In addition, the consistent emphasis on theory, neglect of practice, and test-oriented education makes the cultivated students rigid thinking, lack of individualization, independent learning ability and teamwork awareness, and insufficient social adaptability and innovation ability.

### **3. Research Ideas on the Teaching Reform of Database Principles and Application Courses**

#### **3.1 Reconstruct the Curriculum Framework with Key Knowledge Points as the Main Line**

In order to enable the teaching content to deeply integrate information technology and engineering education, improve the efficiency of engineering education, and improve the requirements of teaching effects, clarify the core goals of independent college students' learning database principles and application courses, that is, the basic principles of application databases and commercial DBMS And database application system development tools, design and develop database application systems facing various practical problems<sup>[2]</sup>. On the basis of carefully sorting out the original complicated theoretical system, adjust the teaching content, extract the key knowledge points that can improve the engineering application ability, and use the points to form a combination of theory and practice aimed at cultivating applied talents oriented to engineering practice Course content system.

After careful discussion and extraction of theoretical knowledge points for engineering applications, the course syllabus was re-formed, the database application system development cases were selected, and the course experiment syllabus was reconstructed. In the corresponding steps of the comprehensive case, mark the corresponding knowledge points that students need to master, so that students can clarify the practical significance of abstract theoretical knowledge in practice, and have an intuitive understanding of database principles in real scenarios, so that students can experience database development and application firsthand The basic process is to check for missing knowledge points, fully mobilize their subjective initiative, and lay a solid foundation for entering the database industry in the future.

#### **3.2 Break the Course Boundaries and Optimize the Course Content Chain**

The database principle and application course integrates relational database system theory, SQL language, relational database programming, relational database development, and engineering project practice<sup>[3]</sup>. It is closely related to the previous courses of C language and data structure, and subsequent courses such as JAVA and C#. At the same time, it is also a basic introductory course for database application development, big data analysis and application. If students are not proficient in the basic structure of program design, cannot apply flexibly to data types, and cannot select appropriate data organization methods and storage structures for data with different structures to organize and store data, then the two major problems that database technology must solve cannot be realized. Problem: Scientific and efficient access to data. At the same time, the course has a high degree of relevance to subsequent courses such as JAVA and C#. Students are not proficient in the creation and use of the two programmable objects of stored procedures and triggers, let alone in the context of engineering projects. The flexible application.

In order to better solve the problem of connection between database courses and previous and subsequent courses, strengthen the communication and contact between teachers related to the database chain, so that teachers can be targeted in the actual teaching process, and use key knowledge points and follow-up courses frequently. The high-level theoretical methods and technical means are focused on explaining, so that the contents of these four aspects form a closely linked integrated chain.

#### **3.3 Drive Training and Teaching Based on Project Cases to Improve Practical Skills in the Context of the Industry**

Abandon the original training content and only use the scattered knowledge point verification experimental teaching method, use the project-driven teaching method, select the design and

development of the student selection system that students are more familiar with as the main line of the project, and connect the scattered knowledge and skills with training. Redesign the experimental syllabus of the course. Carry out teaching, learning and doing closely around the project. According to the modular design principle, the professional knowledge learning modules are divided, and each knowledge module is used as a sub-project to complete the experimental task, and finally realize the implementation of the comprehensive project. To carry out inquiry-based teaching, students are required to analyze and design the results in a group and collaborative manner according to the experimental topics assigned by the teacher. An assessment system that combines process evaluation and summative evaluation is used to make a more objective and fair evaluation result for each student.

### **3.4 Use Online and Offline Hybrid Teaching Methods to Form a Learning Community and Stimulate Students' Independent Learning Ability**

With the help of the micro-class teaching method and the flipped classroom teaching method, the teaching mode of “knowledge guidance-student self-study-string lecture summary” is established to form a learning community of “teacher as the leading, student as the main body”, and to stimulate the motivation of students to learn actively. The hybrid teaching mode presents high-quality online course resources on the teaching platform through the intelligent teaching tools of Internet technology. Before class, students learn the teaching videos through the platform, and complete the tasks of the teacher before class designing relevant knowledge points based on the video as exercises; The teacher solves the key and difficult knowledge and examines the students' learning effect through discussion and inspection of the completion of the exercises, so that the classroom teaching can be more targeted, can be targeted, and thus improve the classroom efficiency; online discussion after class , Arranging online homework, online tutoring and answering questions and other links to consolidate the knowledge points; through arranging computer training to cultivate students' project practice ability, independent thinking ability and innovation ability.

The use of the mixed teaching model of the flipped classroom has promoted teachers' redesign of the teaching structure, teaching content and teaching process of database principles and application courses, and gradually transitioned from the traditional teacher-oriented full-class teaching to student-oriented self-study before class. The combination of in-class and out-of-class learning modes that emphasize key points and two-way feedback after class can effectively improve students' learning enthusiasm and initiative, and also improve students' ability to think about and solve problems independently. At the same time, it also solves the contradiction between the large content of the course and the lack of learning hours, thereby improving the teaching quality and teaching effect of the course.

### **3.5 Construct a Diversified Assessment System, Highlight Independent Learning and Practical Skills, and Reflect the True Level of Students**

Constructing a comprehensive evaluation system that can reflect the results of teachers' labor, reflect the actual learning effects of students, and promote curriculum development is a booster to promote curriculum education and teaching reform<sup>[4]</sup>. Affected by the new crown epidemic in the second semester of the 2019-2020 school year, the course has implemented online live teaching. After more than three months of preliminary teaching, we found that the core concept of this new teaching model based on the Internet platform is to organically combine traditional face-to-face teaching and online learning, and redefine the interdependence between teaching and learning<sup>[5]</sup>.

Under this teaching model, the course assessment is divided into three stages for implementation before class, during class, and after class. The specific implementation content is shown in Table 1. Comprehensive evaluation of students' online and offline, practical training, homework, interaction, project training skills and final grades, forming a comprehensive consideration of students' learning attitude, knowledge ability, and innovation ability.

Table 1 Three-Stage Assessment and Evaluation

stage	Evaluation form	comment content
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Pre-class evaluation	SPOC teaching platform	Single task Preview test
In-class evaluation	Classroom performance SPOC platform as a supplement	Teacher-student interaction Interaction between students and students Practice
After-class evaluation	On-site assessment SPOC platform based	Online assessment On-site assessment After class development

#### 4. Conclusion

The database principle and application course is a comprehensive professional course integrating relational database system theory, SQL language, relational database programming, relational database development, and engineering project practice. The setting of the course content needs to highlight practicality. Through data analysis of student performance in the teaching cycle of the 2019-2020 academic year, the knowledge points and key difficulties for engineering applications are refined, and more accurate course syllabus and experimental syllabus integrated into project-guided teaching are compiled, and learning is fully followed. Students' cognitive laws and practical skills are formed to form a curriculum project-based teaching system; reform the traditional teacher-centered, indoctrinating teaching model, and adopt a combined online and offline hybrid learning model to improve students' subjective initiative; With the help of project-guided teaching, the team completes the actual combat exercises in groups to improve the students' teamwork ability; builds a diversified assessment system, and actively guides students to change passivity, dependence to independence, enthusiasm, and creativity. Improve students' engineering application ability and realize the shift from subject-oriented to industrial demand-oriented.

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