Study on the Iterative Teaching Method in Database Curriculum

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***Abstract*—In the multimedia teaching environment, there are several new characteristics in the database curriculum, such as more contents, faster speed, higher difficulty and so on. In order to strengthen the curriculum quality, improve the learning effect, a new teaching method is proposed, which takes the cases as the basis. The basic practical operations, such as confirmatory experiments, are used to establish the students' perceptual cognition to the database. Then the theoretical framework of database is introduced to students to improve their rational cognition. Finally, students should Solve real complex database problems by the knowledge they learned. Compared with the traditional teaching method, students' enthusiasm and interest can be aroused through the iterations of "cognition, theory and realization", the students' innovative ability can be brought into play, and the feedback from students is better. Therefore, this iterative teaching method not only trains students' practical design abilities, but also strengthens students' theoretical cognition, and obviously improves the teaching effect.**

Keywords- database; iterative; case study; teaching method

I. INTRODUCTION

Database has become the basis of information resources development and utilization in the information society, and it is an important part of information system. As one of the most widely used technology in computer field, database technology accounts for more than 70% of computer applications. Therefore, mastering the knowledge of database theory and using database technology skillfully has become a compulsory skill for students majoring in computer science and information field. The Ministry of Education has already listed the database curriculum as one of the core curriculums of computer science and technology major in colleges and universities.

There are much more and scattered contents in database curriculum. The related theory is abstract, and needs to be combined with practice, so it is a difficult curriculum to be taught and to be learnt. If the teacher only followed the textbook in the teaching process, students would neither have Intuitive perception, nor would they grasp the main points of the theory, but they would find it difficult to deeply understand and master some important knowledge of the principle. Gradually they lost interest in this curriculum. In the experiment teaching process, if there were only simple experiment of SQL language query, without the combination of actual items, we could not arouse the enthusiasm of students, exercise their practical abilities and subjective initiative, and students could not realize how to apply database in computer system and understand the importance of databases. Therefore, in the database curriculum, it is necessary for every teaching worker to explore effective teaching methods and make students' theoretical knowledge perfect and practical ability too strong.

II. CURRENT SITUATION OF DATABASE CURRICULUM

At present, in most curriculums, including the database curriculum, teachers still take traditional teaching methods. They teach knowledge initiatively, and students accept knowledge passively. For a long time, the shortcoming of this teaching method is constantly exposed, and the effect of teaching is not strong, mainly manifested as follows:

A. Weak Enthusiasm and Self-study Ability

For many years of infusion teaching, students have been used to passive learning. After entering university, most students become absent-minded. Their abilities of self-control are poor. The temptation of various external factors leads to the decline of learning enthusiasm. Students' self-learning abilities are still in a lower level or have just begun to form. But database is a curriculum with a lot of theoretical knowledge which is difficult to understand and requires students to understand and imagine carefully and patiently. Many students can't persist in self-study and understanding in classroom, gradually they lost interest in the database curriculum.

B. Single Teaching Method

At present, the main teaching method of database curriculum is teaching with PowerPoint and listening in the class. In this kind of teaching mode, the teachers put in the PowerPoint all contents of the curriculums, which are explained step by step on the slides, even without writing on the blackboard. This single method leads to a lot of problems. For example, the teaching speed gets faster, and the students need to react quickly. Listening efficiency is relatively low. Long time for intensive concentration and rapid response are easy to make students tired, unable to adhere to the entire curriculum.

C. Limited to the Sequence of the Textbook

In the actual teaching process, most teachers still follow the traditional teaching mode, prepare the teaching content as theoretical teaching firstly and experiments secondly

2474-3828/18/$31.00 ©2018 IEEE
DOI 10.1109/ITME.2018.00141

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according to the sequence of the chapters in the textbook. In the theoretical teaching, the introduction of database system is introduced first, then the relational data model and its operation, the use of SQL language and query optimization, and the transaction management are explained. Finally, the database design and database programming, new technology are introduced. The SQL language and other experiments are scheduled only in the second half of the curriculum. Although the students have mastered the basic knowledge of the database, the complete system structure and design concept are difficult to be formed and easy to be forgotten. What students really get is the simple use of SQL language, which is contrary to the original intention of talent development.

D. Difficult to Teach Theory

Before learning database curriculum, students basically know nothing about databases, have no idea to use database management systems, and can't understand the theoretical knowledge. All the concepts can only be memorized by rote memorization. The foundation is not firm, which results in the wrong impression that the database is very difficult to learn. From the beginning of the curriculum, the students' enthusiasm for learning is discouraged. But the later experiment design and even the theory development, need to master the good foundation, otherwise it is difficult for students to complete the task by themselves, resulting in that dozens of students only supply several versions of database design.

E. Simple Experiment Arrangement

There are generally some verification experiments and some design experiments, sometimes some innovative experiments in an experiment curriculum. In these validation experiments, the experimental data are based on relatively simple databases related to students' study and life, such as "curriculum selection database", "library management database" and so on. These databases can not cover all the knowledge points of the curriculum, make students practise database design, management in all aspects of the main technology, hindering the improvement and expansion of students' practical abilities. So other database cases are needed to cover the experimental content, resulting in that the experimental process is relatively independent and incoherent.

III. Exploration of Case Iterative Teaching Method

In the traditional teaching method, teachers are always the leaders, they determine the teaching material in sequence; students are always to be led. This teaching method obliterates students' initiative and enthusiasm, and violates the teaching original intention. The case iterative teaching method starts from the objective law of recognizing things, relies on cases, integrates various teaching methods, iterates continuously, attaches importance to stimulating students' active cognition, actively summing up, actively applying and innovating, so as to truly be student-centered, to achieve the goal of teaching. Through the practice and exploration of iterative teaching, we divide the teaching process into three iterations:

A. Iteration 1 -- Verification Experiments

Nowadays college students are familiar with the general operations of computers. They can know the operations of a particular software by analogying with other known softwares, and they like using computers to complete all kinds of work. In addition, they have already learned a programming language, so we can arrange some experimental curriculums in the early stage of the curriculum, and ask students to complete some basic operations of the database. But the content should not be too complicated and difficult to understand. For example, the installation and structure introduction of database management system software SQL server express 2014 is based on a simple database case, such as curriculum selection database, to complete the definitions of database, student table, curriculum table and selection table, and data input, simple data query, update and other basic operations. Students can follow the teacher's operating video step by step to complete the operations, write down their doubts. The purpose of this stage is to enable students to have a concrete and intuitive understanding of the database and its role, to cultivate students' interest in the database and their desire to grasp database technology in depth.

B. Iteration 2 -- Theory Teaching

After the students know the database perceptually, we can help students consummate the knowledge structures of the students' database theory, so that students can have a deeper and more accurate understanding of the database and its technology. This stage mainly explains the development of database technology, architecture, data model and its operations, standardized design, transaction management and other theoretical knowledge. Verification experiments enable students to know what a database is and how to use it, no longer abstractly. Teachers can closely combine learning results of the first stage with the theoretical content of this stage. In class, students have a more specific, in-depth and perfect cognition to the database. They can listen with questions to the knowledge which cannot be understood in the first stage, and further check the missing problems and get the answers. Practice has proved that the teaching in this stage is no longer difficult and the learning is no longer difficult, too. Teachers can teach the theory according to the concrete database management system software used in the experiment, and students don't think it illusory and can understand the theoretical knowledge according to the practical experience.

C. Iteration 3 -- Comprehensive Experiments

On the basis of two iterations above, the third iteration solves the practical database design problem by synthetically applying the knowledge learned. This stage is based on more complex cases and cover all the major knowledge points as possible. For example, in the actual teaching process, we select the needs of weapons and equipment management according to the actual situation of the students. Students are

required to design and implement weapons and equipment management systems. Following the standard database system design process, the system requirement analysis, conceptual structure design, logical structure design, physical structure design, implementation and maintenance are completed step by step, and the whole processes of database are realized. Through the comprehensive experiment, it is hoped that the students are able to do their own work, apply their study to practically use, play the initiative, cooperation and innovation spirit, and grasp the database technology while consolidating the theory, and achieve the curriculum goal.

Three times of iterative teaching are from simple to deep, from easy to difficult. Content coverages from small to large, gradually completes all teaching and explanation. From the intuitionistic and visible practical operation to the deep summary of the theory and then to the practical application, the students can learn the theory on the basis of some understanding of the database, get better results.

IV. THE EFFECT OF TEACHING METHOD REFORM

After a semester of teaching method reform and implementation of the test, the case iterative teaching method has achieved greater success.

A. Improve Students' Interest and Enthusiasm in Learning

In the first iteration of the experiment, students can understand how the database exists, how to use the database. The simple and easy-to-use experiment leads students to have the desire of cognition to the database gradually, and attracts them to continue the initiative of further study, and keeps the students from the boring theory knowledge and producing the resistance emotion. After completing the first iteration, many students can't wait to learn SQL language in advance, eager to realize all kinds of data operation results that they need. Some students are also interested in the security of a large number of data in the database, wondering how to attack and defend the security of the data, and how to ensure the security of data.

B. Get the Theoretical Explanation More Specific and Closer to Practice

Teachers can explain the theory with the case in the first stage, so that the abstract concepts can be introduced more concretely, and the understanding of the theory can be greatly improved. While helping teachers to reduce the difficulty of teaching, it also reduces the difficulty of students' learning and thinking. The structure and operation of the database learned by students through similar practice can also be easily grasped firmly to prevent the phenomenon of disconnection between theory and practice. Even some students can explain the concept and give examples on their own initiative.

C. Develop Students' Abilities of Design and Innovation

In the past, many students felt that they could not do anything about the database design. They did not know how to design, but they could only learn from others' plans. This was because they had no theoretical knowledge to guide them and were not familiar with the operation of software. Through the foundation in the first two stages, with some practical experience and theoretical knowledge, more students understand the design method of the database and the operation method of the database management system. They also have certain confidence to themselves, and supply more versions of database design plans. Students' innovation abilities are stronger, and have their own opinions on the realization of the database.

V. CONCLUSION

Database technology is an important support for data management in various industries. To learn database curriculum well is important for students majoring in computer related fields, and it is the duty of every database teacher to teach database curriculum well. In order to train qualified talents with solid theory and strong practical ability, we explore the iterative teaching method of "cognition-theory-realization" in database curriculum according to the problems and demands in the process of practical teaching. To make students' database foundation strong.

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