

Discussion on Teaching Methods of Combining Theory and Practice

Fangfang Li*

School of Computer Science and Techenology, Northeastern University, Shenyang City, China

**Corresponding author*

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Abstract: This paper studies the characteristics and teaching difficulties of the combination of theory and practice courses, and discusses the teaching methods of this kind of courses, including interactive teaching and outcome-based education, according to the experience gained in the teaching process of database system practice courses, and gives the comparison of students' learning efficiency. It provides ideas and references for related teaching.

1. Introduction

In college, many computer major courses combine theory and practice, such as some development languages or system-level software, database is such a typical course. In the past teaching, the theoretical courses of this kind of courses were separated from the practical courses. The theoretical courses were taught by the teachers in the classroom in the form of projection of lesson plans and writing on the blackboard. The experimental course is guided by the experimental teacher, and the experimental results are verified by the students according to the experimental content prepared in advance. Students cannot fully understand and feel the content of the theoretical teaching, and the problems encountered in the experimental class can not be immediately corresponding to the knowledge learned in the theoretical class. Interactive teaching is a good way to enlight the students [1-2], and outcomne-based education also is a sussesful method to improve students' ability [3-5]. Therefore, the characteristics of these courses are summarized in the teaching process, and the relevant teaching methods are put forward, which have achieved good results.

2. Course Features

2.1. Interactive Teaching -- Parallel Theory Course and Practice Course

The important feature of this kind of course is that students should not only learn basic theories but also understand them through experiments. Therefore, in the teaching process, I synchronized the theoretical class and the practical class. Students in class carried notebooks in groups. I conducted the operation demonstration and explained the results and phenomena in various

experiments with theories. That is to say, students can take theory classes in the laboratory, while learning the theory, at the same time through experiments to verify the theory, improve the interaction between teachers and students, so as to grasp the key points of knowledge as soon as possible and improve practical ability.

2.2. Outcome-based - University-Enterprise Joint Teaching

In the process of job hunting, enterprises generally require students to have certain practical ability and independent operation ability. In the past, teachers paid more attention to students' mastery of theoretical knowledge. However, with the increase of employment pressure, students are in urgent need of theoretical and practical abilities and skills reserve. Through the on-site teaching and guidance of experienced engineers, students can answer all kinds of problems encountered in practical operation in time. Through participating in real projects, students can gain experience, improve their hands-on ability, and have a preliminary understanding of the basic skills and career knowledge to become a professional.

2.3. Student Evaluation - Increase DBA Capability

Database technology is an important technical ability in the computer profession, which plays an important role in the enterprise and actual development. DBA (database administrator), who specializes in database development, plays an indispensable role in the software enterprise, and has a good job prospect. In the teaching process of this course, based on the practical experience, the ability of DBA is introduced, and the students are trained to have the preliminary skills of DBA in the experiment and team design. Train students to pay more attention to the practical ability, whether they can become professionals to assess the students. In conjunction with the engineering certification standards, our curriculum focuses on the following aspects to support graduation indicators:

2.3.1. Engineering Knowledge

Understand and master the basic computer knowledge, and have the ability to analyze and design software and hardware for engineering problems. This course enables students to master the basic principles of Oracle, have the engineering knowledge required for the work in the field of computer science, and have the ability to use the knowledge to design Oracle database system.

2.3.2. Design/Development Solutions

The students can use the programming language and development tools to develop and realize the software system to meet the production needs, and can analyze the adaptability of the system, existing problems and corresponding optimization measures. This course requires students to have the ability of SQL*Plus programming, oracle management and performance optimization, so that students can master the engineering knowledge of database system development, and the ability of system performance tuning.

2.3.3. Use Modern Tools

The students master software system development and debugging tools, modern information processing technology and tools, and understand their limitations and application situations, and can choose appropriate tools according to the application scenario. This course requires students to choose the appropriate database software according to the actual application requirements, and

design the database part of the system.

3. Interactive Teaching

Interactive teaching is important, which has been approved by some work [6-8]. In the teaching process, we also adopted more interactive modes, which can arouse students' interest when they feel tired and promote the teaching. The main methods in interactive teaching include the following.

3.1. The Basic Consensus

Before the class begins, agree with the students on some principles of the class, but these principles are not defined in terms of "don't" and "don't let", but are translated into more acceptable sentences such as "can" and "let". The consensus is mutual, the teacher puts forward some requirements to the students, the students can also put forward the requirements of the teacher, and then before starting the class, the teacher is clear about the expectations of the students for themselves, and after reaching the basic consensus, the teacher must first abide by the consensus. Mutual respect between teachers and students leads to freer communication and higher efficiency in the learning process.

3.2. Interactive Teaching Activities

Interactive teaching activities can be very rich, which can enrich the learning atmosphere in our class and make the activities in class not monotonous.

3.2.1. Enrich the Types of Learning Interactions

In the past, when we refer to classroom interaction, the first thing that comes to mind is the interaction between teachers and students, and the form is mostly question-answering. However, in fact, learning interaction also includes student-student interaction and student-content interaction. For example, among the above ten interaction forms, student-student interaction forms include: asking students to be teachers to teach part of the content, debate, student evaluation, and student-content interaction includes: quizzes, class worksheets, etc. These interactive forms are a rich supplement. In the teaching process, students can change from passive to active, have a stronger sense of participation, and think that they are the leader of the course, which is conducive to improving learning efficiency.

3.2.2. Activating Classrooms

The teaching philosophy of our course is "thinking", "task-oriented", "teamwork" and "beyond", which seems to be a short four words, but expresses the process of sublimating from the basic teaching thinking method to the challenging concept. Thinking is the first step, the interactive course of primary purpose is to let students to think, think about the knowledge of firmer, way of thinking is the process of cultivating ability, guide students to think, guides the student to answer questions, need to change the wording to let the students easy to accept, the sense again at the same time, change the stiffness in the form of asking questions, to avoid a person to answer the question, Other people do not think together, the question into the form of choice, by standing in line, raise left and right hands and other forms to avoid the embarrassment of students typing wrong questions. When the students are not enthusiastic and apathetic, give some hints and give more time to think. Task as this is can't afford to put teachers in a leading role in the position, but by the tasks as the core, can be in group, writing to complete a given task, enhance the students' engagement and the

team cooperation ability, this way can let students through sufficient communication, consensus of the debate, in the process, the understanding of knowledge, mutual complement each other, Gain recognition from others. Transcendence needs to integrate various abilities of students, transform theoretical knowledge into practical ability, and sublimate theory. Moreover, the ultimate goal of all learning is to go beyond. The knowledge learned in class is always the basis, and the application in practice is the ultimate goal.

3.2.3. Seating Method

In the past, teachers stood on the platform and students sat in rows in our classroom. In fact, we can have more choices, such as sitting in groups, sitting in pairs, sitting in horseshoe shape, etc. In the classroom, the seating is not so flexible, but we can still use group seating, which can meet the needs of group learning. Enhance the strength of communication, while meeting the needs of classroom interaction.

4. Outcome-Based Teaching Method

The essence of output-based Education is to first clearly establish that what students can achieve is important, and then organize the curriculum, instruction, and evaluation so as to ensure the desired learning outcomes [9-10]. What impressed me most in this course were two golden rules: "Reverse" design and "course", the meaning of "reverse" from expect students to "final" learning outcomes, has established "support" teaching and learning outcomes as well as the design course, the so-called "course" means if the course content to achieve a "final" learning outcome or "support" learning achievement is really important, it must be retained in the course, But if some course content is only marginally related to learning outcomes, they may need to be removed.

4.1. Outcome-Driven Idea

We divide the learning outcomes into three levels, the first level is the learning outcomes of the university - professional talents with holistic quality, the second level is the learning outcomes of undergraduate majors - learning outcomes of all majors and courses, and the third level refers to the learning outcomes of courses.

Learning outcomes mountain, is a learning process compared to a mountain, from the bottom to the top of the hill, in turn, is the specific knowledge and technology - high - ability to fulfill the role of general ability, basic course for learning ultimate goal is to train the ability of various aspects, we need to transform based on the content of teaching for the achievement of the teaching, From the demands of what students do to the demands of what students can do. However, competence does not come from nothing. You need to start with what you can do, master the basic knowledge and then improve your skills. In our discussion in class, there was an example about whether the teacher should give a teaching demonstration and then supervise the students to implement it well, or the teacher should give a demonstration and then the students should evaluate the quality standards and then the students should implement it. Some teachers think that the first one is better, but it is obviously content-oriented teaching. In my opinion, according to the outcome orientation, students should be allowed to understand the meaning of the theory by themselves, understand the guiding significance of the theory in the operation, and complete an inquiry-based learning, which is helpful to improve students' ability.

4.2. Outcome-Driven Assessment of Student Learning

In the past, we used to evaluate students' learning outcomes through simple test papers. In fact,

we can use methods such as laboratory reports, oral reports, group study projects, internship site evaluation, critical incident records, journal reflection writing, essays, study contracts, self-evaluation, and peer evaluation. Evaluation competencies should use "real tasks", adopt or replicate messy, ambiguous real life problems, require the use of integrated skills, develop yes, explore yes, there is no single right answer. Students need to judge problems and use knowledge and skills creatively to complete them. Another very test means of the novel is even resist, on a topic, each team can have three chances, if choose the right answer score for the first time, the second, and some points, the third can score a point, the last time answer don't score, so that we can let the student fully communication, express their views, each other in this paper, the point of view, It is also possible to encourage some students with poor grades to participate in the study.

5. Evaluation

In the teaching process, the above methods are used to increase the participation of students in the whole process. In the assessment process, in addition to the theory test, we also have group practice assessment. Students prepare their own questions and cooperate by themselves, and defend them all during the assessment. Other group members ask questions and give their scores. After the group gets the total score, the group members internally calculate the single score according to each person's contribution. This assessment method greatly improves the students' interest in learning and participation, understands the theory more thoroughly, and improves the performance greatly. This is the analysis of the achievement degree of students' indicators in the engineering certification in recent three years, indicating that students' professional ability has been recognized through the study of this course, shown in Table 1.

Table 1: Graduation requirements index and achieved degree

Achieved degree	Graduation Requirements Index								
	2019			2020			2021		
	Index 1	Index 2	Index 3	Index 1	Index 2	Index 3	Index 1	Index 2	Index 3
Theory part	22%	11%	5%	23%	11%	6%	24%	11%	6%
Operation part	6%	28%	18%	6%	30%	19%	7%	32%	19%
Sum	28%	39%	23%	39%	41%	25%	31%	43%	25%
Total	90%			95%			99%		

6. Conclusions

This paper analyzes the characteristics of the course, puts forward the teaching methods and practical experience, and gives the results. It proves that the above teaching methods can indeed improve students' learning efficiency and practical ability.

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