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Application of Teaching Method based on Problem Learning in Introduction to Urban Water Engineering

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Abstract: This article uses the Problem—Based Learning method to reform the teaching process of introduction course. First of all, this paper introduces the meaning and specific content of the problem-based learning method, this paper analyzes the problems existing in the practical teaching process of the course named introduction to urban water engineering, for these problems, the problem-based learning method is adopted to improve teaching method, and good teaching effect is obtained in practice.

Keywords: Problem—based learning; Introduction to course; Teaching method component

1. Introduction

Introduction to urban water engineering is a professional course and an introduction to other professional courses. It plays the role of introduction course in the setting of professional courses. Generally, it is arranged before all professional courses to build a professional framework and stimulate students' interest. The teaching of the introduction course is also an extremely test of the teachers' level. The shallow teaching will easily lead to unclear knowledge points and difficult for students to accept, thus making students lose their desire to learn. In-depth analysis may cause too much repetition of the content of specialized courses and waste of valuable classroom time. Introduction to urban water engineering is an introduction course of engineering, featuring strong comprehensiveness, wide contents and complex knowledge points [1-2]. In view of such courses, traditional teaching methods are basically taught by teachers and listened by students, with many problems such as poor innovation of teaching contents and poor acceptance of students. In the research of teaching methods, it is found that problem - based learning can solve the above problems.

The model of Problem—Based Learning (PBL) embodies the educational concept of constructivism. Constructivist learning theory divides students' learning into two parts: primary knowledge learning and advanced knowledge learning. The primary knowledge learning is mainly through acceptance, understanding and memory. Elementary knowledge learning content by tight logic, such as facts, concepts, principles, clear structure of the knowledge of this part of knowledge abstraction, one-sided and isolated, it is hard to will only primary knowledge of learning knowledge flexible application in solving practical problems, and the advanced knowledge and complementary to the primary knowledge learning, it lacks the strict logical and clear structure, in different actual cases have reflected, the knowledge of complex, often is to pass a lot of practical experience in problem solving and case analysis. Problem - based learning is based on the combination of advanced knowledge learning and primary knowledge learning. Knowledge is acquired through analyzing and solving problems, and then applied to solving practical problems [3-6].

By adopting the teaching method based on problem learning, this course is innovated and reformed in the teaching process, and good teaching results are obtained.

2. Teaching Status of Introduction to Urban Water Engineering

Introduction to urban water engineering is a comprehensive professional course of water supply and drainage science and engineering major. It is an enlightening course of water supply and drainage science and engineering major students' professional courses. It is equivalent to an introduction course of major courses. The main teaching tasks of this course include two aspects: first, make students understand the relationship between water engineering science and water industry, establish the knowledge system of this major, and lay a foundation for the study of the specialized courses; second, arouse students' interest in this major.

This course mainly focuses on the relationship between urban water engineering and water industry, water resources protection and utilization, water supply and drainage network system, water quality engineering, building water supply and drainage engineering, water process equipment and water process monitoring and control, water engineering construction and economy, urban water engineering and other related disciplines.

Through this course, students can have a general understanding of the severe situation of China's water crisis, so

as to enhance the sense of crisis and mission; Enable students to have a general understanding of the main content and broad development prospects of the discipline, so as to enhance the purpose of learning and the determination to devote themselves to the discipline; Make students have a macro understanding of the basic theories, related disciplines, modern science and technology, high and new technology and other rich science and technology content, so as to improve their interest in learning and enhance their confidence in learning.

Through teaching practice and investigation, it is found that there are some problems in the teaching process of introduction to urban water engineering, mainly including the following aspects.

2.1. Obsolete content and single method of teaching

The science and engineering major of water supply and drainage has a long history. It has a prototype since the early days of the People's Republic of China. In the 1990s, the building water supply and drainage committee was established. The major with a long history has the advantages of comprehensive and systematic curriculum setting and rich teaching methods and contents, but there is also the problem of obsolete teaching contents in curriculum setting. As a professional introduction course of water supply and drainage science and engineering, introduction to urban water engineering has such problems and the content is out of date. In municipal engineering, water treatment technology, building water supply and drainage engineering, sewage treatment and other fields, new technology updates faster, new technology emerge in endlessly, from writing teaching materials used by students to experience a long time, change in the content knowledge can't keep up with technology, and on the teachers' limited, preparation of energy is limited, it's hard to do the new technology and new technology bring a lot of class.

In addition, in terms of teaching method and traditional teaching methods with the method of teaching, basic use of blackboard writing teaching with multimedia teaching, it is easy to cause daunted or cramming the phenomenon of students in the whole teaching process is in a state of passive accept, lack the power to transfer the subjective initiative, easy to let the students in the learning process to produce tired of mentality, and this will work with the city water project introduction to the teaching goal, cultivating students' interest in professional values.

2.2. Without objectives of students' learning

In the actual teaching process, because the student before the start of the course of course knew little, easy to appear the situation of the learning goals are not clear, the course content is more than half, also don't know the purpose of this course teaching and content, in the whole learning process, belong to the passive to accept knowledge, lack of themselves to explore the enthusiasm of learning.

2.3. Knowledge derailed from practice

Survey of urban water project is the premise of water supply and drainage science and engineering courses, engineering specialized courses should be combined with practical engineering, the combination of theoretical knowledge and practical, but in the actual teaching process, most of the content of the class is focused on the theoretical knowledge, and the actual engineering application derailment, cultivated talents have theoretical knowledge, and the lack of practical ability to solve problems.

3. Reform of Teaching Methods

Based on the above problems in the teaching process, the author continues to explore in the teaching process and finds that problem based learning method can solve the problems of this course. The problem-based learning method is mainly divided into four steps: first, set up the problem. In the teaching process, teachers divide students into groups and raise a practical problem. Second, solve problems. In order to solve the problems raised, students need to learn relevant professional knowledge, search relevant materials separately, enrich knowledge in the process of mutual communication, and promote the solution of problems in the process of discussion. Third, find new problems. During the discussion, the group will draw up new problems. The emergence of new problems needs to repeat the work of the second step. fourth, reflection and evaluation. After the first few steps of reflection and learning, students will conduct self-reflection and self-evaluation on the solution of the problem, and summarize the new knowledge and thinking skills acquired in the whole process.

This teaching mode is not only because its theoretical foundation constructivism learning theory is a new ideological trend of educational theory, but more importantly, it can indeed help students to lay a flexible knowledge foundation, develop practical problem solving, critical thinking and creative thinking ability, and develop cooperative ability and independent learning ability.

3.1. Optimization of the teaching system

Based on the existing problems in the teaching process, the teaching process of the course "introduction to urban water engineering" is adjusted, and an attempt is made to develop teaching activities based on problem learning. The teaching objects are freshmen majoring in water supply and drainage science and engineering. The course has a total of 36 class hours. Before that, the teaching class basically adopted the traditional teaching method. Compared with the traditional teaching method, the teaching arrangement of the course has been improved

and adjusted in three aspects. First, in the important chapters of the course, on the basis of teaching theoretical knowledge, questions are set for discussion, so that students can study by themselves with questions, and collect data in groups to share and communicate. Secondly, the debate competition is arranged in the middle of the course, which is guided by the issues debated and allows students to learn. In the process of debate, students can constantly find and solve problems and form new understandings. Third, after the end of the new course, I will arrange a visit to the actual project to study, solve problems with questions in the actual project, and find problems in the visit and practice to solve problems, put the book knowledge into the actual production and application, and stimulate students' interest in the future study.

3.1.1. Group discussion

Three problems are arranged in the course teaching tasks: the problems faced by the development and utilization of water resources in China; Water treatment technology adopted in China at the present stage; How to solve the problem of building water saving. Students are divided into groups. They search information separately around the theme in groups. After collecting the information, they discuss and study. The arrangement of course content of this part, first of all, exercise the students' ability of finding out information, and second, after the data collection of learning, the discussion group can enrich the knowledge of the team members, students' ability of analysis problem solving also improved, in addition, the team achievements summary to share, can improve students' ability of expression.

3.1.2. Conduct debate contests

In this course, a debate topic was found from a knowledge point of water resource protection in chapter 2, and a debate contest was held in the middle of the course task. In the preparation process, students constantly found problems, solved problems, and formed opinions and arguments of one side. The title of the debate is "water resources protection, urgent". Students are divided into three groups, one pro and one con, and the remaining group is the jury. This topic seems to be the positive side wins, but when students inquire abundant information, they find a strong point of resistance in the negative side. The role of this debate competition not only adjusts the intense learning atmosphere, but also enables students to learn professional knowledge and exercise critical thinking ability, which can be said to have achieved very good results.

3.1.3. Internship

At the end of the course, I arranged an internship and led the students to study in the production line. Students go to practice with questions left in daily study, looking for answers in practical projects, and finding problems in the process of visiting. The whole practice is based on problem-oriented, which enables students to quickly master knowledge in practical applications. Four points are arranged for the internship, all of which are difficult to understand in teaching with book knowledge. The on-site teaching enables students to quickly remember the abstract knowledge in the book, and return the whole learning to the final production line of the enterprise. The internship also allows students to visit with problems and solve problems in practice.

3.2. Optimization of teaching evaluation system

In order to adapt to the application of problem-based learning method, this course resets the teaching evaluation system, which consists of three parts: the final theoretical assessment, the daily practice assessment, and attendance performance. The final theoretical assessment is based on the examination outline, and the teacher sets the questions according to the requirements of the outline, which mainly examines the students' mastery of theoretical knowledge. The daily practice assessment is mainly divided into three parts. The first part is the response to questions in class at ordinary times, the second part is the explanation of the group content, and the third part is the homework at ordinary times. The group will be graded according to the percentage system, accounting for 40% of the daily practice assessment. There are six times of daily homework, and the score is given according to the percentage system. The average value is the daily homework score, accounting for 60% of the daily practice assessment. Questions answered in class are divided into three grades according to the performance of the answers, in order of 5, 3, 2 points. The results calculated from the previous two items plus the performance of the answers in class are divided into the final daily practice assessment points (over 100 points are counted as 100 points). Attendance is graded on the basis of student attendance.

4. The Summary and Teaching Effect

The teaching of "introduction to urban water engineering" is carried out in a way based on problem learning, which has achieved good results. It enables students to learn from problems, find problems in learning, and return to the reality to apply what they have learned to the reality and teaching practice. According to statistics, after applying the teaching plan, the awards of the class of water supply and drainage science and engineering in 2016 were obviously better than that of the class of the previous class that did not adopt the new teaching plan. In addition, through interviews with other science teachers, it is found that the language expression ability, thinking ability and other aspects of the quality of students in this class have been improved compared with other classes.

Through practice, it is proved that this teaching reform is feasible for engineering teaching. In the future teaching process, we should boldly try this method, return the classroom to students, and change the current situation of mainly teaching, binding students' thinking and suppressing students' innovation. In the process of practice, we should pay more attention to the teaching results and further improve the teaching plan.

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