Thinking and Suggestions on Teaching Problems of "Fluid Mechanics" in Petroleum Engineering

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Abstract

This article analyzes the subjective and objective problems in the teaching of fluid mechanics for petroleum engineering majors, and believes that individual differences among students, the abstraction of teaching content, the single teaching mode, and the over-reliance on multimedia teaching have become the main obstacles affecting the development of the course teaching. Finally, the article puts forward solutions such as improving teaching, increasing students' interest in learning, emphasizing practical teaching, and enhancing students' sense of innovation.

Keywords

Petroleum engineering; Fluid mechanics; Teaching reform.

1. Introduction

In the teaching of the course "Fluid Mechanics" for petroleum engineering majors, students often hear such comments-"This course is difficult to learn". The author believes that it is difficult to learn for the following two reasons.

(1) In recent years, my country's colleges and universities have rapidly expanded their enrollment, and college students are everywhere. The backlog of graduates and the unemployment of highly educated people have also become serious social problems. The rising threshold of the job market has forced college students to "shift down" their employment choices, and the glory of the former "favorites" of college students has faded.

With the transformation of higher education from "elite education" to "national education" [1], the expansion of the enrollment of petroleum engineering majors and the unbalanced development of basic education in various regions have caused the continuous expansion of individual differences among students. High demands. This is mainly due to the fact that the "step-by-step" teaching model implemented by traditional education ignores the different needs of students' individual differences in teaching, but now the increasing individual differences among students make the phenomenon of "not having enough food" and "not being able to eat" in the same class coexist. In addition, the interaction between young students has caused a large number of students to refuse to work hard in their studies, lack of self-control in the classroom, unable to concentrate their thoughts and listen carefully, and cannot consciously review and complete homework after class. This has caused viciousness in the classroom and after class.

(2) Fluid mechanics involves a wide range of knowledge and is a comprehensive discipline. It mainly involves subjects including: college physics, engineering thermodynamics, advanced mathematics, etc. Its content is abstract, and the simplification and derivation of a large number of differential equations and integral equations makes it quite difficult for students to understand. This is the main objective reason why students think that fluid mechanics is difficult to learn.
2. Analysis, Discussion and Countermeasures of "Fluid Mechanics" Teaching

2.1. Mobilize Students’ Interest in the Course

In the introduction stage, most students majoring in petroleum engineering lack a perceptual understanding of fluid mechanics. At this time, teachers are required to demonstrate the successful application of fluid mechanics in engineering and life through multimedia teaching (including: pictures, videos) so as to stimulate students’ enthusiasm for learning. The perceptual knowledge of the students [2]. For example, talk to students about the principles of golf shape design and the evolution of cars. Through these obvious knowledge of fluid mechanics in life, students will know what practical problems can be solved by fluid mechanics. This makes the students’ interest in learning fully mobilized at the beginning of this course.

2.2. Give Examples Appropriately

In teaching petroleum engineering engineering students, teachers need to use vivid examples of the knowledge points of petroleum engineering disciplines to vividly describe abstract and difficult problems and leave a deep impression on students. For example, when talking about the law of crude oil viscosity changing with temperature, you can use lard as an example to teach its different forms in winter and summer to illustrate the viscosity-temperature relationship of crude oil. In this way, it is both vivid and not easy to forget. For another example, when talking about the knowledge points of local acceleration and migration acceleration, it is difficult for students to understand due to the abstraction of these two concepts. At this time, it can be combined with the stable transportation in crude oil transportation and the working conditions of stopping pumping and starting transportation. Explain the knowledge points. In this way, the students not only have a grasp of the two kinds of acceleration concepts, but also deepen and consolidate the relevant knowledge points in petroleum engineering.

2.3. Combination of Multimedia and Traditional Teaching Methods

With the development of modern science and technology, computer technology has been applied to all aspects of real life, especially in the classroom, injecting new vitality into our traditional backward teaching facilities and teaching methods[3]. For teaching "fluid mechanics" this kind of course, it is necessary to adopt a teaching method combining multimedia and blackboard writing to achieve the best teaching effect. Multimedia teaching can display some actual project image data, some structure diagrams, and schematic diagrams to everyone very clearly; but its disadvantage is that the amount of output information is too large, and it does not provide students with sufficient time to think, and some important and difficult knowledge cannot reappear in the students’ brains for a long time, and even if students want to take notes, it is difficult to keep up with the frequency of courseware page changes. The traditional blackboard writing mode fully coordinates the leading role of the teacher and the main role of the student. The writing method is simple and simple, which limits the teaching behavior of the teacher. The writing on the blackboard is advanced and organically coordinated with the teaching process, and it is instant and flexible. Features: Teachers can adjust their original pre-class preset plans in time according to the actual needs of classroom teaching. Moreover, the content of the writing on the blackboard is kept on the board for a long time, and some of them can be used throughout the classroom to facilitate students to summarize, review and consolidate. However, the modern teaching screen writing on the blackboard obviously does not have this advantage. If classroom teaching leaves the blackboard and relies entirely on courseware, it will inevitably make students feel vague and chaotic. Due to lack of organization, students will be ignorant and ignorant. At this time, teachers need to use traditional teaching methods at the same time when using multimedia teaching, derive each key formula, and explain the ideas and meanings in it. This is very helpful for teachers to focus the students’
attention on the knowledge taught, and it is very beneficial to strengthen students' understanding and memory of this knowledge.

2.4. Actively Carry Out Extracurricular Scientific and Technological Practice of Engineering Fluid

Petroleum engineering disciplines have a large number of extracurricular scientific and technological practice projects funded by various petroleum companies, such as: National Petroleum Engineering Design Competition, Petroleum Undergraduate Innovation Fund, and Structural Design Competition. These are the use of students' spare time, with the help of the knowledge they have learned, hands-on participation or design to solve actual production problems. This activity can comprehensively test the learning situation and flexible application ability of students' professional knowledge, thereby training students' practical ability and cultivating students' sense of engineering practice. It is an effective way to promote students' all-round talent. For undergraduates majoring in petroleum engineering, they can use their spare time to organize students to apply fluid mechanics knowledge to make some small inventions and innovations that are actually needed in engineering. For example: use the principle of Bernoulli equation to make jet pumps for downhole oil production, and use Darcy-Weisbach formula to improve drag reducers in oil pipelines. With these extracurricular scientific and technological activities, the students' after-school life has been enriched, the teaching content has been consolidated, and the students' innovative ability has also been cultivated.

3. Conclusion

Today's higher education has moved from elite education to national education. How to teach according to the characteristics of contemporary college students, and truly "student-oriented teaching philosophy" runs through the teaching process, which is very important for contemporary university teachers. We should keep pace with the times and make some useful attempts in teaching reform. Today's society emphasizes people-oriented everywhere. For the teaching process, the object of education is students. The purpose of education is to enable students to master certain knowledge and skills. Teachers should think about the teaching process from the perspective of students as much as possible. Achieve "student-oriented", so as to realize the simultaneous interaction of teachers and students' thinking.

The practice of fluid mechanics teaching reform in petroleum engineering disciplines lies in: the new teaching concept (closely combining general fluid mechanics knowledge with petroleum engineering disciplines) combines multimedia teaching with traditional blackboard teaching to change the traditional teaching mode and strengthen practical links at the same time. Improve students' perceptual understanding of fluid mechanics, encourage scientific exploration, cultivate scientific research awareness, and improve students' innovative ability to meet the needs of innovative talents in petroleum engineering companies.

References