

Exploration and Practice of Applied Teaching Method Based on Oil and Gas Storage and Transportation Direction

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ABSTRACT

According to the problems existing in the teaching methods of oil and gas storage and transportation engineering specialty, such as the single and dull way of teachers' speaking and students' listening, students' passive learning position, weak application ability and ignoring the use and importance of complicated knowledge concepts for the future work, taking the engineering thermodynamics course with strong application and representativeness as an example, the application-oriented teaching method based on the direction of oil and gas storage and transportation engineering specialty is put forward. The vivid interpretation and deduction of the boring theory knowledge of engineering thermodynamics in oil and gas storage and transportation and daily life application are discussed. The practical measures to help carry out the teaching method are introduced from the aspects of constructing teaching mode and improving teaching system.

Keywords: *Oil and gas storage and transportation engineering specialty; teaching method; engineering thermodynamics; applied teaching method*

INTRODUCTION

The basic knowledge of oil and gas storage and transportation engineering specialty is so obscure that it is considered to be a discipline with a large theoretical system. The traditional teaching method advocates that teachers are the principal part of the classroom while students are in a passive position. The disadvantages of this teaching mode make students lack the interest of exploring the profound truth and the ability to create inferences from others. In recent years, with the increasing demand for innovative and comprehensive talents in the country, some new teaching models have been put forward and explored, such as interactive and problematic (Problem-Based Learning, PBL) teaching method. Interaction fundamentally breaks the one-way principle of knowledge flow in traditional teaching methods, and emphasizes the individual role of students, that is, the flow of knowledge is realized in the interaction

between students and teachers. The problem-based learning (PBL) method, which focuses on problem solving, introduces practical problems into a single classroom teaching. The students use textbook knowledge to create innovative answers to their problems under their own understanding, which improves students' interest in curriculum. The theoretical system of the current teaching method has been relatively perfect, but there are still some problems when it is put into practice.

Problems Existing in Current Teaching Mode

1. Subject characteristics restrict the applicability of teaching mode. Oil and gas storage and transportation engineering is different from other disciplines of chemical engineering, electronic information and other engineering disciplines. As an integral part of the oil industry, its professionalism determines that its research content brings very low in line with daily life. Therefore, the degree of students' acceptance and understanding of professional knowledge may be uneven. Although interactive teaching and PBL teaching methods have been improved, students' knowledge and cognitive abilities are ignored when posing questions to students. Students with a good understanding of knowledge have the ability and interest to explore the answers to problems, while some students are not sensitive to knowledge. There will be two common phenomena: One is to give up participating in the discussion, which makes the oil and gas storage and transportation major become difficult to approach increasingly. At the same time, it is not possible to complete the teaching task at the end of the semester. The other is to apply professional knowledge mechanically, resulting in students' plagiarism when they cannot get answers, or "halo effect" when they cannot keep up with the pace of learning. That is, it produces negative emotions for other subjects or even their majors.
2. The theory of professional knowledge lacks the support of practical situations. The most common fault of university teachers is that they can't completely transform their professional ability into teaching ability. Teachers of oil and gas storage and transportation have accumulated some professional experience in postgraduate or doctoral stage, and even in their work. However, in actual teaching, teachers are extremely confident about students' cognitive ability, and the explanation of knowledge only depends on playing a few slides. The kind of teaching method is unfavorable to students' cognition of professional knowledge and application after class. How can we help students complete the difficult process of oil and gas storage and transportation? I think the most effective way is Refinement of Knowledge and Practical Teaching. What teachers teach should not be a single concept of knowledge, but should inject complicated and difficult theories into their own experiences to tell students. They do not require students to empathize with them, and only hope that students can master the methods to understand and reconcile such complicated problems.

Application-oriented Teaching Methods Taking Engineering Thermodynamics as an Example

"Engineering Thermodynamics" is a theoretical course abstracted from engineering practice. It has the characteristics of "three more" with many concepts, many terms and many formula calculations. However, students have no perceptual knowledge of specific engineering practice, which makes it difficult to embody knowledge points into problems, making the theoretical explanation process boring and reducing students' interest in learning. Therefore, it is appropriate to select the course of engineering thermodynamics as the foothold for us to study a new teaching mode.

The first typical characteristic of applied teaching method is to let knowledge shine into life and understand the connotations of knowledge in life. In engineering thermodynamics, it is difficult to understand the law of thermodynamics. If we tell students directly the essence of the second law of thermodynamics, students can understand that it is an irreversible process, which can be carried out in a closed system until it reaches the maximum entropy state. But at the moment, maybe puzzling problems have been introduced. What is entropy? With the help of everyday examples, such as people often say, "A broken mirror cannot be restored", The mirror is broken, and this process cannot be resumed. This appearance manifests that it is equipped with irreversibility. The concept of "entropy" is the degree of disorder when a very orderly whole becomes a disorderly state. For example, sugar is added to clear water, and their existing state in the cup is to fuse bit by bit until uniform sugar water is formed. The contact degree between water and sugar in the process is also the concept of "entropy". Teachers are just like a key to open students' thoughts, guiding students to start from the concept to list more common scenes that can explain the concept of knowledge in life, stimulating students' interest, and allowing students to feel the law's temperature in life outside of the cold theory.

Another requirement of the applied teaching method is that it comes from life, but at last it is higher than life, that is, it cannot be satisfied with the understanding level of knowledge. Practice is the foundation of improving ability. When students are able to accept classroom knowledge, the next step is to design a scene about the application of this knowledge in oil and gas storage and transportation, so that students can design and create. For example, in the course of engineering thermodynamics, the three processes of heat transfer (i.e. thermal conduction, thermal convection and thermal radiation) are mentioned. We can cite examples from life to deepen students' understanding. In summer, when the sun shines, you feel the heat outdoors, which is thermal radiation; In winter, when you cover your hot water cup with your hand, you will soon feel warm, which is thermal conduction. Air conditioner has refrigeration function, which should reflect thermal convection. After that, the scenario is that LNG storage tanks today adopt a structure in which inner and outer tanks are nested with a vacuum layer in the middle in order to store cryogenic liquid, allowing students to search for three possible heat transfer processes. With the foreshadowing, it is easy to see that when the sun shines on the tank wall, it is thermal radiation; The wall of the tank made of common

materials will rapidly heat up, causing the temperature of the liquid in the tank to rise, which is a thermal conduction process. Therefore, the inner tank is provided with an adiabatic material to reduce thermal conduction. As the temperature in the tank rises, LNG cryogenic liquid will be partially vaporized, resulting in thermal convection. Consequently, the vacuum structure of the interlayer is also designed to reduce the occurrence of thermal convection.

The application-oriented teaching method is based on the interactive and problem-based teaching mode. Combined with the characteristics of the discipline of oil and gas storage and transportation, the teaching details are rearranged to stimulate students' interest in learning as the starting point, and the aim is to improve students' autonomous research ability and problem-solving ability.

Relevant Teaching Methods and Measures

1. Optimizing the curriculum system and grasping the appropriate teaching rhythm. Due to its extensive application, engineering thermodynamics is the foundation of many professional courses to be learned in the future, and it is also the link connecting some courses of oil and gas storage and transportation specialty. Therefore, in the teaching process, necessary extensions should be made on the basis of the original curriculum framework, such as appropriate insertion of some knowledge of heat transfer to pave the way for broadening students' knowledge.
2. Embody Professional Characteristics and build specialized curriculum construction. Engineering thermodynamics is involved in various fields, but there are specialties in technical fields. As a major in oil and gas storage and transportation, it is indispensable to create professional characteristics on the basis of courses. Teachers search for research topics, the content of which is actual or needed in the direction of oil and gas storage and transportation, and issue them to students for group discussion and research.
3. Strengthen the supervision of daily feedback operations to avoid the "moonlight" phenomenon. At present, many teachers have adopted the "3+1" teaching mode in exercise drills (i.e. one exercise drill is carried out for every three classroom teaching sessions), but it is not suitable for college students. The university classroom is no longer just a few specialized courses, but more students' free planning time. After three classes, students have forgotten more than half of what they have learned and will be very unfamiliar in exercises. The content of exercise drills will be arranged in the class, and the content review and exercise explanation before the next class will deepen students' memory of knowledge.

CONCLUSION

The oil and gas storage and transportation project is an indispensable research field in the energy direction, and the state focuses on fostering talents with solid theory and strong operation ability. Strengthening students' practical ability and problem-solving ability is the top priority. Strengthening theoretical knowledge and integrating theory with practice to deepen understanding should be the first step of action. The application-

oriented teaching method is used throughout the classroom teaching, which not only enhances the flexibility and variability of the course content, but also enhances the students' thorough understanding of knowledge and plays a positive role in improving the teaching quality.

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