

Research of Improving the Course Quality of "Chemical Safety and Environmental Protection"

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Abstract: In recent years, the frequent occurrence of chemical safety accidents in China has caused not only casualties but also serious environmental pollution, which has made the chemical industry attract the attention of people from all walks of life. Therefore, how to strengthen the safety and environmental protection of chemical production has become a focal issue that needs careful consideration. If colleges want to provide a large number of application talents with the ability to deal with accidents in the chemical industry, they are suggested to improve the course quality of "Chemical Safety and Environmental Protection". This article concludes relevant research, hoping to enlighten the teaching quality of the course for qualified practitioners to enable a rapidly growing, stable, and safe chemical industry in China.

Keywords: Chemical Safety and Environmental Protection; Classroom Instruction Quality

The chemical industry is a pillar industry that promotes the rapid development of China's economy. Therefore, promoting the development of China's chemical industry has a practical significance that cannot be ignored. Ensuring the safety of chemical production equipment and the standardization of personnel operations are the top priorities for maintaining the rapidly growing, long-term, and stable development of the chemical industry. The chemical major students in colleges and universities are the main participants for future chemical enterprises in China. Therefore, to improve their chemical safety and environmental protection awareness and safety accident handling capabilities have been a critical problem to make them qualified practitioners for China's chemical industry. This article makes a brief analysis on improving the course quality of "Chemical Safety and Environmental Protection", as the following chapters:

1. Teaching status of "Chemical Safety and Environmental Protection" course

At present, there are three main problems existing in the "Chemical Safety and Environmental Protection" course in Chinese colleges and universities. First, the awareness of safety and environmental protection of Chinese college students is generally insufficient. They lack a common sense of safety and environmental protection. Second, the current teaching model is still based on the traditional teaching method of imparting theoretical knowledge, but the theories of the course are over complicated which is easy to make students be reluctant to learn, leading to a poor learning outcome. Third, in China, the curriculum of colleges and universities still adopts the standardized assessment method of paper exams, which has caused some students to just cram before exams. This is extremely unfavorable for the comprehensive development and professional qualities of students. Therefore, it is imperative to reform the "Chemical Safety and Environmental Protection" course for the cultivation of future chemical professionals.

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2. Measures to improve the course quality of "Chemical Safety and Environmental Protection"

2.1 Adopting multimedia teaching

The content of "Chemical Safety and Environmental Protection" is generally numerous and messy, which increases the pressure of teachers who used to writing on the blackboard in class. At the same time, because of the complexity, teachers easily to just read whatever on the textbook in class, which is a huge discouragement for students who are interested in the course. The use of multimedia methods in teaching can effectively solve this problem. For example, the "Chemical Safety and Environmental Protection" course has a large number of industrial production devices and safety components. If the teacher hopes students clearly understand the functions and operating precautions, it is almost impossible to achieve the objective by simply writing key points on the blackboard. However, with the help of multimedia equipment that can display pictures and videos to explain the concept, the purpose of effectively improving the course quality can be achieved.

2.2 Importing case studying

Most students of the chemical engineering major in China lack practical work experience. They do not have sufficient knowledge of the safe operation of most chemical units, understand chemical safety accidents, or pay enough attention to chemical production and chemical safety accidents. Therefore, teachers should properly insert the chemical safety accident cases that occurred in recent years in the teaching process, and present students clearly the causes, processes, hazards, and the losses of accidents, so that the students can have a clear understanding of the chemical industry. The harmfulness of safety accidents can effectively improve students' awareness of chemical safety and environmental protection. In addition, some chemical safety accidents can be perfectly matched with the teaching content of the course, and a reasonable combination of case study with classes can deepen students' memory and understanding of the theoretical knowledge on textbooks. For example, when the teacher gives lectures on the chapter "Industrial and Chemical Corrosion Protection", the "11.22 Qingdao Oil Pipeline Explosion Incident" that happened in 2013 can be used to explain the topic.

2.3 Combining classroom discussion and teaching

There are many factors that can cause chemical safety accidents which are very complicated. Therefore, teachers are prone to omit some points when giving lectures to students. On the other hand, group discussions in class can give teachers and students an in-depth discussion on a certain issue, which can inspire the enthusiasm of students and urge them to participate in the class discussion. It also encourages brainstorming so that students can gain a deeper and more comprehensive understanding. In addition, teachers should also fully understand the various impact of chemical safety accidents and combine this knowledge with the teaching content in class so as to expand the students' knowledge and improve their responsibility.

2.4 Introducing experiment teaching

As everyone knows, interest is the best teacher for students. Once the students' interest is aroused, they can be more actively engaged in the classroom and turn from passive acceptance to active absorption, which can greatly improve their learning effect. In regards to chemical engineering, this objective can be effectively achieved by introducing experimental teaching in the classroom. Taking the dust explosion as an example, the traditional teaching method generally adopts the form of "text + picture", which is relatively not vivid, with the use of experiments, students are able to intuitively understand the conditions of dust explosion——concentrated flammable dust, sufficient ignition source, oxygen, and enclosed space. For example, teachers can use plastic bottles and hoses to make a simple experimental device, then prepare a small amount of flour and a lit candle to simulate a dust explosion experiment in class. This will not only stimulate students' interest in learning but also strengthen their understanding and impression of key points. In addition, at the moment, most students of chemical engineering in Chinese universities do not have the first-line experience of chemical production. Through in-class experiments, they can get an intuitive understanding of some chemicals and devices. For example, through experiments to familiarize them with the smell of ammonia so they can quickly understand that ammonia is a strongly irritating gas which is better than just tell them "if the human body inhales a large amount of ammonia, it will cause inflammation of the respiratory tract, and in severe cases, it will also cause pulmonary edema". Thereby, their awareness of

future work will be effectively enhanced.

2.5 Involving practical teaching

Involving practical teaching can further improve and expand the content of classroom teaching, and also effectively enhance students' awareness of chemical safety and environmental protection. The teaching content can be divided into two parts: classroom teaching and practical teaching. The teacher can also assign students with practical activities after class, while other forms of practical teaching can also be inserted in the process. The aim is to bring students out of the classroom and motivate them to go to the production line to visit and study so that to give them a more intuitive and deeper understanding of chemical production practice. For example, the teacher can explain students in detail about chemical pressure vessels referring to the actual production of chemical gas cylinders used in chemical production laboratories; when teaching the content of fire fighting equipment, students can be assigned with after class-observation, detailed analysis and statistics table of all kinds of fire equipment, their application functions and their locations in public buildings such as schools, shopping malls, company buildings, etc.; when explaining the "three chemical wastes", the teacher can encourage and guide students to form environmental protection teams, and give them instructions to complete missions about public welfare and environmental protection as they can. At the same time, the teacher can also encourage students to actively participate in activities related to energy conservation, emission reduction, and technological competition projects which allow students to be more proactive in deep thinking and problem-solving activities to improve their learning autonomy.

3. Conclusion

In summary, the chemical industry is an important industry that promotes the economic development of China. Chemical production is highly dangerous and professional that has a far-reaching impact on the environment and surrounding chemical companies and residents so production safety and environmental protection are critical issues. In this circumstance, improving the safety and environmental awareness and abilities to handle accidents of chemical engineering students in colleges and universities has significant importance in reducing future chemical accidents. In regards to the acknowledged-difficult "Chemical Safety and Environmental Protection" course, this article proposes five countermeasures and suggestions that combine multimedia, case study, classroom discussion, experiments, and practice in the teaching process to help improve the quality of the course and realize the purpose of promoting qualified practitioners for the rapid development of China's chemical industry in the future.

References

1. Zhang P. Analysis of improving the teaching method of "Chemical Safety and Environmental Protection". *Shandong Chemical Industry* 2018; 47(18): 122-123.
2. Xu Y, Cao J, Liu L. Teaching reform and exploration of the "Chemical Safety and Environmental Protection" Course. *Guangzhou Chemical Industry* 2018; 46(16): 154-155.
3. Huang S, Ma M. Experience and discussion of the "Chemical Safety and Environmental Protection" course. *Henan Chemical Industry* 2018; 35(02): 59-60.