

Discussion on the Teaching Reform of Industrial Wastewater Treatment Certified by Engineering Education Specialty

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Abstract : Engineering education certification is an inevitable choice to improve the quality of talent training under the background of new engineering. Based on the course of Industrial Wastewater Treatment, this paper analyzes the current situation and existing problems of the course teaching, and explores the strategies of the course teaching reform under the guidance of the concept and objectives of engineering education certification, in order to provide reference for optimizing the talent training mode of environmental engineering specialty in colleges and universities.

Keywords : Engineering Education Professional Certification; Industrial Wastewater Treatment; Course Teaching; Reform

1. Introduction

Industrial Wastewater Treatment is a main subject of environmental engineering in colleges and universities. Its prerequisite courses include Water Pollution Control Engineering, Industrial Water Supply Engineering, Drainage Engineering and Pipe Network Theory and other related subjects. This aims to enable students to master certain basic knowledge of water pollution control, understand and be familiar with common industrial wastewater treatment processes and methods, and put forward treatment schemes scientifically and reasonably in combination with the typical characteristics and water quality characteristics of industrial wastewater, so as to cultivate students' good ability of practical problem analysis and treatment. In the teaching reform, based on the professional certification of engineering education as a breakthrough, we should reasonably revise the teaching content and practice mode of the course according to the actual needs of professional talent training, which is committed to improving the quality and efficiency of course teaching and laying the foundation for cultivating excellent engineering application talents.

2. Current situation and problems in the teaching of industrial wastewater treatment

2.1 Current situation of curriculum teaching

The teaching content of Industrial Wastewater Treatment is mainly divided into three parts. The first part focuses on chemical precipitation, oxidation-reduction, oxidation technology and membrane separation technology; The second part mainly introduces some commonly used sewage treatment processes and methods, and needs to carry out teaching combined with some real engineering cases; The third part focuses on the corresponding disposal methods combined with the characteristics of wastewater quality in various industries. It can be seen from the above that the teaching content of the course industrial abolition treatment Industrial Wastewater Treatment is extremely fragmented, the coherence of knowledge is not strong, and the knowledge of each part is basically independent and overlapping, so it is difficult to form a complete curriculum system.

2.2 Curriculum teaching problems

At present, the teaching materials of Industrial Wastewater Treatment prefer to introduce the theoretical knowledge of physics,

chemistry and biological treatment. However, and these knowledge points have been explained in the course of Water Pollution Control Engineering. In view of the great overlap of knowledge, many students' interest in learning is not high. The engineering cases in the teaching materials are too old to better feedback the current cutting-edge industrial wastewater treatment technology and the development trend of the industry. In addition, most cases in the current textbook of Industrial Wastewater Treatment are only for the listing of process parameters, and fail to make a comparative analysis on different treatment processes of a sewage quality. Therefore, the author believes that the teaching of Industrial Wastewater Treatment should supplement and deepen the basic knowledge of physics, chemistry and biological treatment commonly used in wastewater treatment, and add some current advanced industrial wastewater treatment engineering practice cases to ensure that students integrate theoretical knowledge with practical application and achieve the teaching effect of paying equal attention to both theory and practice.

3. Teaching reform of Industrial Wastewater Treatment based on professional certification of engineering education

3.1 Combining with the needs of vocational qualification certification, constructing the course teaching content

The professional certification of engineering education takes "achievement oriented teaching" as the main concept, attaches importance to the investigation of the actual teaching effect and ability, and takes the students' professional ability of engineering as the key training goal, which just points out the construction direction of the teaching system of Industrial Wastewater Treatment. China has set up the assessment system of "registered environmental protection engineer" earlier, and water pollution prevention and control is one of the four professional directions in the assessment system. Industrial Wastewater Treatment, as an important part of water pollution prevention and control, and occupies an important position in the vocational qualification examination.

At present, some colleges and universities in China have tried to introduce vocational qualification certification into teaching and establish an educational double certificate system combining academic certificate and vocational qualification certificate. In view of the strong application and practicality of environmental engineering specialty in colleges and universities, the personnel with certain working years are required to participate in the qualification examination of "registered environmental engineer", and it is impossible to combine it with students' academic assessment at present. In the actual teaching process, teachers should pay attention to the latest requirements and standards of water pollution prevention and treatment in different industries and the development trend of the most cutting-edge wastewater treatment technology, so as to optimize and innovate the original teaching content in time; Teaching should also be conducted in combination with recent real engineering cases to enhance students' penetration and understanding of knowledge, which will help students shorten the work adaptation period after graduation and improve their success probability of subsequent participation in the examination of "registered environmental protection engineer".

3.2 Facing the cultivation of students' application ability, reconstructing the curriculum practice teaching mode

3.2.1 Applying case analysis to theory teaching

When teaching the theoretical course, teachers should select one or two representative and appropriate engineering cases for analysis and interaction after learning each knowledge point. For example, when explaining the "coagulation sedimentation" process, teachers can use the combination of polyaluminium chloride and polyacrylamide for pretreatment according to the characteristics of suspended solids and chromaticity through the sewage treatment case of printing and dyeing industry, so as to meet the influent demand in the biochemical treatment stage; In addition, when teaching the membrane separation process, teachers can combine the advanced treatment method of microfiltration and reverse osmosis after biological treatment according to the case of coking wastewater treatment, aiming at its characteristics of difficult degradation and toxic organic matter. The above case teaching will help students shorten the distance between theoretical knowledge and engineering practice, deepen their understanding and penetration, and consolidate professional knowledge and skills.

3.2.2 Enhancing the process management of curriculum design

Reasonable curriculum design can enable students to correctly apply comprehensive basic theoretical knowledge to the practice of industrial wastewater treatment, and play a key role in deepening and consolidating students' professional knowledge. Under the traditional teaching mode, teachers pay attention to the accumulation of daily knowledge and ignore the cultivation of students' problem-solving ability to put knowledge into practical application. Therefore, teachers should design the curriculum accordingly, which can be implemented as follows: After the theoretical teaching content is determined, and the course design theme will be arranged first. Students are required to form a topic discussion group of 5-6 people to organize the investigation of the composition

and characteristics of wastewater pollutants, so as to make preparations for the selection of effective treatment process in advance; When it comes to theoretical teaching, students can learn the knowledge content of this unit with questions and carry out design in groups. In this process, teachers should guide students in time and help them solve the problems. This can not only help students consolidate and deepen the penetration and understanding of curriculum theoretical knowledge, but also enable students to effectively extend their professional knowledge in the process of practical operation. In the final centralized design link, students can be required to submit their own design results and answer the questions and queries given by teachers through the mode of question defense. Through this teaching method, students can truly “learn by doing and learn by doing”, help students improve their awareness of autonomous learning, cultivate their ability to solve practical problems, and improve their adaptability to future employment.

3. 2. 3 Strengthening school enterprise cooperation in running schools

Under the traditional teaching mode, the internship time of environmental engineering students is short, especially the internship for industrial wastewater treatment is often very superficial, and it is difficult to deeply understand the relevant wastewater treatment technology and requirements and standards. Therefore, colleges and universities should actively establish close contact with environmental protection institutions and relevant enterprises, deepen school enterprise cooperation, and hire technical backbone and expert experts of enterprises as part-time consultant teachers in the school, to regularly give lectures on professional topics for students, and introduce some new wastewater treatment technologies and trends; Colleges and universities can also arrange students to participate in production practice in cooperative environmental protection institutions and enterprises, participate in specific wastewater treatment design and daily operation business, and fully understand various posts and links of wastewater treatment. This will help students improve their practical ability to solve complex environmental engineering problems.

4. Conclusion

In order to highly adapt to the professional certification standards of engineering education, Industrial Wastewater Treatment course in colleges and universities can further reform the professional teaching by integrating the teaching content, optimizing the practical teaching mode and other relevant measures, so as to better mobilize students' interest in the course, strengthen their thinking and practical ability, and finally help them improve the internalization and practical ability of engineering professional knowledge, which can help them adapt to employment better and faster in the future and improve the training quality of environmental engineering application talents in colleges and universities.

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