Reformation of the Practical Education System for Environmental Engineering Specialty

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Abstract. Aiming at the problems existing in the development of environmental engineering, the original practice model should be reformed to the new practice mode, which combined the students' self-practice and centralized internship. Teachers need introduce independent practice mode into internship practice teaching and create integrated experimental teaching system including basic experiment, professional experiment and open experimental to meet the requirements of training applied professionals.

Introduction

The goal of higher education is to cultivate all kinds of professional and technical talents with independent working ability. But at present, when parts of the current graduates go to work, they often can't quickly adapt to the work environment. One of the reasons is the poor practical ability and narrow specialty knowledge. How to change this situation and how to cultivate talents with innovation ability has become an important issue that must be urgently solved by colleges and universities. Practical education is one of the basic ways to cultivate innovative talents in colleges and universities. The quality of practical education could reflect the quality of talent training to a certain degree. At present, a plan for “Educating and Training Outstanding Engineers” of China has been put into practice in the engineering profession, and the highlighted key is also practice. Focusing on the practical education is not only the need of cultivating the innovative talents in colleges and universities, but also the requirement of the deeper level of higher education reform and development in our country.

Environmental engineering requires students to master the basic theory and experimental technology of chemistry, environmental science and engineering, and have the concept of sustainable development. They should also acquire various branches of knowledge including various pollutants prevention and control, and pollution control planning and management. After graduation, they could work in environmental protection departments, design units, industrial and mining enterprises, government planning departments, scientific research units, schools and other units. And they tend to be engaged in environmental engineering design, monitoring, planning, management, education, and research and development [1,2]. The cultivation of the students' practical ability is especially important in the whole student cultivation.

In order to follow the tide of technological development, and grasp the fast-changing market requirements, our education must change the past teaching mode, combine closely with the production line, and strive to occupy the initiative of talent training, so as to create the talents with more adaptable, stronger advanced consciousness, and wider applicability [3]. We should make students understand the requirement of the production line to environmental engineering professional in the learning and practical process, combine the learning of theoretical knowledge with the practical application, comprehensively use the learned knowledge including public basic courses, professional basic courses and specialized courses, and enhance students' innovative spirit.
and scientific research ability. It has important theoretical and practical significance to cultivate well-trained technical teams for the society and enterprises.

**Combining the Concentrative Practice with Independent Practice, Focusing on Training Students’ Practical Skills, and Improving the Employment Competitiveness of the Students**

Independent practice mode of the students was introduced into practice teaching. Starting from the summer vacation of the first year of college, students are encouraged to choose and contact the relevant units of environmental engineering internship in their hometown during the holidays, and to obtain elastic credits. So after exercise of six holidays, the students have six internship practices, and six chances to sell themselves to the enterprises. On the one hand, students can contact with the practical production, go deep into the enterprise and have better understanding the related enterprises of environmental engineering. This can train students' practice ability and meanwhile stimulate the students' interest in learning. On the other hand, contacting practice enterprise by students independent, they can try to communicate with business leaders, let the business leaders to understand themselves, promote themselves and simulate the employment. It can greatly enhance employment competitiveness of students, and also can make up some disadvantages that focus on the lack of centralized practice funding, more practice pressure owing to more students, and poor practice effect. Teachers should add the class guidance to the original concentration practice link, pay attention to the communication with students in the class of production teaching, and focus on the difficulty and keystone in all production links to guide and inspire students to think positively. We carry out inquiry-based teaching reform in the original practice, that is to say, under the inspiration and inducement of guidance teachers, take enterprise production actions as the basic object, and provide sufficient opportunity for students to question, explore, discuss the problem and express freely. So that students could apply the learned theoretical knowledge to solve the practical production problems through the individual, group, collective and various activities that can dispel suspicion in order to obtain knowledge and improve the comprehensive quality and ability.

**The Experimental Teaching Focusing On Training Students' Basic Experiment Skills**

It must have a solid experimental basis for support to cultivate skilled practical ability, sedate strain capacity and excellent operation skills of the students. We need break the traditional teaching concept of emphasizing theory and neglecting practice during the experimental teaching, and reform the experimental teaching vigorously [4]. Firstly, teachers should correctly handle the relations among teaching, research and subject construction during the experimental teaching work, and emphasize the promotion of scientific research work to the experimental teaching. They also should absorb advanced educational concepts and experimental teaching ideas, persist in these teaching reform ideas include imparting knowledge, cultivating ability, improving the quality and coordinating development [5]. We want to pay attention to cultivate the students on exploring spirit, scientific thinking, practical ability and innovative ability, and let students enhance their capacity and improve the innovation consciousness through participating in scientific research and scientific and technical innovation activities out of class. Secondly, the experimental construction should be focus on cultivating the students' practical skills and innovative ability. Gradually, laboratory functions will be changed from “teaching to scientific research innovation” and the experiment contents from “verification type to design type to comprehensive type and to research type”. Combining with the actual production to choice the experiment topics, the teachers should often communicate with students who have taken to the work, visit and survey enterprises in-depthly, select experimental topics base on the actual, and try to make the students master an experiment skill on each experimental class. The third is to increase the design and development experiments, and reduce the imitation of verification experiments. The design experiment could arouse students' interest in the major, mobilize students' learning enthusiasm and initiative, and cultivate the students' ability of engineering design and innovation design much better. For example, we could increase the experiment which closely contacts with practice to the basic chemistry experiments of students in the
freshman year, such as “the determination of fluorine ions in water”, etc. For this experiment, teacher should first help students access to relevant information, understand the various detection methods adopted by production line as well as the advantages and disadvantages of different methods, and so as to guide students to design experimental schemes through looking up information. After been identified by the teachers, the students operate the experiment independently, observe experimental phenomena and results. The fourth is to encourage students to participate in the preparation of experiments. In previous experimental class, all kinds of reagents required in the class are prepared by teachers before the experiment, and various experimental instruments also have been debugged. But now, all these preparatory work are done by the students themselves, making the students understand the experiment from one-sided to the system. It greatly inspired the students’ interest in learning and potential.

Opening the Experiment to Further Improve the Students’ Capacity for Independent Innovation

Experiment is an important means to cultivate the comprehensive ability and innovation ability of students. Opening laboratory could provide maximize time for students to study experiments, improve their level of theory with practice, and exercise students' ability of engineering practice and scientific research and development. Students participate in selecting experimental subjects according to their experimental basis, professional characteristics, hot social issues and the practical problems encountered in the process of their practice. Teachers encourage students to solve problems by means of the experiment, which actually exercise the students' ability to find the problems, analyze and solve problems. Sometimes it will also find some new problems during the course of the experiment, which can prompt students to further analysis and thinking and induce the new experimental motivation, so that the learned knowledge of students can be fully validated and experienced in the experimental teaching. This could help to improve the self-learning ability of students, and strengthen the cooperation consciousness and the spirit of solidarity of students. Teachers guide students to follow the principles from the basic, simple and partial to extension, complex, and the whole and guide the experiment content. Thus, the students develop upward step by step and learn all the content finally. Reflecting the education idea based on the people-oriented, it not only can effectively solve the phenomenon of neglecting the students’ individual differences existing in the current experimental teaching, but also can provide opportunities and stage to students who have strong learning desire, promote the development of students’ personality.

We should take employment as the orientation, take education as the fundamental, reform the practice teaching and combine the experiment and practice links. Making full use of the existing resources, including the practice base, the school library and the electronic reading room, students could study through the class, lectures, experiment, independent internship as well as the research study in open laboratory. So that students not only learn a variety of professional knowledge in theory, but also can exercise their practical ability, organizational ability, writing skills, the ability to analyze complex problems and solve practical problems, and communication skills with different levels of people, etc. It also can further improve the students’ language skills through the defense and simulation employment of independent practice, and lay a good foundation for students’ job interview and the future work.

Summary

Teachers need introduce independent practice mode into internship practice teaching and create integrated experimental teaching system including basic experiment, professional experiment and open experimental to meet the requirements of training applied professionals.
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References


