Discussing on Practice Reform of Environmental Engineering Specialty

Jie GONGª,*, Li WANG, Xue-E LI, Zi-Ming LIU, Da-Jun REN, Tao FENG
School of Resources and Environmental Engineering, Wuhan University of Science and Technology, 430081, China
ªeyrejie@163.com

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Abstract: Practice teaching process is an important part of environmental engineering specialty, which plays a key role in cultivating students' practical ability and innovation ability. The current situation and typical problems of the three kinds of environmental engineering practice in Wuhan University of Science and Technology has been researched in this paper, considering of educational resources, a workable teaching reform measures for the practical teaching of that major has been put forward.

Introduction

With fast development of economy, a series of environment problems, such as environment pollution, ecosystem out of balance, resource shortage etc., are turning worse. In recent years, along with the increasing attention and input of Chinese government to environmental protection, the research work of pollution prevention has been developed rapidly, which provide a broad employment market for graduates majoring in Environmental Engineering, meanwhile, the enterprise demand for talent is also getting higher and higher, and almost every graduates are required to have a certain practical experience so that they can adapt to the work quickly. We statistics about several graduates of environmental engineering in Wuhan University of Science and Technology, and find out that the employment directions of graduate student are more biased in engineering design and construction unit, which requests higher for the students' practical ability.

The practice teaching is an important part to cultivate students' innovative consciousness and comprehensive quality, strengthen the theoretical knowledge and improve the practical ability and innovative ability of college students. The Practice Teaching of environmental engineering in Wuhan University of Science and Technology mainly consist of the understanding practice, the production practice and the graduation practice. The understanding practice mainly highlight the role of professional enlightenment education, and enable students to form a perceptual knowledge of the subject with the form of visiting; The production practice plays a role of connecting, of which the aim is to provide opportunities of combination of theory and practice for students, and to cultivate the students' ability of comprehensive using of basic theory, understanding and analyzing the actual production process, for laying a good foundation to learn the follow-up professional courses; The graduation practice should highlight the deepening of professional education, combined with the graduation design, sharpened focus, strive to further in a certain area, and broaden the students' knowledge[1]. According to the teaching requirements and characteristics of environmental engineering specialty, the following is carrying on the elaboration in view of problems and how to reform in the course of practice teaching in recent years in the example of environmental engineering undergraduate students in Wuhan University of Science and Technology.
The Current Situation and Main Problems of Environmental Engineering Specialty Practice

The Imperfection of Practice Base Construction

Due to the metallurgical background and geographical location of Wuhan University of Science and Technology which is affiliated to Industrial Zone in Wuhan Qing Shan district, adjoining with Wuhan Iron and Steel Co Ltd., the firm is a large state-owned iron and steel enterprises, and is also the focus of pollution control units, the pollution installations of that enterprise involves almost all aspects of waste gas, waste water and waste residue in environmental engineering, it can enable students to have a comprehensive understanding in main process and method of production application in environmental engineering. The understanding practice, the production practice and the graduation practice are almost arranged in WISCO owing to a good partnership of school-enterprise cooperation between our universities with that company. The internship sites of environmental engineering are commonly focuses on the WISCO and several municipal sewage plants in downtown area where close to our school, The internship sites are unfixed, and can be replaced in case of extraordinary circumstances.

In addition, we haven’t signed a formal, long-term internship agreement with the internship units, leading to the instability of practice base and the difficulty of contacting internship units (the main reason is that students will not bring direct benefits during the internship period, on the contrary, they will increase some security risks); or there are relatively stable internship units, but it’s hard to provide comprehensive practice; moreover, problems such as the conflicts between practice time and enterprise production cycle, will directly influence the effect of practice.

Single practice pattern and lack of effect on practice

Due to the gradual improvement of internship units’ superior safety management system, practice unit almost do not accept that students go to the workshop practicing on shift in factory, it’s becoming more and more infeasible that students in internship units be engaged in actual work and equipment operation. Moreover, the content of practice is reducing, and the practice method is mostly hurried and cursory visit. Though staff speaks a lot, students only take notes with a simple perceptual cognition. Combined with students rarely or incompletely understand the professional knowledge before practice, or lack of advanced knowledge of the enterprise they are to practice. Often they just have a perceptual knowledge of the main process of sewage treatment plant, not clear about the process principle, and the theory and the practice can’t always be in a good combination, which often result in poor practice effect.

Practice examination models

Practice guidance teachers generally based on the comprehensive evaluation of the students’ practice scores, such as attendance, daily performance and the contents of the internship report. As the way of visit the internship consist mostly of the staff speaking, and then watching the craftwork, after which students raise questions. Students’ internship harvest and experience are just superficial, while most problems encountered in the production practice are almost not involved, which requires students to understand with the digestion and absorption after school, that’s to say, internship report is their understanding of main content of the practice. Internship report includes an overview of the internship units with their process flows, students’ practice experience and so on. As for the practice content, each student is roughly same, so the contents of the internship reports are stereotyped, basically without personal insights. If the teacher just evaluates the practice results according to attendance and internship report. It remains to be unknown how much professional knowledge students exactly grasp, whether they do digest and absorb the practice content after school. Therefore, this kind of practice examination method cannot really evaluate students’ internship performance.
Practice reform ideas

Practice reform should be aimed at the new situation faced by the practice teaching. The reform has not adapted to the actual situation, it is time to establish the new practice mode to meet the needs of the development of the situation. With years of internship guidance practice, the reform of the three kinds of practice is imperative, and can proceed from the following aspects:

**Relying on the college training base, gradually improve the construction of the practice base**

First of all, we should consolidate the existing practice base resources, develop some related production enterprises and public institutions which are close to the school, with convenient transportation, production technology and production conditions, can meet the students practice, such as Sinopec Wuhan Branch and national Qing Shan Thermal Power Plant. And further enrich the practice base list, sign practice base agreement with some enterprises and be listed. Those temporarily unsigned units are supposed to be developed as the expectant practice bases. Secondly, strengthen the daily contact and communication with the practice base or expectant practice base, consolidating the cooperation between both sides. Like our school educational administration department lead the sodality with Wuhan Iron and Steel Group Company every year, or service for the enterprise technology and solve their production problems with school professional and technical expertise and scientific research advantages, or carry out school-enterprise cooperation in scientific research, or train technical personnel and management cadres for the enterprise.

Our university training base for environmental engineering specialty, formerly known as Huangjiahu sewage plant of Wuhan University of science and technology, was established in 2005. The quantity of wastewater effluent was about 3000 m3/d, which originates in domestic sewage produced by internal students and teaching staff for laundry, bath, dining, washing and toilet. The main treatment process of sewage treatment station adopts A/O technology and sewage deeply purification treatment technology of STCC, of which the final effluent should steadily reach the grade-IV standard of the national "Surface Water Environmental Quality Standard". Due to the late construction of Huangjiahu municipal sewage treatment plant and its collection system, the sewage treatment plant has been gradually transforming functions, and attempts to purify and reuse the campus landscape lake water. Since it has medium-scale daily processing volume and both primary treatment and depth treatment process, of which the sewage plant process flow and basic structures are both comparatively perfect including mechanical treatment, biological treatment, grade-III sewage deep treatment in process extent, now has been built into practice and training bases for environmental engineering major of Wuhan University of science and technology. Students can learn more about wastewater treatment process principle, operation link, control system, failure handling and so on by the attendant internship of the main structures as well as physical devices of sewage treatment plant and hands-on operation. On the other hand, it can actually solve the problem of single method in student internship and also can save internship funds and students' expenses.

**The whole process control of practice teaching and deep grasp every link**

**Practice mobilization process**

Practice working group must take an ample mobilization and make meticulous preparation before the internship. Firstly, give students ideological education, make the goals and function of internship clear, to arouse students’ enthusiasm; Secondly, students personally retrieve and collect data to preview the process methods, process flow and main structures of the apprenticeship site according to the instruction provide by practice teacher, and submit the practice preparation report, thus improving students' autonomous study impetus; Thirdly, the faculty adviser assigns practice questions in advance according to the tasks, then make students taking on internships with these questions and finding solution to the problems in the internships, and arouse students’ initiative and creativity and enhance the effect of internship; Finally, emphasize the safe working specifications of internship in the mobilization meeting, introduce the curriculum contents in the major, operating instructions, practice discipline, writing method of internship report, production process of the
apprenticeship site, corporate culture and background, talent demand of the company and so on, to make students getting into internship rapidly.

**Firm the practice process management and strengthen the practice scene evaluation**

A strict practice process management is the guarantee of the safety and effect of the practice. Due to the shortage of the team-lead teacher manpower, it is necessary to strengthen students' self-management. Draw on part of outstanding student class leaders to attend team-lead teacher's working meeting during the internship, and strengthen the communication between teachers and students; Divide practice students into several groups according to the production teams, choose the student with strong sense of responsibilities and prestige as group leader. Full exert and transfer students' consciousness of self-education, self-management and self-service.

Generally, students go to the workshop at daytime and organize notes at nighttime, teachers can ask regular on-site questions and irregularly check students' notebooks and so on, understand the extent that students grasp the practice content, and adopt the ordinary condition of making notes, the initiative and correctness of answering questions into the content of the practice score assessment.

**The improvement of the appraisal mode**

Establish and perfect the diversified way of evaluation. Students should be requested not only submit written internship reports but also write internship diaries. Then we should divide students into groups to accomplish a comprehensive reply after internship. By the way of explaining lantern slides, practice guidance teachers composing of assessment team to ask questions and so on, we can check the condition of students grasping the practice content and the application of basic knowledge. Then the comprehensive performance is given after we synthesize the above results. It’s convenient for student teachers to understand the students internship effect in time, as well as supervising students accomplished each link of the practice and paid an attention to the field explain and observation to achieve better results with this evaluation mode.

**The practice summary of teachers**

It’s possible to let students speak freely through the way of questionnaire survey, and we can understand the demand of students for professional practice and views. Then we should summarize the internship work combining with the practice work. The summary should include the construction of the student teachers qualification, the construction of practice base, the internship program and practice effect. Via the continuous improvement of the internship, consist of a teacher team with reasonable structure, strong work ability and high sense of responsibility, to propose the solution to the weak link in the internship process, and to put it into effect next time. Then we evaluate the effectiveness of reform plan according to students’ evaluation of teaching process, to achieve the continuous improvement of practice work and the requirements to close to students and social.

**Rich practice teaching method**

**The use of multimedia**

It’s essential to introduce the practice teaching of multimedia methods, on-site visit and practice for practice teaching. Because of the background of our iron and steel metallurgy, environmental engineering in our academy mainly focus on the disposal of metallurgical pollutants. We should not only understand the disposal process of metallurgical pollutants, but also the technological process of WISCO in general. So, WISCO has produced *How the Steel Was Tempered*, a feature film for the internship units, which introduces the making process of the steel from raw material to firing and iron to students vividly, and make students have a general perceptual knowledge of WISCO.

Multimedia courseware can not replace the scene, but carefully prepared multimedia can make up for the lack of the on-site practice. The internship teacher could use the previous internship datas including the process flow, the process parameters, and the field data of the main structures.
and purchasing a batch of ready-made multimedia courseware of environmental engineering before
the practice, and meticulously processed the above source material into practice teaching
multimedia courseware. Via broadcasting field videos, animation, pictures and education before the
practice, enable to understand the process and content of every practice program students more
intuitively and clearly. Increase students’ perceptual thinking and rational knowledge of the teaching
content; transform passive and boring study into active and meaningful learning [2].

Combine the traditional visiting practice with expert lectures

On the basis of the traditional practice of taking students to visit and practice in large enterprises,
we can invite industry experts and senior technical personnel to school to have lectures aimed at
specific internship content and purpose. The practice model of ‘go out, please come in’ could
supplement and deepen the theoretical knowledge learning. At the same time, it can cultivate
students’ interest in learning professional knowledge; improve their awareness of practicing
consciously and valuing the opportunity to practice as well as their practical ability [3].

Summary

The professional practice process is very important for Environmental Engineering in practice
teaching. The instructor should summarize continually during the practice work, explore more
effective reasonable way and then cultivate students’ comprehensive ability. With environmental
engineering professional practice reform, the effect of practice teaching will be improved so that the
students could be better adapted to the needs of the society.

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