

# The Exploration of Teaching Method Reform of the Water Supply Engineering

Nan Qiao<sup>a,\*</sup>, Feng Guo Cui<sup>b</sup> and Wei Xing Liu<sup>c</sup>

School of Architecture and Civil Engineering, Northeast Dianli University, Jilin, 132012, China

<sup>a</sup>email: qiaonan@nedu.edu.cn, <sup>b</sup>email: cuifengguo@163.com, <sup>c</sup>email: 476863298@qq.com

**Keywords:** Water supply engineering; The teaching problem; The theory teaching; The practice teaching; Methods reform

**Abstract.** Objective: Cultivating students' ability to analyze and solve practice problems by the improving the teaching effect and teaching reform of the water supply engineering; Methods: Under the deficiency in the teaching of water supply engineering and research results of the research group teachers, constructing teachers team, increasing engineering examples and overall independent experiments and rational allocation of practice time to reform the method of the theoretical and practical teaching; Results: The students' enthusiasm of learning water supply engineering run high and strengthen the learning content and students can use knowledge that studied to solve the practical problems; Conclusion: By the reformed teaching, the students' ability to analyze and solve practice engineering problems has been improved and the employment pressure of students has been relieved.

## Introduction

The water supply engineering which belongs to the engineering practical curriculum is a core course of water supply and drainage engineering and it is the main content of relevant professional learning in various colleges and universities [1,2]. To study this course, students could master related basic theory and method of water treatment which is necessary for working on water supply and drainage and environmental protection [3].

However, the survey about the water supply engineering of related colleges and universities' teaching practice found that this course has many problems in the process of teaching [4]. Aiming at the shortage of the course, we reform the method of teaching during the water supply engineering class.

## The Problem During the Water Supply Engineering Teaching

**Teaching Content Is Complex and Basic Knowledge Is Boring.** Water treatment engineering involves different subjects, with the development of science and technology, many new theories, new technology, equipment and materials arise, this leads to the course content have become increasingly complex [5-7], at the same time, it puts forward new requirements to the teaching of the course, the instructor must adapt to the need of practical application, meanwhile as the course covers a lot of norms and standards, explain dull and blunt, the students also has certain difficulty in understanding.

**Teaching Ways Don't Meet the Need of Practical Teaching Course.** Water treatment engineering has different curriculum content with serious shortage of class, involving complicated knowledge. Traditional cramming teaching method was unable to meet the needs of cultivating the students' ability and knowledge-transference. Due to the complex of knowledge points and the way of teaching is not lively, students lose interest in learning the course. How to combine the actual situation of teaching methods and use all kinds of auxiliary means to promote students' learning enthusiasm and achieve the best teaching effect is a realistic problem.

**Lacking Reasonable Practice Teaching.** Water supply engineering is a practical course, knowledge can get fully understood and implemented through the actual operation and practical application [8,9]. But resources in practice base is limited, plus lacking of money, the practice

content just included visiting construction site and water works and students skimmed the face. And because the practice teacher is usually less, management dose not reach the designed position, students' operational ability doesn't get exercise, the improvement of comprehensive quality is impossible [10].

### **The Reform During the Water Supply Engineering Teaching**

**Construction of Faculty of Science.** Building a reasonable structure of the teachers is the key to the construction of the course [11]. Therefore, curriculum group let the highly educated teachers undertake courses, and only special experimental teachers explain in-class experiment. Teachers can play expertise, complete the course teaching, and expand students' knowledge scope. In recent years curriculum group of teachers are shown in table 1.

Table 1 Curriculum group of teachers		
post	number of people	note
teaching post	8	three doctors, two are reading doctors, three masters
experiment post	1	one is reading doctor

**The Reform of Theory Teaching. Combine the blackboard writing and multimedia teaching.** We could fully using modern teaching tool and means, and introduce computer as assisted instruction [12]. Using Flash, 3 d animation, for example, to display various water supply structures, students can see the three-dimensional morphological of structures, students can understand the problem fast and vivid as well as visual [13].

Making full use of audio-visual materials can greatly enrich the classroom teaching, increase the amount of information, show new products, new technology, new equipment, solve the problem of the old and single teaching content.

**Increase Teaching Specific Engineering Example.** Usually pay attention to collect the water supply engineering case drawing of municipal design institute, establish a "water supply engineering case". Explaining classic case in "water plant designing", enables students to have the purpose of engineering application, combine the theory and practice, improve the students' ability to solve practical problems.

**The Reform of Practice Teaching. Conduct the comprehensive experiment in experimental teaching.** After in-class proving experiment of coagulation and precipitation, filtration, disinfection of water supply engineering, increasing a comprehensive experiment, namely, according to the characteristics of the available water around, students design the water treatment process by themselves [14]. Jilin songhua river in winter, for example, the water quality characteristics are low temperature and low turbidity, asked the students design the water treatment process based on knowledge. Students themselves go to the scene after dividing, to carry on the design, experiment and modification, finally get the best deal. In the process of the comprehensive experiment, students cooperate with each other, team work ,high enthusiasm, make full use of classroom knowledge and network resources to solve problems, students' experience especially the confidence to solve practical problems can be increased when they get the best solution. [15]

**Allocate Time Reasonably in Practice, Adding the Process of Explaining and Referring to the Drawings by Themselves.** During the previous practice process, students could not make full use of the chance to study how to distribute good time.

The teacher's redistribute the practice content and time through the teaching research (see table 2).

Table 2 Practice contents and the time distribution form

Time	Content	Form
first day	visit the waterworks	students raise questions after visit
second day	visit the waterworks	students raise questions after visit
third day	review the related knowledge of water works in school	review by themselves
forth day	visit the waterworks again	divide students into groups, each group elect the represent to explain the process in water works and solve the questions after the first visit
fifth day	refer to water drawings	students refer to drawings in uniform and engineers explain to them
sixth day	practice summary in school	students summarize by themselves
seventh day	reply teachers' questions in school	teachers ask questions according to the practice content, students answer

Redistribution of internship time and content increased the process of students' explain, students found problems through the preliminary practice, through the review, they apply theoretical knowledge according to the practical again, solve practical problems by making theoretical knowledge together [16]. Then in this internship students form passive to active, students' thinking become active, increase students' interest, strengthen the mastery of knowledge of water supply engineering.

#### **Use the Holiday to Find Problems, Solve the Problem in the Process of Graduation Design.**

Water supply engineering is generally arranged in the sixth semester teaching, after examination due to the arrangement of seventh semester teaching content and taking part in the postgraduate entrance exams, students has been forgotten the content of the water supply engineering, they are not willing to choose the direction of the water supply engineering in graduation design [17].

Through the teacher's teaching and research, they arrange the social practice link about water supply engineering in holiday, asked the students in the sixth semester summer vacation to carry out "drinking water quality survey" in hometown. The students use holiday time, research the water quality of their hometown. Research by students, for example, found that the hometown of drinking water had fluorine and heavy metal exceeds bid, micro organic pollution and so on. Through the problem summary, supply water quality problems in hometown bring students deeply touches, urging to solve hometown water's quality problems in graduation design links.

#### **Summary**

Through the teaching method reform of water supply engineering, the students can make use of the limited classroom teaching master the theoretical knowledge, through the various practice again, using the learned theory to solve the current practical problems, the students' enthusiasm are increased, learning contents and the ability to analyze and solve practical engineering problems are strengthened.

#### **Acknowledgements**

This work was supported in part by grants from the Office of Teaching Affairs of Northeast Dianli University (No. 201308) and School of Architecture and Civil Engineering of Northeast Dianli University.

## References

- [1] W.T. Mo: Journal of Course Education Research, Vol. 6 (2013) No.3, p.246.
- [2] S.X. Tai: Science and Technology Entrepreneurs, Vol. 3 (2012) No.9, p.194.
- [3] X.S. Yan, J.C. Fan: *the Water Supply Engineering(the 4th edition)*(China building industry press, China 1999).
- [4] T.P. Xia, Y.H. Guo: Education of Science and Technology Innovation, (2010) No.14, p.250.
- [5] H.B. Qi, Z.C. Yu and F. Li: China Power Education, Vol. 25 (2013), p.139.
- [6] H.Y. Li: Journal of Taiyuan University of Technology (social science edition), Vol. 12 (2007) No.8, p.54.
- [7] H.R. Ji, Z.Y. Liu: Hunan Vocational and Technical College of Environmental Biology, Vol. 19 (2009) No.3, p.82.
- [8] M. Lu, L.J. Xi and X.M. Chen: Journal of Northeast Dianli University, Vol. 33 (2013) No.4, p. 79.
- [9] J.L. Zhang, J.F. Lu and L.P. Sun: Chinese Science and Education Innovation Tribune, Vol. 5 (2013), p.57.
- [10] S.G. Zhu: Anhui Institute of Architecture & Industry(Natural Science), Vol. 16 (2008) No.5.
- [11] Y. Liao: Journal of Shanxi Building, Vol. 36 (2010) No.31, p.203.
- [12] L.J. Nie, X.D. Yin: Journal of Chinese Modern Education Equipment, (2012) No.11, p.33.
- [13] W. Shen, X.J. Ren: Higher Education Forum, (2009) No.3, p.52.
- [14] D.Z. Zhang, Y.B. Yang: Journal of Changchun University, Vol. 18 (2008) No.5, p.95.
- [15] K.M. Yang, X.L. Yang: Research in Higher Education, Vol. 27 (2010) No.2, p.71.
- [16] X.Y. Lv: Adult Education in China, Vol. 23 (2009) No.5, p.105.
- [17] S.H. Lin, Z.Q. Jing and Z. Wang: China Forestry Education, Vol. 28 (2010) No.5, p.76.