Mixed Teaching Reflection on the Strong and Weak Electric Subjects about the Non-Electrical Specialty

Yongfei Xue¹,a, Chunyan Wang²,b, Zhiming Liu¹,c and Yinghui Wang¹,d
¹School of Civil Engineering, Henan University of Technology, Zhengzhou 451191, China;
²Chengdu Textile College, Chengdu 611731, China;
a xueyf_hust@126.com, b916167316@qq.com, c125564541@qq.com, d85470185@qq.com

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Abstract. This paper puts forward the mixed type method about the teaching process, combined with the basic situation of the strong and weak electric subjects of the non-electrical specialty, to strengthen the students’ engineering awareness and improve students' engineering practice ability. Firstly, it introduces the teaching situation of the strong and weak electric subjects. Then, it displays out the mixed teaching methods in the theory and practice teaching classes which are carried by authors’ teaching processes. The mixed type teaching reflections are appeared. Finally, it obtains the countermeasures analysis under the new situation. Thus, it combines electrical specialty with the non-electrical specialty together, and creates the mixed teaching conditions for composite engineering technology talent to promote the practical ability and innovation ability.

1. Introduction

The vast majority of non-electrical engineering professional development direction is controlled automatically [1]. It requires the educators to improve teaching ideas. So these require students not only to master the basic theoretical knowledge and professional skills, but also have the ability to apply knowledge to solve problems, engineering practice, creative thinking, and synthesis and innovation experiments. These abilities depends on the practice of teaching process, and has a close connection with the electrical subjects which are strong electric subject (building electrical engineering), weak electric subject (automatic control principle). Their undergraduate education is very critical. On the other hand, the mixed learning is a kind of learning mode of "Internet + education". "Internet +" displays more technical elements and learning resources for the online and classroom face-to-face mixed learning, to support the traditional network teaching content debris. The design can be achieved so that learners through the smart phone terminal will be able to achieve online learning, and truly achieve anytime, anywhere according to individual needs to learn, to make up for the classroom face to face teaching individually [2].

Many vocational colleges’ teachers further explore problem how to educate the construction electrical and automatic control principle [3-5]. The teaching process of the course, teachers not only to teach students the necessary theoretical knowledge, but also should focus on training students to apply the theory to solve practical problems. With the innovation education and quality education discussions today, teaching method should be mixed type, which is combined with traditional face to face learning and online learning. In another word, that is teachers’ "teaching" and students’ "learning"[6]. The authors discussed the mixed type according to their own teaching experience. It is suggested that the cultivation of basic ability should be emphasized in the teaching process of higher vocational colleges, and the students’ learning initiative should be improved, the students’ thinking and the application ability should be strengthened [9-11].

2. Strong and Weak Electric Teaching Situation

Now the strong and weak electric teaching mode of non-electrical specialty is always adopted as the building electrical engineering and automatic control principle subjects, based on the electrical and electronic technology subject. The building electrical engineering subject of our school is arranged in 32 class hours, and added 2 weeks practice course design. Automatic control principle subject is 32 class hours (8 on the machine), and added 2 weeks practice course design.
The study of the building electric engineering subject is to master the basic concepts and basic methods of building electrical based on the electronic and electrician technology subject. It must master the design of distribution system, lighting calculation method and the form and principle of all kinds of power supply system. It must have the ability to use electricity safely, installation and system construction, operation and management the construction of the electronic equipment. For the building electrical engineering subject, teaching material is selected as the “building electrical” edited by C. L. Duan (2012), published by the Chinese mechanical industry press. According to the syllabus, electrical materials are change as follows: basic knowledge of electric engineering, materials commonly used equipment, power supply system, electrical control equipment, building lighting engineering, introduction of electricity and lightning protection of buildings and intelligent building security system. Among them, the building equipment electrical control is the new and important chapter.

The teaching of automatic control principle subject, its purpose is to make the students master the basic concepts and basic methods of automatic control, master the calculation method of time domain analysis, frequency domain analysis of linear system, system calibration, understanding the form and principle of all kinds of nonlinear systems. More, it should have the ability of the automatic control design, the preliminary ability of the control installation and system construction, and the operation and management of the construction environmental equipment. Its contents are listed as follows: introduction, mathematical model of automatic control system, basic characteristics of system model, time domain analysis method, frequency characteristic method, synthesis and correction of control system. The teaching material of the automatic control principle subject is edited by Y. F. Li, which is combined with the basic knowledge of the principle of automatic control and building environment specialty. It is very good for building environment specialty to improve weak electric ability. But the market still needs more versions; the same is to the building electric engineering subject.

In the teaching course, students don’t always digest the key and difficult parts, don’t apply the electronic part of the building electrical equipment well, and don’t understand the strong power control of the building equipment. The students don’t almost go deep automatic control theory, and professional combination. So they are feeling boring, gray and astringent. Thus it does not play a basic role in the development of follow-up courses, let the depth of professional knowledge alone in the future. Finally, the students are not at all able to produce certain skills in building equipment automation.

3. Mixed Teaching Countermeasures

3.1 Introduction class.

The introduction course is the gateway to a course. Students' interest in and understanding of a new course is derived from the introduction course. Teachers can give some vivid examples to illustrate the electrical theory and its applications, these examples from life can stimulate students' interest in learning. In addition, the overall content framework, learning methods and significance is also the first clear, so that students realize the significance of the course for future learning and work, and stimulate their enthusiasm for learning. Basic introduction lesson is embodied in the classification system. The classification lessons can have knowledge of the system, clarity of the position and significance of the branches, and the obvious radiation role of the other professional subjects.

Summarizes should be pay attention to in other chapters’ teaching, and echo the introduction class.

3.2 Activating classroom and stimulating students' thinking.

In every lesson, after students obtaining the necessary knowledge in teaching, the students' thinking training is appropriate. Teachers cannot stay in the boring knowledge, but change teaching methods, penetrate deeper thinking. Thus students will be benefit for a life. For example, in the course of building electrical courses, load calculation and lighting content is a simple part, and encourage students to use the group inquiry method to study the future employment, such as Fig. 1.
At the same time, with the help of CAI courseware, it is convenient to display the electrical calculation parts in the examples. So it seems that the time is longer, but the students will master the application skills of electrical technology. In the chapter of equipment control, before class begins, the students should talk about the PPT manuscript, tell the electrical control lines in advance review, tell the compositions of them in their own words. Thus combination with questions and grouping teaching, tries to create a diligent classroom environment, and improve the culture skill of the teachers, and simplify the complex knowledge to learn easily. For the electrical circuits, introduce step by step, to make students participate in them, and understand them.

There are a lot of theoretical formulas and derivation processes in the automatic control principle material. It is focused on the establishment of the theoretical formula model, the physical meaning and application. For a large number of formula derivations, we can arrange from the ideological analysis, dilute the cumbersome mathematical derivation process [10]. Such as in the derivation of mathematical model of professional problems in the use of non-steady-state heat transfer and mass transfer, often let students cannot understand in the absence of physical knowledge, even the weary. So it requires teachers to use modern teaching methods, make the content more concise, easy to understand, in order to make students interested in learning.

3.3 Strengthen classroom practice.
Because of many concepts and exercises, if students have no good understanding and do questions, cannot produce better results. So we must boldly reform the teaching organization method. It should set exercises class’s time in professional teaching plan, answer questions in spare time, while require the completion of homework and exercises on time. As many students have less activity, it should take a combination of Q & A. That is, in the question time teacher can focus on some classmates questioned. The individual students can give appropriate inspiration and guidance, and finally point out their wrong question, and give the correct conclusion. The timing of the assignment can guarantee the effect of the exercises.

The subject of automatic control principle is also a discipline based on the experimental study. The experimental teaching is an important part of automatic teaching. Because of the limited time of laboratory software learning, students don’t understand every detail of the experiment. To deepen the impression and improve the experimental results, students are required to do the necessary experimental summary after experiment lessons [11]. Teachers must do the necessary guidance to deepen the students’ understanding of the experiment, strengthen the experimental results, and further inspire students’ innovative thinking. Thus it can effectively promote the effect of experimental teaching.

Each class is encouraged to establish a learning-subject group which has a number of students with excellent academic performance. The study chairman is the group leader, is responsible for organizing activities. The study group has the higher goals and tasks. The study group has learned part of the planned theory of deeper learning content or graduate part of the course content, so that they can find questions, analyze problems and solve problems at a higher level. Teachers help the study group of experimental counseling after class time. More, the teachers can set up open laboratory project to do the depth experiments, such as configuration, network protocols, dynamic addressing. Therefore, the team members may touch the mainstream of today’s society, improve
their confidence. At the same time, the team members can help other students in poor situation, discuss issues and analyze the problems with other students. Thus it is good to promote class style and study style, and cultivate outstanding students.

3.4 Reflections on the transition period

In the new period, the every professional expectation is the higher level of applied talents. But the theoretical class hours are further compressed. It is a challenge to study the strong and weak electric subjects about the non-electrical speciality. It is suggested that the basic theory of automatic control should be carried out based on the "automatic control principle of building equipment" by Professor Y.F. Li. That is the system description of the controller, actuator and object to be adjusted. The classroom experiments are classified the understanding ability as exercise projects. In addition, the open experiments are promoted to encourage the appearance of the outstanding students.

4. Conclusion

Building electrical (strong electricity) as a professional course should be known for the application of students. The principle of automatic control (weak electricity) has both theoretical and practical dual characteristics, and has a long-term impact on the professional depth of knowledge and innovation. In the teaching process, the teachers should not only transfer the necessary and basic knowledge to students, but also pay attention to the mixed teaching method. They emphasize the combination of theory and engineering practice, cultivate the application ability of analyzing and solve practical problems, and improve the professional quality of students. The students with different levels have the different teaching contents, teaching methods and teaching objectives. This can stimulate interest for students in the future study and work, and lay a good foundation.

The mixed teaching effect is the goal of every teacher’s tireless efforts. Aiming at the characteristics of non-electric specialty, we have discussed the teaching characteristics aspects, teaching experiments, and teaching method of the strong and weak electric course. All of the above is hoping to promote the future teaching reform.

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6. References


