

Exploration and Practice of “Full Participation” Teaching Method

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Abstract—Firstly, the disadvantages of traditional teaching mode in electrical and electronics fundamental series courses are analyzed in the paper. Secondly, to overcome the disadvantages, this paper conducts effective teaching reform in an overall way from integration of theoretical teaching content, practice training, teaching means, teaching aids development and assessment method, and eventually concludes these reform measures into “full participation” teaching method with certain innovation significance. The method has strong practicability. It accords with the cognitive rules of students, and be able to guide students to actively participate in teaching activities and effectively motivate students’ learning enthusiasm, guide them to become interested in follow-up professional courses, improving their engineering consciousness and innovative thinking ability and providing more satisfactory students for society and employers. The teaching effect of the method is obviously superior to the traditional teaching method, having great value of popularization.

Keywords—*electronic and electrical; series courses; full participation; teaching method*

I. INTRODUCTION

The accumulative trend of economic globalization and rapid development of science and technology has brought a series of impacts on talent training model, specifications and requirements, teaching content and curriculum system in universities and college. Electronic and electrical basic series courses (hereinafter referred to as “serious courses”) are the technical basic courses of various electrical information specialties. The reform of serious courses is directly related to the training quality of electrical information professional talents and their employment. Therefore, the effectiveness of the reform is particularly important.

“Series courses” carry out teaching in the traditional mode and have the following disadvantages:^[1-5]

● **Analysis on the nature of curriculum:** this kind of course has strong practicalness. Traditional teaching

process imparts knowledge to students in the single way of “infusion-cognitive-verification”. It focuses on the teaching of theoretical aspect, lack of practice training.

● **Analysis from time arrangement:** currently new knowledge and new technologies keep emerging. Colleges and universities need to impart much more knowledge to the students compared to before. Therefore, the contradiction between reduction of teaching hours and increase of teaching content has been reflected.

● **Analysis from assessment method:** the traditional assessment method mostly takes the form of “judge students with one exam”, making students only pay attention to the final exam. They only study hard before the exam, and pay little attention to the accumulation of knowledge and the training of ability at ordinary times.

● **Analysis from the quality of students:** In recent years, with the constant expansion of enrollment, the higher education in China has changed from the previous elite education to popular education. The overall quality of students has declined compared to the past. A considerable amount of students have low learning interest and enthusiasm, along with poor ability of self-discipline.

● **Analysis from social needs:** While the university graduates facing “employment difficult”, the employing units also have the “difficulty of selecting talents”. The biggest difficulty in college students’ job search is “lack of work experience”. The main reasons is that the course setting and content teaching in traditional teaching mode is seriously separated from social needs. It does not pay attention to the cultivation of students’ practical ability. There are plenty of “professors” in universities, but lack of “coaches”.

Through the analysis of the disadvantages of traditional teaching, the reform of teaching method of “series courses” in our school has been gradually explored and carried out in our

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school by research group. It aims to guide students to actively participate in teaching activities, fully mobilize the enthusiasm of their independent learning, and increase their interest in follow-up professional courses, improve their engineering awareness and innovative thinking, providing satisfactory talents for the society and employing units.

II. EXPLORATION AND PRACTICE OF THE METHOD

(1) Carefully study and integrate the theoretical teaching content, create the space of "thinking" and "inquiry" for students, so as to realize the transformation of teaching methods from "Instillation - Cognitive - Verification" to "Guide - Inquiry - Application" and the change of the teacher's role from authority to partner.

Regarding current problems of teaching hours reduced, and the contents that need to master increasing, and the overall level of the students declining, teachers of research group carefully study, integrate theoretical teaching content, and emphasize "teaching" and "learning" design. At the beginning of these basic courses, teachers provide students with a number of comprehensive design topics, and let them choose one in the form of learning groups, and the topic will become the goal of entire teaching process after selected. When the course comes to the practice content, assign simulation and physical lapping and arrange students complete them independently or in group after class based on the practice content. Typical content uses the time in class to carry on special topic discussion. This not only arouses the learning enthusiasm of students, deepens their understanding of knowledge, but also strengthens their awareness of engineering practice and improves the efficiency and effectiveness of learning. Fig.1 is the schematic diagram of "full participation" teaching method with the example of "intelligent traffic light" integrated design.

In the classroom teaching, teachers integrate into the practice teaching content^[3], and guide students to participate in the whole process^[4]. Finally, the teaching mode is transformed from the traditional "Instillation - Cognitive - Verification" to "Guide - Inquiry - Application". This will not

only enable students to sort out the knowledge clues, have overall understanding of the learned knowledge, but also inspire students' active thinking, improve students' learning interest and innovative thinking ability^[5], and promote the communication between teachers and students, eventually realizing the change of teacher's role from authority to partner.

(2) Reform experiment and practice link, improve the participation of students in the whole teaching process, achieving the transition of students' position from passive learning to active participation.

Theoretical teachers and experimental teachers closely link with each other. They discuss the contents of experiment together, and use several small scale integrated design experiments to replace the original verification experiment. Theoretical teachers are responsible for arranging the experimental task to the students according to the teaching progress, require them to complete the schematic design and simulation and write the first draft of the report of the experiment before entering the laboratory. Students directly verify the design results after entering the laboratory. Experimental teachers are responsible for the acceptance of the experimental results and give achievements. Experimental achievements are included in the achievement at ordinary times. The teacher encourages and guides students to complete complex comprehensive design topics. Students who complete the topics well can be exempted from examination through the way of making public reply in acceptance. This method has greatly aroused the students' enthusiasm to actively participate^[4].

The reform effectively solves the practical problems of the disconnection between theory teaching and practice teaching in traditional teaching, and realizes the change of students' status from passive learning to active participation.

(3) Combination of a variety of teaching methods to improve the overall teaching effect, realizing the transformation of teaching method from demonstration and cognition to inquiry and application.

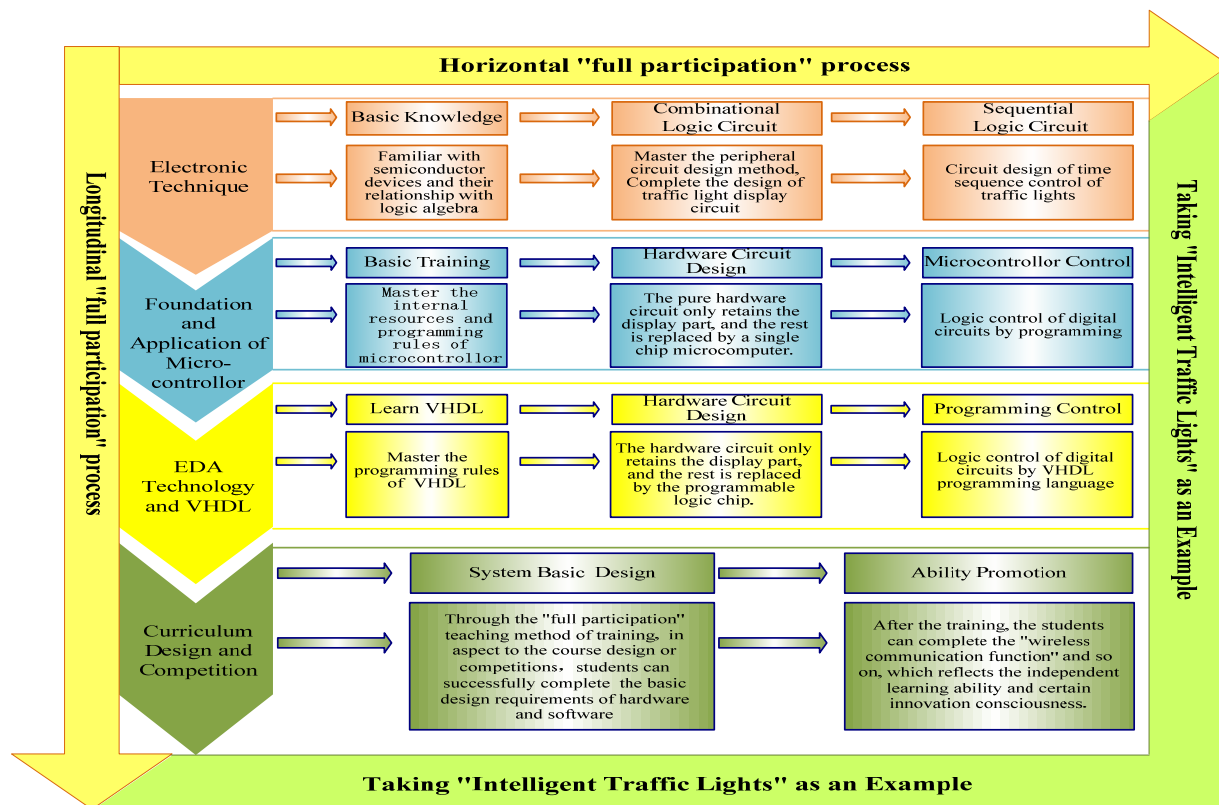


Fig. 1 Diagram schematic of the teaching method of "full participation" in the Courses

The courses are characterized by strong theoretical and practical definition. But at present, these courses are reduced in curriculum hours while the contents are increased, which is difficult for students to accept. In view of this practical problem, teachers of research group make full use of modern information means^[6], make all kinds of video tutorials, establish online interactive channel (such as QQ question and answer group, WeChat public course platform, etc.), to strengthen the guidance of students. This approach has greatly eased the pressure of reduced curriculum hours and heavy task. Students generally reflect that the effect is good.

Teachers of research group have also developed multiple sets of portable experimental device, which not only allows students to learn and use at any time anywhere, but also solve the problems of insufficient laboratory space and equipment in school. Related laboratory also materializes the teaching achievement into the experimental equipment, and set up the experiments for relevant specialty students, including digital electronic technology, analog electronic technology and microcontroller principle and application, etc.

This method finally realizes the transformation of teaching method from demonstration to inquiry application.

(4) Increase the proportion of the achievement at ordinary times, and use the "cumulative process" assessment method to ensure that the "full participation" teaching method to achieve the desired effect.

In order to ensure that the "full participation" teaching method to achieve the desired effect, we increase the proportion of the achievement at ordinary times (general

accounting for 30%~50%), revise the standard of the achievement at ordinary times. In the open, fair and equitable premise, we use the cumulative process assessment method on assessment, so that students with poor autonomous learning ability and poor self-discipline can also be "pushed" forward. This assessment method eventually received significantly better teaching effect than the traditional teaching method.

III. METHOD'S INNOVATION POINT

A. Innovation of educational idea

In order to solve the traditional teaching mode's disadvantages of little practice opportunity and low autonomous learning enthusiasm of students, this method takes "four changes" as the innovation point of the teaching idea, namely:

- 1) Realize the transformation of teaching methods from "Instillation - Cognitive - Verification" to "Guide - Inquiry - Application".
- 2) Realize the transformation of teacher's role from authority to partner.
- 3) Realize the change of students' status from passive learning to active participation.
- 4) Realize the transformation of teaching method from demonstration and cognition to inquiry and application.

B. Innovation of teaching methods

Teachers of research group carefully study and integrate theoretical teaching content, emphasize "teaching" and

"learning" design, and integrate practice teaching in classroom teaching. Combining a variety of teaching methods with the implementation of "Guide - Inquiry - Application" teaching method, they explore the "full participation" teaching method, which effectively solves the disconnection between theory teaching and practice teaching in traditional teaching.

C. Innovation of assessment methods

Increase the assessment efforts of the achievement at ordinary times, and take the "cumulative process" assessment method as a means of supervision to ensure the "full participation" teaching method to achieve the desired effect.

IV. CONCLUSION

At first, the project was put into effect in two specialties of electronic information engineering and electronic information science and technology in our school. Later, it was further promoted in the automation professional excellence engineer class, the electrical engineering and automation professional excellence engineer class, the experimental class and Kampuchea foreign student class in our school. The teaching effect is satisfying. But in our school, some specialties will include more classes, such as electrical engineering and automation, automation and information engineering, etc. It can't be popularized in large area in these specialties. We are exploring an effective way to promote the application of project achievements in these major specialties. The main approach is to rely on the Institute of Electrical Engineering College Student Innovation Center, and promote by means of the "autonomous learning, voluntary practice" of students. At present there are more and more students in electrical engineering and automation participating in practical activities.

We are prepared to take the "let one point guide a whole area" method in the next step, and let students who have the initiative learning enthusiasm be group leader, and establish learning groups within the class to drive the majority of the students to participate in the practice. The teachers are responsible for guiding the students in practice. Believe that more practical teaching experience will be explored in the process to comprehensively improve the teaching effect of professional basic courses.

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