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Exploration of "Power Electronics Technology" Teaching Method for New Engineering

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Abstract: *In recent years, even though the new economy and new technology are constantly developing and progressing, the teaching of power electronics technology in many colleges and universities is still slightly behind. The progress of the times has not led the teaching to keep pace with the times. The lag of college education to a certain extent, it hinders the further development of this technology. Therefore, under the background of the rapid development of new engineering, how to cultivate relevant professionals in power electronics technology, so as to effectively solve the problem of the lack of high-quality professional and technical personnel in enterprises and institutions remains to be considered. This paper discusses the teaching methods of "power electronic technology" under the background of new engineering, in order to improve the teaching effect.*

Keywords: *New Engineering, Power Electronics Technology, Teaching Method*

1. Introduction

As a comprehensive basic discipline, power electronics technology has the characteristics of fast speed, large content and wide coverage in terms of content update, which is closely related to engineering practice. In the past, the teaching of power electronics technology used classroom teaching to explain relevant theoretical knowledge to students, interspersed with experiments and curriculum design in the teaching process, and seldom cultivated students' practical ability, and also applied to engineering. There is little teaching, which is contrary to the requirements of cultivating innovative talents and engineering and technical talents under the current new engineering background. Therefore, the traditional teaching methods must be improved to meet the requirements of the new environment.

2. Problems existing in the teaching of "power electronic technology" under the traditional background

2.1. Teachers' teaching concepts and teaching methods are outdated

In the past "power electronic technology" teaching process, teachers always occupy the dominant position of teaching. Teachers will independently complete the explanation of the entire course, unilaterally help students to review, independently teach new course content and import new course content, etc. During the course teaching, teachers will first introduce the development history of power electronic technology and its practical application, and introduce power electronic devices and some common problems in the application of these devices to students one by one. Usually in the teaching process, teachers unilaterally export knowledge, but lack of training on students' innovative ability. This kind of teaching is far from the requirements for engineering talents training under the background of new engineering.

2.2. The teaching material system is lagging behind

With the progress of the times, most of the textbooks compiled according to the traditional curriculum standards are based on the subject system. In the design of the content of the power electronics technology textbooks, the overall and systematic nature is emphasized. Therefore, even if the new economy, new technology, and new engineering are constantly developing and progressing, However, there is still a certain lag in the updating of teaching materials. Based on the background of new engineering, in order to change the lag of the traditional teaching material system, and based on the demand for talent training in power electronics technology teaching, it is required that the setting of teaching materials should focus

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on professional practice, and effectively combine some relevant professional courses to develop rationally. teaching materials.

2.3. Lack of innovation in student academic evaluation system

In the past, the comprehensive evaluation in the student academic evaluation system was based on the comprehensive evaluation of final exam results, coursework completion, classroom participation and performance, and could not meet the requirements of the new engineering background to provide an objective and true assessment of students' learning. There is a lack of innovation, and it cannot meet the needs of a comprehensive and true reflection of the students' learning situation.

3. Research on the teaching method of "power electronics technology" under the background of new engineering

3.1. Link theory with practical application to attract students' interest in learning

In the process of "power electronic technology" teaching, combining theoretical knowledge with practical application can effectively attract students' interest in learning, thereby strengthening students' ability to solve tedious engineering problems. Taking DC/DC converters as an example, in our daily life, there are many application scenarios of DC converters, such as mobile phone chargers, notebook power adapters, etc.[1] When introducing the knowledge about DC converters, mobile phones can be applied The inner working principle of charging is explained, which can not only help students better understand the relevant knowledge of power electronic technology, but also further strengthen students' interest in learning the knowledge content and promote the improvement of course teaching quality. In the teaching process of the power electronics technology course, there is a special explanation of the relevant working principles of circuit topology. In the textbook, the input and output voltage and current waveforms are explained theoretically, which clearly explains the working process of circuit topology. , how the DC voltage is transformed. Although the working principle is explained in detail in the textbook, pure theoretical teaching is a little boring and difficult to understand for students who are just beginning to contact the "Power Electronics Technology" course, so it cannot arouse students' interest in learning. Therefore, based on the background of new engineering, in the process of teaching "power electronic technology", teachers must combine the theoretical knowledge in the textbooks with practical applications to teach students, so as to improve students' interest in learning, and help students to have a deeper understanding of power Exploratory research on electronic technology.

3.2. Introduce new technology platforms to improve teaching quality

With the progress of the times, based on the background of new engineering, a platform for experts and scholars to research and develop new power electronic technology has emerged for the teaching of power electronic technology - Matlab/Stimulink. It allows users to independently study power electronic technology, fully open the user's imagination, help them conduct research according to their own ideas, and then propose new theories related to power electronic technology, and can also conduct in-depth analysis and inspection of existing theories. This new platform is not only less expensive to check, but also more secure than other methods. In the traditional teaching mode, teachers will unilaterally instill knowledge on students, and teach students the basic theory of power electronics technology. Through theory, the input and output voltage and current waveforms of related circuits can be analyzed and obtained, but in the process of teaching based on this background, due to the lack of effective communication between teachers and students, it is difficult for students to participate in the teacher's unilateral immersive lectures Therefore, the final teaching effect is unsatisfactory. Matlab/Stimulink is a very reliable verification method for power electronics technology. It allows students to learn independently through this platform, which effectively enhances students' sense of participation and initiative in the teaching of power electronics technology. Secondly, Matlab/Stimelink provides the possibility for students to conduct independent research and design of power electronic topology, which improves the authenticity and reliability of theoretical analysis, not only improves students' interest in learning, but also has a very good effect in teaching effectiveness.[2] For example, in the process of theoretical analysis of the DC simulation circuit, there is a certain deviation between the actual analysis results and the simulation results. From this, we can know that the pure theoretical analysis and the actual results are not completely consistent. It is not helpful to truly understand the difference between theoretical analysis and actual results, and students cannot know the reasons for the difference. Using the

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platform of Matlab/Stimulink can effectively solve this problem, it can help students to conduct free analysis and exploration, help students to perfectly combine theory with practice, and help students understand the actual connotation and practical content of the theoretical part of the textbook. Advantages and disadvantages. Students can use this as a basis for better research and practice when they face complex engineering and technical problems in the future.

3.3. Improve the student evaluation mechanism and improve the interaction between teachers and students

In order to effectively enhance students' enthusiasm for learning and successfully teach students in power electronics technology courses under the background of new engineering, it is necessary to improve the students' academic evaluation system to ensure the scientificity and authenticity of the evaluation. Based on the training needs of engineering and technical talents under the background of new engineering, the teaching evaluation system of power electronics technology must clarify the content of evaluation, redefine evaluation standards, and clarify evaluation methods. In terms of evaluation content, the evaluation scope should comprehensively and comprehensively evaluate students' performance in the whole power electronics technology teaching classroom, course practice performance and completion of course tasks, including students' self-learning ability, course practice ability, Innovation ability, interpersonal communication ability, etc. The evaluation criteria are subdivided into multiple levels, including excellent, good, moderate, pass, fail, etc. The evaluation method should include students' mutual evaluation, self-evaluation and comprehensive evaluation of teachers. The weights of different evaluation methods should be allocated and then comprehensively scored, in order to make a fair, scientific and objective evaluation of students, and help students to comprehensively and comprehensively evaluate students. Accurately understand their own learning situation. Such an evaluation mechanism can strengthen the communication and exchange between students, teachers and classmates, thereby effectively improving the effectiveness of course teaching and fully fulfilling the requirements for high-quality personnel training.

4. Comprehensive teaching design scheme of "power electronics technology" for new engineering

In order to respond to the national and social requirements for the training of new engineering "electric power electronics technology" talents, and to explore better teaching methods, teachers can attach great importance to the curriculum teaching design. Teachers can adopt the professional teaching concept of "CDIO engineering education" in the process of teaching course design, focusing on cultivating relevant students 'professional skills, teamwork ability and students' ability to adapt and control the system. Based on this concept, teachers can take the development of specific engineering projects as the guide, organically combine the theoretical system and system in the teaching material, and then attract students 'interest in learning through effective technical discussion, analysis and design scheme, evaluation of loopholes and other ways to learn, and effectively cultivate students' team spirit and innovative thinking ability. "CDIO" comprehensive curriculum design scheme includes: query data, argument, analysis theory, design, project scheme, create simulation platform, practice analysis, comparison results, complete practice report, teachers can take this process, improve their teaching scheme, let students in the process of experiment familiar with engineering practice method, strengthen the innovation experiment consciousness, improve the classroom teaching effect, ultimately effectively promote the cultivation of high-quality engineering and technical personnel, the specific implementation process is as follows:

4.1. Search for information

Urge students to do a good job of data query before the experiment, cultivate the students good engineering practice habits, let the students through the relevant project data sorting and induction, early to understand the project related background knowledge and development trend, the existing technology of related engineering, in order to deepen the students' understanding of the relevant theoretical knowledge. After this step, students' ability to search, summarize and organize relevant literature will be strengthened, and their summary ability will also be effectively improved in the experiment.

4.2. Demonstration scheme

After guiding the students to query the relevant experimental materials, we must also let the students

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make clear their own experimental task, and give the corresponding implementation plan for the task. In the process of practice, the teachers should also guide the students to form their own teams, and let them discuss and demonstrate the proposed plan with the students. By guiding students to discuss and conduct division of labor and cooperation, it can effectively stimulate students 'enthusiasm for course practice, improve their enthusiasm for innovation, which is very helpful to the cultivation of students' teamwork ability.

4.3. Analysis theory

Students according to their own experimental tasks, the relevant knowledge points of classification, and then the relevant knowledge points of logical decomposition, and the decomposition of each submodule for mathematical modeling and control respectively, do a good job on the analysis of theoretical content, this step can effectively cultivate students' logical analysis, sorting ability.

4.4. Design project plan

After the classification, each sub-module has different operation characteristics and different principles. Teachers should guide the students to design the project system circuit and control parameters respectively for each specific project practice requirements. To complete this work, students must first have a very deep grasp of theoretical knowledge, so that they can give corresponding and effective project plans according to different practical requirements. This process is to focus on cultivating students' ability to analyze and deal with problems.

4.5. Practice analysis

Based on the MATLAB construction platform, guide the students to test each simulation module and the whole system, timely monitor the actual waveform of the simulation oscilloscope conduction to the display during the process and the practice data of each link and module of the experiment, and then analyze the various characteristics of the experimental results.

4.6. Contrast the experimental results

To guide students to compare and analyze the results after theoretical analysis combined with the experimental results after practical analysis, analyze and summarize the operation rules of the experimental model, and guide students to further improve and optimize the previous project design scheme, so as to deepen their understanding and application of the theoretical content of the teaching material.

4.7. Complete the practice report

The whole design process and implementation steps are finished, one of the most essential work is writing practice report, teachers should guide students to access the literature, in the process of experimental data and content and the final experimental results, and the final experiment and conclusion listed in the form of standard practice report, so that not only can effectively cultivate students 'writing ability, the whole logic, analysis and summary of students' future work and study also has a good effect.

5. Conclusion

In order to meet the needs of talent training in the new engineering environment, in the process of teaching power electronics technology, it is necessary to determine new teaching objectives, update teaching content, help students acquire new knowledge, and help them develop new engineering skills, in order to improve In addition to the theoretical knowledge of power electronics technology, students can also effectively strengthen their engineering practice ability, so that students can have an independent and innovative awareness in the process of learning and practice. By combining theory with practical applications, citing new technology platforms in the teaching process, and improving student evaluation mechanisms, help students improve their ability to deal with practical engineering and technical problems, and ultimately become innovative engineering and technical talents that contribute to social, economic and technological development.

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References

[1] Guo L, Li Y, Zheng A, Jin N, Wu J, Dou Z. Exploration of "power electronics technology" teaching method for new engineering. Education and Teaching Forum, 2020; (38):303-304.
[2] Wang C, Yang X, Li J, Sun X, Lu L. Exploration of the project-based teaching method of "power electronics technology" course under the background of new engineering. Modernization of Education, 2019; 6(70):63- 64+70.