

Teaching Reform and Practice Based on <Automatic Control>

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Abstract. According to the characteristics of the course of electrical control professional control theory, the concept of engineering education is used to design, implement and run the system throughout the teaching process. All the thinking and design of teaching design, teaching method, teaching method and organization form are carried out. Practice has proved that the reference to the concept of engineering education, so that students feel useful, to stimulate students' interest in learning, improve students' engineering practice ability and innovation ability, to improve the quality of teaching provides a new way of thinking.

Introduction

<Automatic Control Theory> is an important basic course of engineering students, but also a theoretical and engineering practice are strong professional basic course. The traditional teaching of teaching content and the way outdated, backward; Teaching methods emphasis on spoon-fed, lack of inspiration guide, Students lack knowledge of practical problems, it is difficult to use the knowledge used in engineering practice theory and practice. On the basis of summing up the experience and lessons of traditional teaching, this paper makes use of the principle of CDIO engineering education, and makes some useful aspects of the theoretical teaching content, teaching methods, teaching methods and practical teaching of the course.

Introduction of CDIO

CDIO education model is based on the concept of product, process and system design, implementation, implementation and operation of the entire life cycle as the background of the educational philosophy as the carrier, so that students take the initiative, practice, the way between the organic way to learn, access to engineering ability. CDIO engineering teaching uses modern teaching methods, innovative teaching models and new learning environment to provide students with practical learning experience close to engineering and provide students with practical application opportunities to help understand and remember these abstract concepts. Into the CDIO "automatic control principle" curriculum reform, is to strengthen the combination of curriculum theory teaching and practice, in practice, classroom discussions focus on training students' engineering awareness, practical ability, teamwork and other comprehensive quality.

Theoretical Teaching Reform

Optimization of teaching content. Teaching content optimization is an important part of teaching reform, it is also the core to improve the quality of teaching. Traditional teaching in the use of mathematical efforts, abstract, complex computing, combined with the needs of personnel training objectives, the original curriculum content was updated, enrich and adjust. In view of the key contents of the syllabus, the basic concepts, the basic principles and the basic analysis methods are explained first. But for some theorem as long as the correctness and satisfaction to meet the conditions can not pursue its proof of the process; Combined with students familiar with the engineering examples, so that students have easier entry point, to stimulate students interest in learning. After the teaching reform, we finally determine the course content is: the basic concept of

the automatic control system, working principle and basic composition; automatic control system modeling; automatic control system time domain, frequency domain analysis and automatic control system design (calibration);The transfer function and frequency characteristics of the method; automatic control system time domain, frequency domain performance indicators of the analysis; the use of frequency method for automatic control system design; nonlinear systems and discrete linear system analysis and design.

Reform of Teaching Methods. Classroom teaching is the main way and way of students to acquire knowledge, and the quality of teaching directly affects the teaching effect. In the course of lectures combined with examples of life, integration of project teaching, pay attention to the combination of the actual engineering background, the system analysis and design, from the actual control system to understand the structural characteristics of the system, working principle. For the specific case, through the establishment of its differential equation, transfer function, structural block diagram, signal flow diagram of several different mathematical models to establish a model of contact, to strengthen the understanding of the theoretical knowledge of students. To strengthen the engineering practice ability training, based on the traditional teaching, integration of project teaching, virtual simulation and case analysis and other methods, so that students in the simulation of engineering practice environment to learn.

Project Teaching: project-based teaching is based on specific issues to find a solution to the problem. In order to meet the CDIO engineering education concept, relying on the project to 3-5 students as a group, teachers use coaching or co-exploration of the way to guide.

Virtual Simulation: a system to imitate another real system technology. The use of virtual simulation can make students in a more secure environment than the actual situation to improve engineering practice ability, in the control theory platform to apply the technology is feasible and necessary.

Case Study: can provide a lot of practical experience on the actual project, a typical case can also provide detailed background content. By discussing the case, students can personally experience the system or product CDIO process, and participate in the answer to the question, improve the students thinking and decision-making ability.

Diversification of Assessment Methods: In the comprehensive students in the knowledge, innovation, application and other aspects of the ability to use written examination, classroom interaction, experimental operation, project development and other diversified assessment methods. Diversified assessment methods, not only to promote students to master the mastery of classroom knowledge, but also attach importance to the knowledge of engineering applications and innovation, effectively improve the teaching level and teaching quality. Multi - dimensional teaching information feedback system is shown in Fig.1.

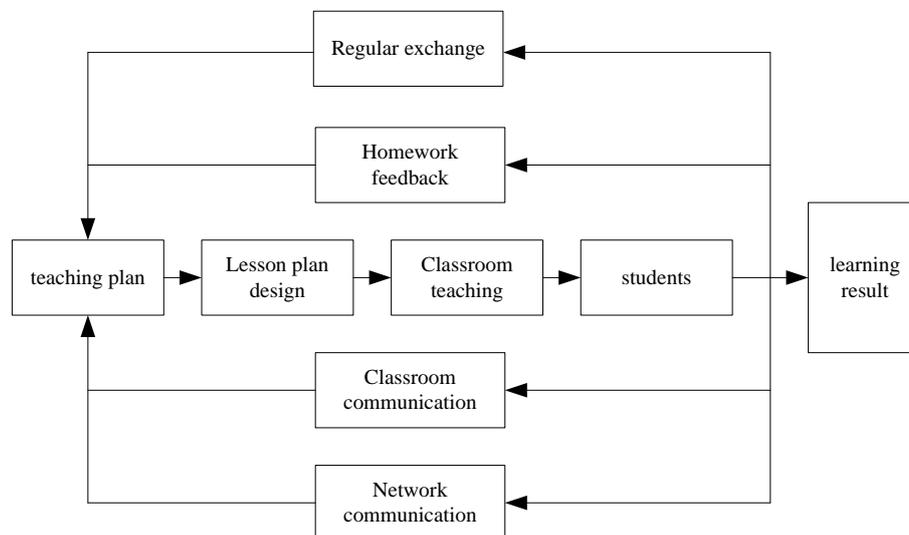


Figure.1 Multi - dimensional teaching information feedback system

Reform of Teaching Methods. Modern multimedia teaching means with intuitive, image, novel, fun and so on. PPT, MATLAB simulation software can be used as a teaching tool, through the simulation demonstration, making the abstract theory, the concept becomes more easy to understand. For example, we can use MATLAB software to write M program simulation system output waveform, the system root trajectory, the system of the Bode diagram and Nyquist curve, so that students have a deeper understanding of theoretical knowledge.

Moreover, through the actual demonstration in the classroom, so that students can better grasp the use of MATLAB software, while saving a lot of time manual drawing. The school also carried out the construction of online courses, students and teachers can interact online, submit homework, video lectures, exercises download and other links closer to the distance between teachers and students, but also improve the student's interest in learning. Bilingual teaching as the current emerging and important curriculum means should also be added to our teaching, some professional vocabulary to explain, simple and classic paper analysis, can improve the professional level of students at the same time, improve professional quality.

Practical Teaching Reform

Practice is the only criterion for testing truth, and practice is an assessment of the knowledge of students' knowledge. First of all, professional laboratories to complete the syllabus in the provisions and requirements of the verification, comprehensive experiment. Secondly, the computer simulation experiment based on Matlab software also requires students to master, students can use their own time to complete self-study, again, the production site visits and practice practice is also an important guarantee for students to enhance practical ability, and finally combined with the curriculum design or experimental. The use of MATLAB software, the preparation of M program or painting Simulink simulation map, to complete most of the tests in this lesson, can complete the verification test, but also to complete the design and comprehensive test.

Summary

Based on the CDIO concept of "automatic control principle" curriculum reform, from both theoretical and practical aspects, in the school of engineering students in the practice, The research proves that while mastering the professional knowledge, the students can better track the forefront of the international development of the discipline, grasp the development direction of the discipline, enhance the comprehensive ability of analyzing and solve the problem and improve the overall teaching level of the school. The construction of teaching and learning soft environment is the necessary guarantee to improve the quality of teaching. It is the prerequisite and foundation of establishing modern teaching mode. It is a useful supplement to traditional teaching. Based on the CDIO teaching platform, to achieve the sharing of educational resources, the image reflects the structure of professional knowledge module, broaden the students' thinking space, and fully demonstrate the superiority of modern educational technology.

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