

# Exploration on Teaching Reform of Electrical Drive and Control Course for Engineering Application

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## Abstract

According to the actual teaching situation of electrical drive and its control course for electrical engineering and automation specialty, combined with the new educational concept of theory and practice, the innovative teaching reform of this practical course is carried out. This paper focuses on how to carry out the education concept of integration of theory and practice into the teaching of this course. The reform measures proposed include selecting teaching contents, changing teaching methods, strengthening practice and so on, so as to stimulate students' interest in learning and enhance their practical ability, which has achieved good results in teaching practice.

## Keywords

Electric Drive and Control; Richard Solid Fusion.

## 1. Introduction

Electrical Transmission and Control is their core professional course, theoretical and practical, its relevant knowledge students can use at any time after graduation, has a deep impact on students' employment and work. With the development of industry and agriculture, the social demand for talents in this area is getting higher and higher, which requires teachers to carry out teaching innovation on the course of "Electric Drive and Control" in combination with the actual teaching situation and new educational concepts. In recent years, with the introduction of the education concept of the integration of reason and practice, the research group tried to combine the concept of the integration of reason and practice to carry out teaching innovation of this course, strengthen the combination of theory teaching and practice as much as possible, and focus on cultivating students' engineering consciousness, practical ability, teamwork and other comprehensive qualities in practice and theory classes.

## 2. Teaching Content Optimization

The research group updated and adjusted the teaching content in time from the practical and engineering point of view according to the educational concept of integrating truth and reality. This course in our school has a total of 48 hours, including 44 hours of theory and 4 hours of experiment. This course aims to combine control theory with various electrical transmission systems and solve the static and dynamic design calculation and physical realization of the system by using engineering methods. This course will involve many courses, such as power electronics technology, circuit, electrical machinery, control theory, motor drag foundation and computer control technology. The course content has dealt with the relationship between classic content and modern content well, based on the classic content such as dc speed regulating system single closed loop, and according to the actual situation of students, the content is appropriately expanded, that is, to keep up with the trend of new technology and practical application. The course structure is guided by the law of human cognition from shallow to deep. In teaching, on the premise of maintaining the relative stability of the content of the course itself, attention should be paid to the appropriate introduction of knowledge about

new technology, so as to enhance students' perceptual understanding, inspire students' innovative thinking and promote their independent development. The teaching content is in line with the professional requirements, and some current application cases are explained in the lecture. The relationship between classic content and modern development is properly handled. The content of the course is consistent with the target of application-oriented training, which can effectively cultivate students' innovative thinking and the ability to find, analyze and solve problems. The course teaching content is integrated into relevant practical cases, and relevant knowledge is obtained through the proposal, design, debugging and operation of cases, so as to realize the transformation from traditional teacher-centered teaching to student-centered learning [1]. In order to ensure the teaching quality of electrical Transmission and Control, the undergraduate teaching quality standards of various teaching links have been issued according to the school's orientation, training objectives and educational level. In order to investigate the quality standards of classroom teaching, the mechanism of supervision and evaluation, peer evaluation and student evaluation has been established. The supervision and peer evaluation evaluate the implementation of various quality standards according to the content of classroom teaching quality evaluation table, and make comprehensive evaluation of teaching content, teaching methods and means, teaching attitude and basic teaching skills.

Supervision evaluation: From the teaching content, the teacher of this class of teaching system of the comprehensive detailed and comprehensive in course content contains rich timely present development situation and the future development direction, at the same time, the basic principle about the logic is clear, the classroom use the select a lot of pictures in the PPT and data, the specific performance in combining with the actual production, Concretize complex and abstract problems with quotations. The evaluation result is true and good.

Peer review: From teaching methods, teachers in the classroom use of PPT, adopt the teaching methods, introduced a problem, it is very good to know at the moment doing what kind of problems to solve, and can adopt the way of classroom questioning, remind students to pay attention to listening, and will be made a problem at the beginning of the chapter page presented to students in the form of a mind map, Ask the students to have a specific direction while listening. The evaluation result is true and good.

### 3. Improvement of Theory Classroom

In order to make theory and practice closely combined, before teaching, students were given videos, animation courseware, training and other research, so that they could understand the actual application situation and typical application cases in the field of factory industrial automation. Through observation, students can have a deep perceptual understanding of the course, a clearer learning direction, and increase their interest in learning. Use multimedia teaching, optimize teaching means, enrich teaching process. The classroom teaching content should pay attention to the integration of truth and reality, and practice through the familiar demonstration of students, so that students can find problems by themselves, analyze and solve problems. Teachers play a guiding role and only explain basic theories, methods and skills, and cooperate with students to complete the project in other time. In the teaching process, let the students have the ability to establish a suitable model for electrical engineering problems or speed regulation system, clearly express and describe general electrical engineering problems; Infiltrate the enterprise's ideology and culture and work methods, so that students gradually have a good professional quality.

- (1) This course implements an integrated teaching mode of teaching, learning and doing;
- (2) Teacher-led and student-centered teaching methods such as reasons-and-reality integrated teaching method, guided teaching method, case teaching method, design task method, independent learning method and on-site teaching method are adopted for teaching .

(3) In the long-term teaching practice, the teacher summed up a set of training system suitable for skill cultivation and in line with the development of students' personality, that is, the cyclic process of demonstration, observation, imitation, explanation, improvement and practical operation. Teaching and researching activities in a planned way, every 2 weeks exchange activities, according to students' acceptance of different adjust teaching method, the course professional stronger, simply teach students understand difficulties, can combine the multimedia teaching, interspersed with video, animation, transform boring words vivid and interesting animation, so the combination of teaching results have certain achievements. Several other teachers will discuss teaching reform and even publish related teaching reform in response to this effect. Research papers, for teachers and students are progress, so the activities of the teaching and research office is more meaningful, we pool wisdom, continuous improvement, common progress.[2].

The practical teaching link can realize the parameter measurement of the motor system through the circuit connection of the relevant power module, which can well meet the training requirements of students; Practical teaching is effective in cultivating students' ability to discover, analyze and solve problems. The above methods fully embody the student-centered teaching principle. Reading, mobilize students' enthusiasm and participation enthusiasm, to achieve the teaching purpose of integration of teaching and doing, embodies the education concept of combining work and study, received a good result. Practice teaching assessment method: the traditional practice assessment is mainly based on the students' usual experimental course attendance, classroom performance and experimental report book three comprehensive assessment of students' experimental results. In the following practice assessment, in addition to these assessments, students should also be assigned some optional tasks, so that students can find their own methods to carry out the demonstration and design process, the teacher through the design of indicators for assessment and included in the results of the experimental assessment. Through the study of this course, students are able to design reasonable and feasible experimental schemes, optimize development environment and technical schemes, and implement solutions with scientific methods based on electrical professional knowledge and specific software and hardware requirements. In the course of teaching, we attach importance to the application of modern educational concepts such as enlightening learning, inquiring learning and cooperative learning in teaching. Be able to interact with students according to the course content and student characteristics to improve the teaching effect. In the course guidance, the new lesson content is introduced by using the situational diagram and common examples in daily life, so that teachers and students can interact and explore new knowledge. For example, in the discussion room, students sit around in a circle, and let students think independently first, then communicate within the group, then report, and other students supplement Correct, the teacher reveals the accurate conclusion, the expression; Consolidation exercises, extension (layering exercises); Comb knowledge, solve doubts.

#### **4. Practice Teaching Reform**

Experimental arrangement and theoretical teaching go hand in hand, changing the arrangement order of theory before experiment. In the past, in order to avoid the conflict of experimental arrangement, most teachers choose the teaching order of theory first and experiment later. Students reflect that the theory learned in this way is swallowed without understanding, and when it comes to the experiment, they forget everything. This arrangement makes theory and practice completely disconnected. In order to change this situation, the teacher randomly verifies the relevant theories through experiments to strengthen students' knowledge and understanding.

There is only one electrical control laboratory in our school. In order to solve the resource shortage, the laboratory is open all day long. Students can go to the laboratory in their spare time to strengthen their theoretical learning and project design through circuit design simulation, on-site debugging and physical connection. But, because it is strong electricity, when starting, there must be experimental teacher inspection guidance, and then electricity.

Strengthen case design. Complete the case studies required in each section and incorporate them into the course assessment. After a semester, this score is the average score of all the projects required for the whole semester, which urges students to design and debug projects and focus on practice.

School-enterprise cooperation should be established. For students with strong hands-on ability, they can get paid internships in surrounding enterprises through the contact of the school, which can encourage students to study theory and put into practice [3].

## 5. Assessment Reform

Combine teaching innovation, carry on reform to examine. In the new assessment process, we weaken the proportion of theory, and strengthen the assessment of experimental items and in-class tests, so that students pay attention to the experiment and simulation design from the ideological. The course design adopts a new design concept: teaching in the laboratory, simulating the real working environment, allowing students to participate in the process from regulator design, to the establishment of simulation model, to the final verification and analysis, so as to learn and master the knowledge and skills associated with the work process. In view of the realization of the test content of electric drive and control, it is difficult to accurately analyze the influence of regulator parameters on the motor speed, and it cannot deepen the students' direct impression of the influence of motor speed parameters on the motor speed. Therefore, the introduction of MATLAB SIMULINK software system simulation, for students in the theoretical curriculum design of the regulator for calculation and analysis, check and optimize their design of the regulator. It can not only deeply understand the regulator control model and other knowledge points, but also improve students' interest in learning, and improve their practical ability, so as to achieve the purpose of learning for use.

## 6. Conclusion

The theory solid fusion education mode is introduced into the teaching of the electric drive and control innovation, after several years of teaching grope for team members, has obtained the good teaching effect, greatly improve the practical ability of the students in our school this aspect, the students' interest in learning and unprecedented increase, but also enhance the students' practical innovation ability and teamwork spirit.

## References

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