

# The Innovation of Teaching Mode of Machine Tool Electrical Control in Technical Colleges

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**Abstract:** *With the deepening reform of the education and teaching system, as the cradle of the training of complex skilled personnel in machine tool electrical control, technical colleges and universities should adhere to the basic principle of keeping pace with the times, innovate teaching models, strengthen comprehensive quality, transport high-quality skilled personnel for the society, and promote the sustainable development of electrical engineering.*

**Keywords:** Teaching system; Machine tool electrical control; Innovative teaching mode.

## 1. SPECIFIC STRATEGIES TO INNOVATE TEACHING MODE AND IMPROVE STUDENTS' AUTONOMOUS LEARNING ABILITY

Autonomous learning is a kind of subjective consciousness, a good habit and an ability. Generally, students with autonomous learning ability are willing to contact with new things, full of strong thirst for knowledge and exploration, good at creating learning means that meet the overall development of individuals, and can reasonably allocate time, make learning plans, think about problems from a dialectical perspective, raise questions, and maintain a high degree of concentration in the learning process. Cultivating students' autonomous learning ability is the basic link of quality education and the basic requirement of innovative talent training mode. Only by ensuring that students have autonomous learning ability can we effectively strengthen teaching effect and help students build self-confidence.

### 1.1 Guide students to master correct learning methods and strengthen learning effect

To cultivate students' autonomous learning ability, we can neither rule out nor rely too much on the teacher's explanation. From the perspective of students, we should not only understand the essence of what we have learned, but also know what kind of learning methods can help us improve our professional level to the greatest extent. Teachers should refer to the teaching syllabus, master the basic laws of the machine tool electrical control course, reasonably plan the teaching process, and set up diversified teaching activities. The specific contents are as follows: First, teachers can ignore the new knowledge that is closely related to the old knowledge. On the basis of strengthening the old knowledge, they can establish phased learning objectives, let students think with their brains, use the transfer and extension of knowledge, break through obstacles, and successfully grasp the context and essence of new knowledge. For example, for the content of self-locking control, teachers can start from the connection and difference between self-locking control system and inching control circuit, let students find self-locking key points spontaneously, and deeply analyze the working principle of contacts. Secondly, for the explanation of new knowledge, teachers can take the "recent development zone" as the starting point, guide students to think independently step by step, and give detailed guidance and tips in key links. For example, when explaining the positive and negative control of contactor interlock, the teacher can start from the position of the interlock contact in the circuit to let students understand the fundamental role and practical meaning of interlock. Third, the review or practice class cannot become an exercise class and cannot blindly focus on the repeated interpretation of theoretical knowledge to avoid students' resistance. Generally speaking, the practice explanation should pay more attention to the process, let students analyze and examine the problem from a correct perspective, propose practical solutions, strengthen students' autonomous learning ability, and develop thinking patterns.

### 1.2 Adopt modern information technology to provide students with diversified independent learning channels

Autonomous learning is not only limited to the classroom, but also needs to make full use of spare time. Therefore, teachers should make efficient use of modern information technology to achieve good interaction with students and break through space constraints. Specific independent learning channel construction should start from the following aspects: First, the basic principles and specific strategies of the control circuit are then made into documents and transmitted to the class WeChat or QQ group in the form of compressed packets, highlighting the timeliness of interactive teaching. Second, students can ask questions through online social platforms at any time when they have questions, thus improving teaching efficiency. Third, before the new class, teachers can arrange preview tasks in social groups to urge students to get familiar with new knowledge in advance, so as to warm up the new class. Fourth, teachers can set diverse and interesting questions through social platforms to stimulate students' subjective initiative, attract students to explore actively and improve their learning ability. Fifth, teachers can sort out and upload the key and difficult points of the new course to the network platform, so that students can search in real time and deepen their impression. Sixth, teachers can announce the completion of students' homework on the social platform, praise the students with excellent performance, and adopt encouraging teaching to form a benign internal competition.

## **2. RELY ON SLIDES TO SIMULATE AND DEMONSTRATE THE PROCESS**

The advantage value of demonstration teaching method is embodied in strengthening students' perceptual cognition, facilitating the implementation of theoretical knowledge into practice, and deepening the internalization and understanding of knowledge. The teacher can show the customized slides that meet the teaching requirements before class, such as the correct circuit and fault circuit of the motor, use multimedia technology to simulate and demonstrate the operation process of the motor, ensure that students master the action principle of the circuit, understand the specific characteristics of all kinds of circuit abnormalities, arouse students' high attention, lay the foundation for carrying out practical teaching, and improve students' practical operation ability.

## **3. Set wrong questions to cultivate students' thinking**

From a dialectical point of view, "error" has special value. If we can deeply understand the causes of "mistakes", we can constantly summarize experience from failures and strengthen our professional ability. In the process of education and teaching, error correction can be used to cultivate students' thinking and form a complete cognitive model. For example, when explaining the contactor interlocking positive and reverse control circuit, the teacher can make appropriate small changes to the learned knowledge, draw a circuit diagram with hidden errors, let the students discuss spontaneously, put forward the error points, and analyze the reasons.

In the process of error correction, the teacher should correctly guide the students to find the error points by combining the common sense of the circuit, and encourage the exploration of different correction methods. Finally, the teacher should make an objective evaluation. In this way, it can not only deepen the impression of students, but also form a good interactive relationship. Formal teaching practice and efficient application of error correction teaching method can not only help students reviewing old knowledge can also deepen students' cognition of new knowledge, effectively improve teaching efficiency, stimulate students' interest, and achieve twice the result with half the effort.

## **4. Set diversified problems to improve teaching efficiency**

The teaching of machine tool electrical control in technical colleges should take students' practical activities as the starting point, especially for the teaching of complex control circuits. However, how to carry out thematic teaching from practical activities has become a new topic for educators in technical colleges to study. In fact, adopting the problem-based approach is the most reasonable and effective strategy. First of all, teachers should set practical professional questions in advance, guide students to think independently and stimulate students' subjective initiative. After reviewing the continuous forward rotation control circuit through the method of error correction, the following question can be raised: "In the process of industrial production, it is necessary to realize the flexible switching of forward and reverse rotation through the operation of the workbench or the lifting and lowering of the elevator, so how can we effectively control the running direction of the motor and ensure the safety and stability of its rotation?" In the process of students' independent thinking, the teacher can throw out the guiding prompt "By properly adjusting the power phase sequence of the three-phase motor, the rotation direction of the motor can be controlled." Then, how can we change the power phase sequence? This has also become an important turning point for the introduction of new courses, so as to satisfy students' "appetite".

## **5. ADOPT INTEGRATED TEACHING MODE**

Machine tool electrical control is a compulsory course for the installation and maintenance of electrical automation equipment. It is based on the intermediate electromechanical control, integrates the basic content of automatic control, and combines various media to realize the installation, commissioning and maintenance of electromechanical integration equipment. In the field of education and teaching, various learning tasks should be arranged in combination with specific work processes. The integrated teaching of machine tool electrical control should start from the following aspects:

### **5.1 Efficient application of integrated teaching mode**

Compared with traditional teaching methods, the core of integrated teaching is guidance and inspiration. In the actual teaching process, students' enthusiasm is stimulated by setting diverse tasks. Teachers can set more typical work tasks and reasonably decompose the main teaching tasks, which can reduce the learning pressure of students to a certain extent. In addition, teachers can set questions, assign tasks, urge students to use their spare time to consult relevant materials, spontaneously form a help group, carry out in-depth discussions on specific problems, obtain solutions to problems, and consolidate professional theoretical knowledge. In case of disagreement or new knowledge, teachers should unify the time, adopt necessary modern teaching methods, systematically explain relevant contents for students, remove obstacles, and help students build self-confidence. For example, the use of PLC expansion port, setting the operation parameters of frequency converter, adjusting the motor drive parameters, etc.

### **5.2 Adopt demonstration teaching methods to stimulate students' interest**

In the demonstration operation, teachers should correctly demonstrate and guide representative problems to ensure that students understand their practical significance and application skills. In this process, teachers need to abandon the idea of "only me" and avoid sweeping. We should pay attention to cultivating students' extensibility thinking and strengthening their comprehensive ability. For example, for the parameter setting of motor drive, the teacher can use the position mode as a case to stimulate students' interest and cultivate the ability of independent learning.

### 5.3 Realize the organic combination of theory and practice

After in-depth discussion in the group, submit the task plan that has been repeatedly confirmed and improved. On the one hand, students should learn to maintain efficient interaction with the service object, negotiate and demonstrate the rationality, feasibility and standardization of the project, and obtain the approval of the service object. Teachers should objectively analyze the advantages and disadvantages of the scheme based on the overall situation of the project and make a decision on whether to allow the scheme to be tried out. In the process of practical operation, if there is a problem that is difficult to solve, the teacher can give correct guidance and prompt, instead of telling the whole solution to the problem, and let students explore again according to the clues to find innovative solutions.

### 5.4 Urge students to record learning logs

In the process of integrated teaching, students should not only master more comprehensive and solid professional knowledge, but also focus on cultivating their professional ethics, improve their ability to analyze and solve problems, strengthen team cooperation ability, and better integrate into the specific learning process. Based on this, teachers should always pay attention to the students' records of the learning process, and urge them to record the knowledge and feelings gained from each time they put into the task. When completing the project, the team members will make a periodic summary report and comment on the advantages and disadvantages of other teams, so as to exercise students' language organization ability, social ability, coordination and communication ability and management ability. In addition, teachers should give full affirmation, encouragement and respect to students' research results, carefully read students' learning logs, and make correct corrections. If necessary, they can talk to individual students to understand their plight and psychological burden, so as to close the distance between teachers and students, ease their negative emotions, let students master the correct learning methods, eliminate all external interference as much as possible, and participate in professional learning, So as to improve the level of professional skills.

## 6. CONCLUSION

To sum up, in the process of carrying out the teaching of machine tool electrical control, technical colleges and universities should fully fulfill the basic requirements of the education and teaching system and talent training mode, break through the shackles of traditional teaching concepts, innovate teaching methods, and carry out diversified teaching activities, so as to improve students' professional skills and strengthen their comprehensive quality.

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