

Self-adaptive Development of Mechanical and Electrical Major in Application-oriented Universities

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Abstract: Mechanical and electronic engineering is a hot specialty in the market, where there is a great demand for mechanical and electrical talents, which puts forward a high demand for the cultivation of mechanical and electrical talents. Based on the current situation of mechanical and electrical engineering professionals, this paper puts forward some self-adaptive development measures for them from the aspects of professional development goals and professional positioning, professional connotation construction, teachers' team construction, strengthening employment guidance, and not forgetting the original intention of professional training, etc., to implement the training of applied technology talents.

1. Introduction

The major of mechanical and electronic engineering, based on the theories of mechanics, electronics and information, uses computer technology, measurement and control technology and internet plus as technical means to solve complex technical problems in electromechanical systems and realize the intelligentization of end products or systems (such as robots). It emphasizes "mechanical-electrical-hydraulic integration" and interdisciplinary integration (system integration), and pays attention to the application of computer technology, automatic control technology, information technology and new technologies. At present, many colleges and universities take the opportunity of constructing the first-class universities and disciplines of the world to set up quality monitoring mechanism of talent cultivation based on evaluation by benchmarking engineering education certification standards, optimizing talent cultivation scheme, deepening teaching reform, refining and implementing practical teaching conditions. Especially in the current development trend of intelligent manufacturing, many products such as 3D printers, various robots and automatic production lines are mechanical and electronic products, and the mechanical and electronic industry, where mechanical and electronic personnel are located, has been following the pace of the market and is a sunrise industry. With the continuous development of the society many products have richer functions, which requires its technical support to keep up with its needs, and puts forward higher requirements for the training of professional talents in its universities. Therefore, the author will also talk about the adaptive development of the applied technology-based university industry from the following aspects.

2. Determine development goals and positioning of the major

2.1 Market demand oriented

At present, there are about 180 undergraduate colleges and universities offering mechanical and electrical majors in the country, and nearly 40 of them are the original traditional independent colleges and universities. The orientation of personnel training levels for mechanical and electrical majors varies in all kinds of colleges and universities. For example, many colleges and universities, especially key colleges and universities, give priority to the cultivation of research-oriented talents at the doctoral and master level. The traditional second-tier colleges and universities mostly focus on the cultivation of compound talents, while higher vocational colleges on skilled talents. The

training of applied technical talents at the intermediate level obviously cannot meet the needs of the society. At present, the new college entrance examination model is implemented in many provinces, with emphasis on major ranking when recruiting students. However, in the minds of ordinary people, they all have their own views on the level of colleges and universities, and there is also big data analysis at Cuaa.Net, so major development is the last word to distinguish from private and public universities, and 985/211 universities and others. General colleges and vocational colleges have a fresh way of thinking about the goal of personnel training and professional development, which is concise with characteristics and can adapt to the market demand and has its own characteristics^[1].

2.2 Paying attention to major research work, improving the quality of research

The formulation of professional personnel training programs is definitely not to be done behind closed doors. There is no right to speak without investigation. The outbreak of epidemic has changed the world order and the way of education and teaching, so it is necessary to optimize its research work and improve the quality of research on the basis of traditional research. Teachers should go out and find teaching inspiration in practice, accumulate teaching cases and explore educational ideas. For example, the research can be made in a centralized and decentralized manner, and the time can be decentralized. It does not necessarily have to be a special work, which can be interspersed with a year's work, for example, as a teaching and research activity to investigate the laboratory construction of a university. Practice can be carried out simultaneously online and offline. It can be a face-to-face conversation between an enterprise and an engineer/technical executive, or an online face-to-face conversation. Each has its own strengths. offline face-to-face has its own reference, while online face-to-face speakers have time to think and express their opinions more fully. It also includes the analysis of the data at Cuaa.Net and the data analysis for recruitment by major job-hunting websites, to understand the talent development and the demand analysis of the talent market from various aspects. In a word, the research work should be optimized in various ways to improve the quality of the research^[2].

3. Enriching the connotation of major construction and promoting its characteristics

The sustainable development of major must be systematically supported by its connotation structure. Curriculum is the main carrier of knowledge transmission, and the setting quality of its curriculum system reflects the characteristics and level of running a school. According to the development direction of specialty construction, combining the research content and market demand, we should update the curriculum system construction content, strengthen the specialty core curriculum construction, integrate the curriculum content, highlight the professional basic knowledge and skills, and establish a suitable curriculum system^[3].

3.1 Doing a good job in the top-level construction of the curriculum system

Because some courses are required by several majors, a basic course system can be set up in combination with the current requirements of first-class courses, ideological and political demonstration courses, general education and other aspects. At the same time, the subject basic curriculum system should be "combined" with the professional software courses. For example, the three subject basic courses *Fundamentals of Test Technology*, *Fundamentals of Control Engineering*, *Hydraulic and Pneumatic Transmission* and the three software courses *Computer Simulation*, *Computer Aided Test System* and *Computer Aided Design* can be combined to set up as a learning thread of the mechanical subject basic courses, so that the software learning serves the professional courses, and the independent courses in the eyes of the students are actually linked by the content of "holding hands" and a systematic curriculum system is scientifically established.

Mechanical and electronic engineering major is a typical combination of "machine" and "electricity", and its mechanical and electrical control courses have high learning requirements. For the professional courses with single-chip microcomputer principle and application, mechanical and electrical transmission and control as the typical representative, a special course system with discipline knowledge as its connotation and ideological and political education as its guidance must

be established^[4].

Practice teaching system and experimental construction are an organic whole, and electromechanical major is a typical engineering major, so it is particularly important to cultivate the ability and quality of engineering practice teaching. Experiments in professional courses should be strengthened and the types of experiments should be enriched to meet the needs of the cultivation of students with different abilities. The reform of comprehensive training programs should be strengthened to expand students' engineering horizons by introducing new teaching equipment. The integration of subject knowledge represented by different laboratories can motivate teachers to make full use of existing resources to develop comprehensive projects in the form of scientific research or student scientific research/subject competitions that students can participate in, so that teaching can be mutually beneficial, and the cultivation of students' engineering practice ability can be implemented to the ground^[5].

3.2 Integration and innovation of basic teaching units

The basic unit of the construction of the curriculum system is each course. Therefore, the construction of first-class courses, online open courses, gold courses and other courses should be taken as an opportunity to increase the construction of courses, including the construction of teaching resources and the integration and innovation of teaching contents. It should be noted that the focus of the construction of courses is oriented to all students, and care should be taken for most students, rather than training a few. With the rapid development of the society, new technologies, hot knowledge and new teaching methods need to be integrated into the traditional teaching contents. Before the outbreak of the COVID-19, traditional teaching was offline teaching, while online teaching was encouragement and guidance, which was "rare". However, an COVID-19 epidemic has completely changed the teaching methods, and the whole society has adapted to online teaching in a sudden change.

According to the characteristics of applied talents, it is necessary to strengthen the cultivation of students' engineering application ability while studying theoretical courses, so as to be student-centered and make students more involved in course experiments. For example, the course experiment of *Hydraulic and Pneumatic Transmission* in the unit where the author works has followed the traditional teaching mode for a long time. Before doing experiments, teachers will introduce each experiment in detail from the experimental purpose, experimental principles, experimental instruments, experimental contents, experimental steps, data processing, etc., which is not conducive to cultivating students' innovative thinking, losing the true purpose and significance of "experiments", and students only have to imitate the operation mechanically when doing experiments. In order to stimulate students' interest in learning, tap students' potential, cultivate students' innovative consciousness and ability, and improve students' ability to analyze and deal with practical problems, an experimental model combining traditional experiments with designed experiments is adopted. Specifically, the experiment is divided into two types. In the first type, the traditional teaching method is adopted, so that students can have a preliminary understanding of the instrument and overcome their strangeness to the instrument and experimental principle. On the basis of the first type of experiment, the second type of experimental design experiment will be carried out, which requires students to put forward their own experimental scheme, design hydraulic (pneumatic) circuit diagram, control circuit diagram and data table, and then complete the experiment independently. Finally, the teacher will organize a collective discussion to analyze the experimental results and the advantages and disadvantages of students' respective schemes.

4. Teaching Staff Construction

Teachers are the executors of curriculum system construction, and the construction of teachers' team influences the success of curriculum system construction. With the goal of meeting the needs of professional teaching and scientific research, focusing on improving the overall quality of the team, and in accordance with the principle of combining stable training, improvement and introduction, the team of teachers has been developed and expanded through various channels,

initially forming a pattern of full-time teachers as the main body, a small number of part-time teachers as supplements and external experts as consultants^[1].

The comprehensive level of the existing teaching staff should be fully improved to achieve a state of sustainable learning. Every teacher should make a personal development plan such as the "14th Five-Year Plan", and the faculty (department) should make the teacher's "14th Five-Year Plan" at the same time, so that the individual and the overall plan can be considered as a whole. The implementation of the plan after overall planning can not only be reflected in the completion of basic teaching tasks, but also mainly reflected in the completion of basic teaching tasks, good business training, learning and skills supplement, etc. Or teachers can do a good job in the construction of a certain course according to their own teaching experience, including project application, etc., so as to drive personal development with goals, thus driving the construction of subject curriculum system.

5. Strengthening employment guidance, never forgetting the original intention of professional training

At present, the pace of life is "short/flat/fast". For a long period of time, the "high flow" also affects students in all aspects. Therefore, they have flexible forms with the characteristics of the times in their choice of employment methods. They think that as long as they are not needs, it is not a bad idea to choose delivery, selling houses, live broadcast, selling milk tea, etc. as means of earning a living and ways of making money. However, these are quite different from the original intention of personnel training. In the survey of graduates' occupation types conducted by the unit where the author works, nearly 60% of them are engaged in professions related to their majors, which meets the expectation of employment development for talents cultivation. Nevertheless, non-major related employment includes a part of flexible employment personnel. To some extent, they also have the correct concept of job selection, such as "employment first, job selection later", "emphasis on career rather than region and treatment" and so on, which is however less interesting to consider from the perspective of professional development and cultivation of professional talents.

For the employment guidance courses offered in the follow-up work of strengthening employment guidance, teachers should also continuously update employment guidance and scientifically guide students. In addition to the lectures given by relevant teachers, it is also necessary for professional teachers and class teachers to publicize and explain the work, such as making use of class meeting time or free time in class to publicize and explain to the students the possible work direction and nature in the later period, so as to enable the students to have a deeper understanding of the major, or to invite industry technical engineers/excellent senior students to carry out vocational lectures or specialized and vocational learning lectures in the lower grade. The employment perspective is embodied in the daily education of "moisten things and keep silence" bit by bit, just like the ideological and political class.

6. Conclusion

The cultivation of professional talents in colleges and universities is a control system. In order to make the information flow from "input" (the blank paper before entering the university) to "output" (the talents who meet the graduation requirements) smoother, there must be many feedback links (such as research/education and teaching reform, etc.) re-acting on "input" on the basis of the original cultivation of talents. The cultivation of talents is an adaptive development process, in which more construction talents are delivered to the country through continuous adaptive development.

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