

# The Construction Planning Research and Practice of Process Equipment and Control Engineering Major in the New Economy

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**Abstract.** Facing the impact of the new economic situation on the structure of traditional knowledge and cognitive structure, the problem that how to carry out professional construction planning which is in line with the cultivation and development of future engineering talents is of great significance. This paper mainly introduces the research and practice that the major of process equipment and control engineering in Anhui University of Science & Technology has already done for the problem, as well as the research in progress. It is hoped that the educational reform and graduate quality can be promoted through theoretical research and teaching practice.

**Keywords:** new economy; professional construction; talent cultivation; process equipment and control engineering.

## 1. Introduction

At present, a new round of scientific and technological revolutions and industrial changes in the world are accelerating, and the competition for comprehensive national power is becoming increasingly fierce. China has implemented major strategies such as “innovation driven development strategy”, “Made in China 2025”, “Internet plus”, “The Belt and Road”, etc. The new economy characterized by new technologies, new formats and new industries has been developing with great vitality. The rapid development of the new economy urgently requires engineering and scientific talents with higher innovation and entrepreneurial capabilities, as well as cross-border integration capabilities. In order to meet the new needs of the new economy for talent cultivation, higher engineering education characterized by social production activities and talent cultivation must promote the transformation and upgrading of existing engineering majors, establish a diverse and individualized engineering education cultivating model while speeding up the layout and construction of the "Emerging Engineering Education".

With the revision of the relevant acceptance standards by the Ministry of Education such as Engineering Education Accreditation and Excellent Engineer Program, more and more colleges and universities have carried out research and exploration on professional construction planning. However, the problem is worth studying, exploring and practicing that how to combine higher education with national reform and social needs, especially how to carry out professional construction planning which is in line with the cultivation and development of future engineering talents under the impact of the new economy on the structure of traditional knowledge and cognitive structure. The construction planning research and practice of the process equipment and control engineering major in Anhui University of Science & Technology is exactly based on such a premise.

## 2. Fundamental Research that has been Carried out

The major of process equipment and control engineering in Anhui University of Science & Technology is the specialized specialty in Anhui Province which has made many achievements in education and teaching reform. It's also the comprehensive reform pilot program and high-level teaching team. In the environment of industrial transformation and upgrading, as well as the

deepening internationalization in China, the major of process equipment and control engineering has carried out relevant researches facing a series of problems in current engineering education:

### **2.1 The Challenges Faced by Traditional Engineering Education in the New Economy was Explored**

The current engineering talents are still unable to fully meet the needs of socioeconomic development in terms of hierarchy and structure. The practical education received by innovative engineering talents is actually insufficient, and there still exists many problems such as weak innovation and entrepreneurial capabilities, as well as cross-border integration capabilities.

### **2.2 The Revised 2018 Undergraduate Professional Cultivating Program was Completed**

Through the research on the necessity, goal, task and guarantee of engineering talent cultivation, we believe that the engineering talent cultivating plan should be combined with the needs of the industry. We must study the necessity and implementation of innovative talents in a targeted manner so that we can truly make colleges and universities pay attention to individualized education and cultivation in engineering talent education.

### **2.3 The Requirements of Professional Engineering Accreditation for Talent Cultivation was Discussed**

Teachers in the major of process equipment and control engineering in Anhui University of Science & Technology have participated the Engineering Education Accreditation. They are also familiar with the goal, positioning and evaluation system of engineering talent cultivation by Ministry of Education of China. In particular, they have certain research ideas on the talent cultivating model based on the results-oriented education premise.

### **2.4 The Impact of New Knowledge Brought by the Development of the New Economy was Explored**

With the advancement of innovation driven development strategy in China, new formats, new models and new knowledge are gradually emerging in primary industry, secondary industry and tertiary industry. Cross-border and cross-domain integration allows knowledge to be constantly intersected, integrated, upgraded and developed. The new economy has impacted traditional knowledge structure and cognitive structure, and also put forward higher requirements for the cultivation and development of future engineering talents.

### **2.5 The Demand of the New Economy for the Engineering Talents' Cross-Border Integration Capabilities was Discussed**

The new economy which is cross-discipline and cross-industry emphasizes on replacing traditional specialized division of labor with industrial chain integration. It features with obvious "interdiscipline and fusion". Consequently, engineering and scientific talents facing the new economy must have cross-composite characteristics and cross-border integration capabilities of cross-discipline and cross-industry. The current engineering talent cultivation pays more attention to professionalism and lacks integrated knowledge and cross-discipline knowledge. Therefore, the requirements of the new economy for comprehensive cross-border talents are also new challenges for engineering talent cultivation.

## **3. Main Contents of Professional Construction Planning**

### **3.1 Study of the Objectives and Conditions of Professional Talents Cultivation in the New Economy**

Through deepening understanding of industrial transformation and upgrading and internationalization in China, the problems of traditional engineering education need to be examined in

a certain way. Guided by the interdisciplinary integration and integrated engineering education concept, we have to explore actively the development path of engineering education which is in line with the economic development situation and professional characteristics, so that we can meet the demands of the society for the comprehensive engineering talents under the new situation.

### **3.2 The Exploration of Talent Cultivation and the Revision of Cultivating Program**

According to the requirements of professional assessment, we will carry out education and teaching discussions, as well as research professional cultivating program, including cultivating method, cultivating content, cultivating effect, talent assessment, social benefit to adjust socioeconomic situation, industrial structure and national policy. We strive to form an advanced and effective professional cultivating program with the main purpose of talent cultivation, from student enrollment to graduation.

1) Find out the fusion between “Made in China 2025”, “Internet plus”, “Big Data” and process industry; organize expert teaching seminars in the industry; analyze the needs of knowledge, ability and quality of engineering and technical talents in the next 3 to 4 years; formulate a new and more reasonable curriculum system; realize the transition from focusing on knowledge transfer to paying more attention to ability and quality training.

2) Summarize the experience of Second Classroom, innovative practice activities, subject competition and laboratory opening, and discuss methods and evaluation criteria for promoting students' independent learning.

3) Actively respond to the national major policies such as "energy conservation and environment protection", "Environmentally Conscious Manufacturing" and "New Energy"; adjust professional service targets; investigate the needs of relevant employers; set up feature courses, and organically combine school education with employment.

4) Develop gradually in response to the needs of new industries starting from the transformation of traditional process industries into new engineering.

### **3.3 Curriculum Construction Planning**

The existing teaching systems and contents will be further reformed and optimized. One of the guiding ideologies is to strengthen the engineering education of undergraduates, as well as cultivate their practical ability and innovation capability. We will organize teaching seminars including industry experts, develop new and more reasonable teaching systems and teaching contents, and establish links between courses students can not only master all aspects of knowledge and ability, but also digest them.

1) In terms of curriculum reform, the curriculum content will be optimized, engineering cases will be added to the professional courses, and courses with strong engineering applicability will be added as well. We will also establish a closely related engineering “curriculum group” with comprehensive courses, professional courses and experimental courses to develop students' ability to solve complex engineering problems.

2) In terms of teaching methods, we will adopt new teaching methods such as Micro lecture, MOOC to attract students' attention and active classroom atmosphere, changing the instilled education to the inspiring education. Combine the advanced APP teaching method, we want to realize the big data statistics and analysis of classroom teaching, and deepen the course evaluation mechanism based on process management.

3) Encourage teachers to introduce advanced science and technology into relevant courses, so that students' interest in learning can be stimulated and complementary teaching and research can be achieved; stimulate teachers' enthusiasm of teaching reform, and encourage teachers to adopt new methods to improve quality of curriculum teaching through policy orientation; increase the internationalization of teaching contents and encourage English language teaching so that can improve students' ability to interpret professional knowledge.

### **3.4 Faculty Construction Planning**

Faculty construction planning is considered mainly from the perspective of specialization and internationalization. On one hand, we will improve teacher's professional level through further study. On the other hand, we will broaden the knowledge and vision of teachers through communication to adapt to social and economic development. Building a team of teachers with love for the party, dedication, team spirit, high academic and teaching level is of great significance in faculty construction.

1) Develop a regular training system for teachers. We will try to make every teacher participate the training of professional courses or skills at least once in 3 years. Also, it is hoped that 2 to 3 teachers will study for at least half a year in top universities in the major of process equipment and control engineering.

2) Encourage teachers to participate in various teaching, practice, and subject meetings related to majors and courses. We hope they can communicate with experts of this major and understand the current development of the industry, which is helpful for improving teaching contents, and results.

3) Strengthen the construction of teaching echelon; pay attention to the rationalization of the age structure and the improvement of the academic level, and focus on cultivating young teachers.

4) Further strengthen the construction of teaching teams. We hope every teacher in the team can love education, teaching and students with enterprise, responsibility, and the spirit of exploration and innovation. We will make great efforts to make faculty with reasonable age, title and academic structure, forming a team characteristic of "cultivating people as their own responsibility, promoting teaching through disciplines, and focusing on the training of young teachers".

### **3.5 Practical Teaching Construction Planning**

Professional practical teaching depends on two aspects of teaching laboratory and practice base. It is needed to further strengthen the construction of these two aspects to cultivate students' innovative spirit and professional quality, improve students' engineering practical ability, as well as promote the combination of talent cultivation and social production practice.

## **4. Expected Results of Professional Construction Planning**

By analyzing the challenges faced by traditional engineering education under the new economy, the impact of new knowledge brought by the new economic development, the demand for the cross-border integration capability of engineering talents in the new economy, and the necessity of transforming traditional teaching methods in the information age, we expect to follow the principle of "promote reform by evaluation, promote construction by evaluation, promote management by evaluation, combine evaluation and construction, focus on construction", strengthen undergraduate professional construction planning, create distinctive professional characteristics, further deepen undergraduate teaching reform, improve the quality of teaching management and the quality of undergraduate teaching, adapt to the needs of the society for talent cultivation, combining the need of undergraduate teaching professional assessment for professional construction.

1) Formulate a sustainable construction planning of process equipment and control engineering major, so that the school-running characteristic in Anhui University of Science & Technology can be more distinct, and the school-running level can occupy the leading level in other universities of the same kind.

2) Accelerate the transformation and upgrading of process equipment and control engineering major based on the undergraduate professional assessment. Meanwhile, improve the ability of the professional service industry to transform and upgrade, and provide reference for the construction of new engineering in our university.

3) Construct a teaching system for feature courses and an engineering "curriculum group"; realize the combination of school education and employment; conduct specific research and practice on cultivating students' ability to solve complex engineering problems.

## 5. Conclusion

The status of students is established through the research and practice of professional construction planning. According to the requirements of engineering talent cultivation, the research optimizes talent cultivating mode and methods, reform existing teaching systems and contents, reform teacher training mechanism, strengthen practical teaching, focus on innovative practice, promote the combination of talent cultivation and social production practice, improve the level of professional construction, and highlight professional characteristics, combining the teaching practice in the university.

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