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# Curriculum System and Practice of Electromechanical Applied Talents Training Based on the Integration of "Knowledge System, Ability Training and Innovation Consciousness"

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***Abstract.*** *With the continuous advancement of social development, social enterprises demand more and more applied talents. The cultivation of Applied Talents in Colleges and universities has always been a short board in college education. How to train college students in various practical theories has become one of the difficulties in Colleges and universities in China. In this paper, based on the teaching mode of innovation and entrepreneurship platform, a practical teaching activity is designed for students majoring in mechanical and electrical engineering of a university in our city. Through the way of contrast experiment and questionnaire survey, the learning achievements of students under the teaching mode are recorded, counted and analyzed. It is concluded that the curriculum system of mechanical and electrical applied talents training based on the integration of "knowledge system, ability training and innovation consciousness" can help students' academic performance, and the teaching mode is very popular among students, reaching 65%.*

***Keywords:*** *Applied Talents, College Education, Mechanical and Electrical Major, Practical Teaching*

## 1. Introduction

After graduation, the employment of undergraduate graduates has become a common problem, that is, "enterprises cannot recruit suitable talents, and college students cannot find suitable jobs". However, China's universities graduate millions of graduates every year, which has a great contradiction with the employment

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problem of undergraduates. This contradiction shows that the teaching mode of colleges and universities is different from the development mode of social economy, and cannot adapt to each other. The teaching of professional knowledge and the actual needs of enterprise talents are different. According to the actual situation of the project, the Ministry of education has launched the "excellent engineer education and training program" through the close cooperation between colleges and enterprises. It can be seen that the training of engineering and technical personnel in local colleges and universities is facing great development opportunities and challenges. According to the latest announcement of the Ministry of education, there are 877 ordinary undergraduate colleges and universities in China, of which local ordinary undergraduate universities account for about 87%. Local universities have become the backbone of China's higher education. From the important mission of local colleges and universities in social development, the urgent demand for Applied Talents in economic and social development, and the problems and difficulties in talent cultivation in local colleges and universities, we can draw a conclusion that applied talents are the inevitable choice. Training talents for local colleges and universities.

China is a big manufacturing country, but it is not a manufacturing power. China in the new era proposed "made in China (Internet)"+ Intelligent manufacturing needs to integrate artificial intelligence technology, Internet of things technology, electronic communication and other disciplines on the basis of traditional mechanical and electrical majors to form a multi-disciplinary integration of mechanical and electrical majors. Therefore, colleges and universities with mechanical and electrical majors should immediately start to carry out targeted personnel training mode innovation and reform, and cultivate engineering talents with modern new engineering disciplines Use talents. The knowledge structure of application-oriented innovative talents breaks through the boundaries between disciplines, realizes the intersection and penetration between mechanical and electrical disciplines and information disciplines, and enables students to have solid basic theoretical knowledge, extensive knowledge and certain depth of knowledge. Independent innovation is the only way to realize the transformation from a big manufacturing country to a powerful manufacturing country. Independent innovation requires engineering innovation talents first. Modern manufacturing industry emphasizes that in order to promote the development of human creativity in intellectual labor, we must attach great importance to the cultivation of innovative, compound and high skilled talents, and strengthen the cultivation of comprehensive quality of various talents. Local engineering colleges and universities should become the main base for training engineering application-oriented innovative talents needed by modern manufacturing industry. Jinling University of science and technology is a local university, mainly engaged in engineering. Its main goal is to train innovative talents suitable for engineering application, so as to meet the needs of industrial development and economic and social development in Nanjing and Yangtze River Delta. In view of the demand for advanced mechanical and electrical engineering talents in modern manufacturing industry, the school of mechanical and electrical engineering of Jinling University of science and technology has carried out

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research and Practice on the cultivation of innovative talents oriented by engineering application.

At present, it is necessary to make clear what kind of talents training scheme is based on the actual situation, and the training of talents should be based on the actual situation and the needs of technology only in the process of formulation and optimization can we keep pace with the development of the times. In this paper, based on the "knowledge system - Ability Training - innovation consciousness" integration of mechanical and electrical application-oriented talents training curriculum system related knowledge concepts, the practice method is tested, through a university in our city mechanical and electrical professional students in class contrast experiment, analysis of the role of the course theory and practice. Through the experiment to analyze the teaching system in the future mechanical and electrical professional personnel training can play a role.

## 2. Related Concepts of Curriculum System of Electromechanical Applied Talents Training Based on the Integration of "Knowledge System, Ability Training and Innovation Consciousness"

### *2.1 What Is the Integration of "Knowledge System Ability Training Innovation Consciousness"*

The need of the diversification of talents is to establish an effective and unified training mode for technical personnel and school education, so as to diversify the training mode. The employment activities organized by the government provide a stable source for the introduction of skilled and applied talents. In the key way to enhance the ability of mechanical and electrical construction, skilled personnel have been "revitalized". In the reform of talent shortage mode of mechanical and electrical engineering, the unity of engineering and learning is neutral. Mechanical and electrical education is regarded as the key link to improve the quality of mechanical and electrical education. All mechanical and electrical personnel system, improve the comprehensive carrying capacity of all kinds of talents. Enterprises. In order to realize the cultivation of high skilled talents, higher vocational colleges must pay attention to the ability construction, from the unified learning knowledge and progress to the implementation means, place, time, etc., and pay attention to the cultivation of students' majors. Ability and quality as well as personalized development. Higher vocational schools should build on the teaching mode of production, learning and research, zero distance contact with enterprises, actively respond to the call of the market, adjust the teaching purpose of continuing education in the direction of improving vocational skills, and realize the cultivation of high skilled and high-quality talents. Colleges and universities should combine the characteristics of high skilled talents needed by the market, accurately locate the market, speed up the reform and construction, and take the cultivation of high skilled talents as the primary task and fundamental purpose.

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### *2.2 Importance of Innovation Ability Training*

China is a big manufacturing country, so the mechanical and electrical specialty has a good industrial foundation. In recent years, with the promotion of "made in China 2025" action plan, manufacturing enterprises and industries put forward higher requirements for graduates' innovation ability. Therefore, to improve the innovation and entrepreneurship ability of students majoring in mechanical and electrical engineering in higher vocational colleges is a new requirement of manufacturing enterprises and industries for existing higher vocational students, and it is also the need to adapt to the development of manufacturing industry. Cultivating mechanical and electrical talents with innovation and entrepreneurship ability in higher vocational colleges is conducive to promoting the development of China's mechanical and electrical industry.

With the higher and higher requirements of manufacturing enterprises for graduates of mechanical and electrical specialty, it is more and more difficult for them to find jobs, especially those with higher education background. On the one hand, it is necessary to improve the innovation and entrepreneurship ability of students majoring in mechanical and electrical engineering; on the other hand, it is necessary to cultivate students' innovation ability in higher vocational colleges so as to realize independent entrepreneurship. On the other hand, it meets the requirements of the industry and enterprises, so that higher vocational graduates can better adapt to the needs of enterprise development. Therefore, to a certain extent, to improve the innovation and entrepreneurship ability of students majoring in mechanical and electrical engineering in higher vocational colleges, to a certain extent, alleviate the employment problems of students majoring in mechanical and electrical engineering in higher vocational colleges.

Mechanical and electrical specialty is a higher vocational education established earlier. At present, many higher vocational colleges have set up mechanical and electrical specialty. However, at present, the cultivation of innovation and entrepreneurship ability in higher vocational colleges is still very weak. Some colleges and universities only add courses such as "professional ethics" and "employment guidance for college students" in the talent training plan, but do not practice the students' innovation and entrepreneurship, and the ability training runs through the whole teaching process. Strengthening the cultivation of innovation and entrepreneurship ability of students majoring in mechanical and electrical engineering in higher vocational colleges has a great role in promoting the comprehensive strength of mechanical and electrical specialty in higher vocational colleges.

### *2.3 Key and Difficult Points of Training Applied Talents*

As we all know, innovation is the vitality and power of entrepreneurship. In order to start a business successfully, people need to innovate constantly. Therefore, the organic combination of innovation ability and entrepreneurial ability can provide a sensitive tool for entrepreneurship. According to the survey, at present, many

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vocational colleges only provide career planning courses and career guidance courses for junior high school students. Relying on these courses at most, they have established the entrepreneurial consciousness of students majoring in mechanical and electrical engineering, which can be said to be a bucket to improve the comprehensive entrepreneurial quality of students. Although some vocational schools encourage teachers and students to actively participate in innovation and entrepreneurship skills competition, but at present, they just stay on paper, no practical operation, let alone in-depth practice. At present, higher vocational college students are keener on entrepreneurship report and entrepreneurial skills competition, which is the performance of innovative power that college students have entrepreneurial ideals but lack of driving force.

There is no organic combination of innovation ability and entrepreneurship education, which makes many mechanical and electrical majors in higher vocational colleges have entrepreneurial ideals, but there is no certain continuity, giving people the feeling of three minutes heat. 1-2 independent professional innovation courses, but these contents are limited to the training of students' simple operation level and shallow level skills training. In order to pay more attention to the practice of mechanical and electrical specialty in higher vocational colleges, we should pay more attention to the implementation of practice to cultivate students' innovation and entrepreneurship ability. At present, there are few carriers of entrepreneurship activities in higher vocational colleges, and most of them have no practical basis for innovation and entrepreneurship education. As a result, when carrying out innovation and entrepreneurship education in higher vocational colleges, there is a phenomenon of "talking on paper". There is no actual operation and practice link, or only professional association to complete the practice link, which is not conducive to the innovation and Entrepreneurship of mechanical and electrical professional skills training. The reason is mainly due to two factors, one is the lack of practical basis for innovation and entrepreneurship, the other is the lack of teachers' support for innovation and entrepreneurship requirements.

## 3. Curriculum System and Practice of Electromechanical Applied Talents Training Based on the Integration of "Knowledge System, Ability Training and Innovation Consciousness"

### *3.1 Practical Objectives*

In this paper, based on the multi-faceted integration of mechanical and electrical application-oriented personnel training methods, select a university in our city, a total of 3 classes of mechanical and electrical major, 178 students participate in the practice. The three classes are sophomores, and the average scores of the three classes in the final examination of freshmen are 67, 72 and 69 respectively. The distribution of men and women is uniform. Class A is taken as the experimental class, and the teaching mode of innovation and Entrepreneurship Based on intelligent manufacturing platform is used to carry out education work. Class B and

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class C are control classes. There is no difference between them and the previous teaching methods. Teachers teach by example.

### *3.2 Experimental Steps*

The practice lasted for three months. During the three months, students were tested every 30 days to find out their learning situation and progress.

Subject: analog circuit

Assessment method: written examination, closed book

After the completion of subject teaching and assessment, the satisfaction degree of students to the actual teaching mode in this practice is counted by questionnaire survey.

## 4. Curriculum System and Practical Research Results of Electromechanical Applied Talents Training Based on the Integration of "Knowledge System, Ability Training and Innovation Consciousness"

### *4.1 Analysis of Assessment*

*Table 1. Assessment form*

| Class | Population distribution | | | | |
|---|---|---|---|---|---|
| | 91-100 | 81-90 | 71-80 | 61-70 | 0-60 |
| Class A | 5 | 12 | 13 | 24 | 12 |
| Class B | 6 | 14 | 8 | 34 | 6 |
| Class C | 3 | 9 | 12 | 18 | 2 |

According to table 1, the data in the table are the results of the unified assessment test conducted by the three classes before the beginning of the practice. From the results, it can be seen that the scores of the three classes are not significantly different, which are all concentrated in the range of 61-90 points. There are 5 students with 91-100 points in class A, 12 people with 81-90 points, 13 people with 71-80 points, 24 people with 61-70 points, and 12 people under 60; the students in class B are 6, 14, 8, 34 and 6, and those in class C are 3, 9, 12, 18 and 2 respectively.

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### *4.2 Distribution of Assessment Results in Different Periods*

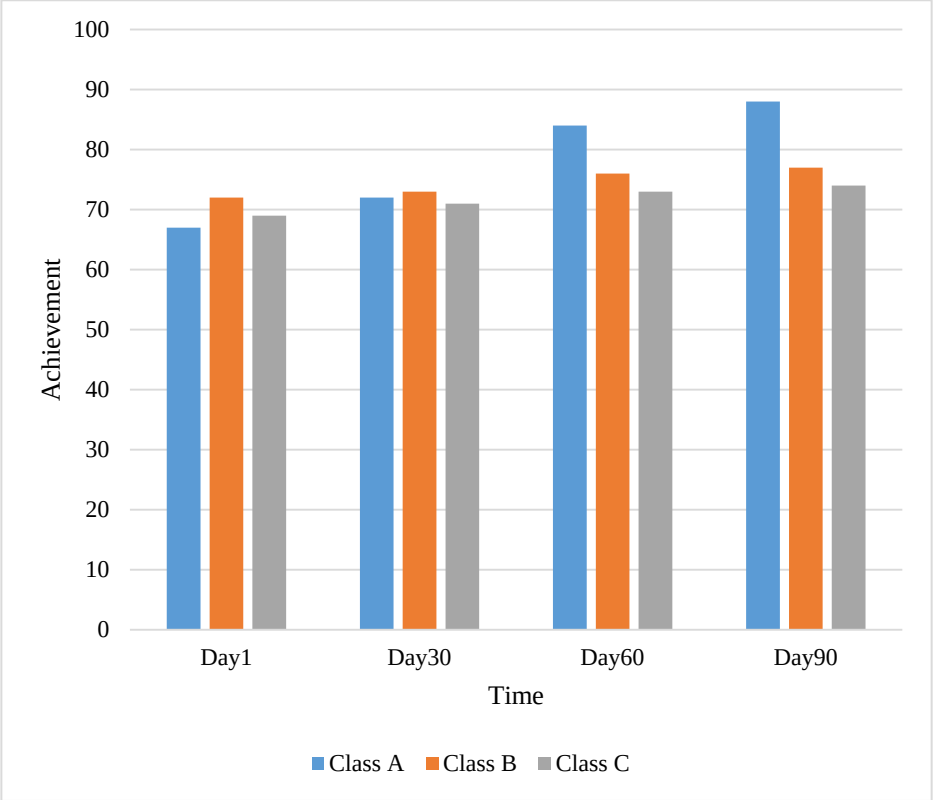


*Figure 1. Score distribution in different periods*

It can be seen from Figure 1 that there is no significant difference in the average scores of three classes in each period, but class A has the lowest average score among the three classes. After three months of practical test, class A has the highest final score among the three classes.

*Table 2. Score distribution in different periods*

| | Class A | Class B | Class C |
|---|---|---|---|
| Day1 | 67 | 72 | 69 |
| Day30 | 72 | 73 | 71 |
| Day60 | 84 | 76 | 73 |
| Day90 | 88 | 77 | 74 |

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As can be seen from table 2, the scores of class A in each period are 67, 72, 84 and 88 respectively, and the degree of improvement is obvious. In contrast, there is no significant difference in the performance improvement of class BC in each period. The score difference between class B and class C is 5 points, that of class C is 5 points and that of class A is 21 points. Through the scores, we can draw an objective conclusion that the curriculum system of electromechanical applied talents training based on the integration of "knowledge system, ability training and innovation consciousness" can improve students' performance.

### *4.3 Statistical Analysis of Questionnaire Survey*


*Figure 2. Questionnaire survey statistics*

As can be seen from Figure 2, there are 116 students who are very welcome to the new teaching mode adopted in this practice, accounting for 65% of the total number, while only 9 people are not welcome, accounting for 5% of the total number. It can be seen that the teaching mode in practice is still welcomed and respected by the vast majority of students.

## 5. Conclusion

With the deepening of higher education, application-oriented talents have become the choice of more and more enterprises. Through the practice and

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investigation and analysis of this paper, we can draw a conclusion that the teaching method of electromechanical applied talents training curriculum system based on the integration of "knowledge system, ability training and innovation consciousness" can effectively improve students' learning enthusiasm and effectively enhance students' learning enthusiasm Academic performance, through the rich teaching content and practical content, students can be improved in the theoretical basis and practical operation. Based on the combination of "knowledge system, ability training and innovation consciousness", the teaching mode of electromechanical applied talents training course system can avoid the teaching results of one thousand people under the traditional education mode, and lay a good technical foundation for the education of thousands of people in Colleges and universities.

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