

# Research on Vocational Ability Training of Electromechanical Specialty in Higher Vocational Colleges

Kuantian Wang<sup>1, a</sup>

<sup>1</sup>Emilio Aguinaldo College, Manila, Philippines

<sup>a</sup>kuantian.wang.mnl@eac.edu.ph

## Abstract

**With the transformation of China's economic development, enterprises have higher and higher requirements for the vocational ability of higher vocational colleges, requiring students to master interdisciplinary talents. Taking the electromechanical integration specialty as an example, this paper puts forward the problems existing in the vocational ability training of electromechanical integration specialty, and puts forward countermeasures, so as to enhance vocational ability and improve employment competitiveness.**

## Keywords

**Professional ability; Discipline competition; Compound talents.**

## 1. Introduction

With the continuous development of China's modern industry, the mode of economic growth has changed from extensive to intensive, and social and economic growth has entered the new normal. Made in China has an urgent demand for high-quality compound skilled talents. The equipment manufacturing industry is still the main pillar industry of the national economy in the context of made in China, and it is also the main battlefield of "innovation driven, transformation and upgrading" of China's economy in the future. China's manufacturing industry is still restricted by the traditional industrial model, and there are problems such as low efficiency, overcapacity, lack of innovation, and serious shortage of high-end skilled talents, which force China's traditional manufacturing industry to change to intelligent manufacturing, which is urgent.

The national vocational education reform implementation plan was issued by the State Council in January 2019, also known as the "twenty articles of vocational reform". The "twenty articles of vocational reform" require deepening the reform of the training mode of compound technical talents, starting the pilot work of the 1+x certificate system, and combining academic certificates with vocational skill level certificates. In 2019, Premier Li Keqiang also mentioned in the government work report that academic qualifications should be combined with vocational skill level certificates. It can be seen that the 1+x certificate system is an important innovation for vocational education.

In June 2019, the Ministry of Education issued the "opinions on the formulation and implementation of professional talent training programs in Vocational Colleges" (hereinafter referred to as the guidance), requiring certificate accommodation, integrating the skill level standard into the talent training program, carrying out the pilot work of 1+x certificate system, further optimizing the talent training mode and improving the quality of talent training[1]. The 20 articles of vocational education clarify the 1+x certificate system from a macro perspective. The pilot plan issued by the four ministries and commissions has launched the integration of academic certificates and skill level certificates, that is, the integration of 1 and X. The guidance

further clarifies that the skill level standard should be integrated into the talent training program of vocational education and strengthen the training mode of compound talents.

## **2. Current Problems in The Training of Electromechanical Professionals**

In the face of policy orientation and market demand, docking the 1+x certificate system and its related skill level standards has become an important topic for higher vocational colleges. At present, there are some practical problems in the training process of mechanical and electrical professionals, mainly as follows:

### **2.1. The Teaching Mode Is Single, And the Teaching Content Is Backward**

At present, the teaching mode still stays in the "full house filling" and "duck feeding" teaching mode, which is teacher centered and passively accepted by students, and the teaching mode is single; The teacher simply explained the knowledge points in class, ignoring the cultivation of students' interest in learning. The classroom atmosphere was dull, the teaching objectives could not be achieved, and the teaching quality was low. Although there are many new forms of textbooks on the market, adding multimedia elements such as QR code, animation, video, and compiling chapters according to projects and modules, many of the detailed contents still use the old knowledge system. With the advent of the era of "intelligent manufacturing", smart construction sites and smart factories continue to emerge. 1+x vocational skill level certificates have been incorporated into vocational education, and the original knowledge system is not enough to support[2].

### **2.2. Teaching Evaluation Is Single**

At present, teaching combines process evaluation with summative evaluation, which is usually fed back according to the data of the teaching platform and combined with the final grade. Although it has been improved, it still evaluates the mastery of students' knowledge points. The 1+x certificate system cultivates compound skilled talents, emphasizing the cultivation of comprehensive ability, mainly including employability, working ability and innovation and entrepreneurship ability. The existing evaluation system fails to cover these capabilities.

### **2.3. Talent Training Is Out of Line with The Needs of Enterprises**

In recent years, with the continuous expansion of the enrollment of colleges and universities in China, there are more and more college graduates every year, followed by the increasingly difficult employment every year, and some students are unemployed after graduation. In order to improve the employment rate and quality of students, the school mobilized all teachers to try every means and use all kinds of resources to provide employment opportunities for students; On the other hand, in order to recruit suitable talents, enterprises "rob" colleges and universities and "dig" enterprises. Every year, enterprises appear the phenomenon of "labor shortage"; The phenomenon of "difficult employment" and "labor shortage" is due to the mismatch between the supply of talent training in Colleges and universities and the demand for talent in social and economic development, which is divorced from the demand of enterprises; The backward training mode cannot meet the requirements of new economic development such as "new technology", "new business form", "new mode", "new industry". In order to cope with the competition of new technologies and industries in the future, colleges and universities must reform the existing training mode, actively arrange the training of engineering talents, improve students' engineering technology ability, and meet the requirements of seamless connection with enterprises.

### **3. Countermeasures for Professional Ability of Electromechanical Specialty**

#### **3.1. Task Led, Project Driven, Teaching Mode Of "Integration of Doing, Learning and Teaching"**

The training mode of Mechatronics majors adopts the teaching mode of "task leading, project driving" and "integration of doing, learning and teaching"; The teaching and Research Office of Mechatronics specialty conducts in-depth industry and enterprise research, and analyzes the ability and quality requirements of the post together with industry, enterprise experts and technicians; According to the needs of enterprises, enterprise engineering projects are introduced into the teaching system, and then the project tasks are decomposed into each course[3]; In the process of teaching, we should simulate the production process of the industrial site to organize teaching, so as to integrate the functions of the engineering classroom, training workshop and simulation factory, and build a "Trinity" teaching mode; To "do" is to practice through every course, every project, and the process of "doing" the project is student-centered, with teachers as auxiliary roles. In the process of patrolling and observing students' "doing", if students are found to have more problems, teachers should adjust the order of "doing" in time. Teachers should first "do" the demonstration operation, and then let students follow. If you encounter problems of individual students in the process of patrol observation, you can remind students to correct them, and you can let them "go wrong" without causing major problems. Then teachers can collect some examples of "doing" better and doing "wrong" to guide students to analyze where "good" and "wrong". After that, the teacher will "do" the demonstration operation or let the good students do the demonstration operation. Continue to "do" according to the free combination of demonstration, practice and correction.

#### **3.2. Vocational Skill Level Certificate and Discipline Skill Competition "Two Wings" Fly Together to Promote the Cultivation of Electromechanical Skilled Talents**

Establish a modular curriculum resource system integrating "1+x" certificate and "course certificate competition" of subject skill competition in Electromechanical Specialty. Under the guidance of the "1+x" certificate system and the teaching team of discipline skill competition, establish a teaching system and teaching resources of new technologies, new standards and new processes that meet the enterprise standards of the electromechanical industry. Connect with the professional standards of enterprises, formulate the corresponding curriculum system of Electromechanical Specialty, integrate the vocational skill level standard and the content of discipline skill competition into the professional teaching courses of Electromechanical Specialty, organize teams to study and formulate the talent training plan of modularization of Electromechanical Specialty ability, "X" certificate training standard and assessment standard, and study the connection and integration of "X" certificate, discipline skill competition and Electromechanical Specialty Courses The compilation of training materials for the "X" certificate, the unification of training resources, the specialization of training courses, and the continuous innovation of teaching methods in the teaching process of the teacher team. So as to ensure that the vocational quality and skill education connected with it can be stably implemented in the education and teaching links of each module of Electromechanical Specialty, truly realize the integration of "class certificate competition", and "attach equal importance to competition and certificate", so as to ensure that the knowledge learned by students in school can be truly applied to future jobs.

### **3.3. Strengthen the Training of Post Skilled Talents by Combining "Deficiency and Reality"**

In view of the current shortage of experimental equipment in the college, while mobilizing teachers to make full use of existing equipment, we should adopt school enterprise cooperation to develop a virtual simulation test platform to enhance students' practical ability; For example, the current PLC laboratory equipment in the college has a single function, and the experimental equipment is old and seriously damaged, which has been unable to meet the normal teaching of PLC courses[4]. The members of the project team have made some achievements in the construction of the virtual experiment platform for electrical courses in the school level teaching reform project "electrical course package based on working process". The project team has further developed on the basis of previous research results to solve the problems of experiment and training in the college.

### **3.4. Relying on the Innovative Practice Base of The College, Cultivate Engineering Skilled Talents of Electromechanical Specialty**

#### **3.4.1. The Combination of The Two Classes "Breeding" For the Training of Engineering Skilled Talents of Electromechanical Specialty**

The second class is an open class based on the college's innovative practice base, facing students of all grades, levels and majors, mainly students, and combining students with teachers; The main function of the second classroom is to connect and expand the knowledge points of each course in the first classroom, and cross integrate and cultivate the courses of all levels and majors. The combination of the two classes has laid a solid knowledge foundation and provided a platform - "breeding" for the cultivation of interdisciplinary and engineering skilled talents.

#### **3.4.2. The Introduction of Engineering Projects and The Guidance of Tutors Will "Cultivate Seedlings" For the Cultivation of Engineering Skilled Talents of Electromechanical Specialty**

Introduce engineering projects, classic topics of previous discipline competitions, and "X" certificate assessment cases into the innovation practice base, and adopt the tutor training method of "ideological guidance, learning guidance, and talent guidance", correct students' thoughts, stimulate students' learning initiative and innovation, guide students to improve students' vocational skills, and cultivate good seedlings of mechanical and electrical engineering skilled talents - "seedling".

#### **3.4.3. Participate in the Training and Assessment Of "X" Vocational Skill Level Certificate, Participate in Discipline Skill Competition, and "Cultivate English" For Cultivating Engineering Skilled Talents of Electromechanical Specialty**

Encourage students to participate in the training and assessment of "X" vocational skill level certificate, increase credits and bank points, and improve the competitiveness of vocational skills; Give full play to the role of discipline competition from point to area, and integrate the content of discipline competition with the content of teaching links, so as to realize the seamless connection between discipline competition and the teaching system of Engineering skilled personnel training, and select excellent students to participate in various provincial and national competitions through teaching link experiments and experimental examinations; Through the experience of "X" vocational skill level certificate training and examination and discipline skill competition, the "learning, certificate and competition" are closely linked and interactive, the applicability of teaching and engineering practice are strengthened, the training of Engineering skilled talents in vocational colleges is led to the depth, and the elite of Engineering skilled talents in mechanical and electrical majors - "Yuying" is cultivated.

### **3.5. Strengthen School Enterprise Cooperation and Promote the Deep Integration of Production and Education and The Organic Combination of Education and Training**

Taking the "X" certificate as the combination point, the school and enterprise will be bonded together to form a joint force for joint education and training, and open a new way of education through the integration of production and education. Under the X certificate system, education and training are combined in a new way. Taking Kunshan Qiuti and Jabil green dot as benchmark enterprises, the Electromechanical Specialty forms an alliance to jointly target the employment needs of enterprises for Electromechanical Specialty, negotiate with enterprises to select the X certificate required by enterprises, and establish an education and training platform. Schools, enterprises and training centers jointly formulate education and training programs. Benchmarking enterprises are deeply involved in the form of "order classes", that is, they carry out in-depth cooperation with colleges and universities from the aspects of personnel selection, training, employment and student management, and the selected education is used; "Order class" trains more professional and skilled talents for enterprises.

### **3.6. Build a Diversified Assessment and Evaluation System**

Break the traditional examination and evaluation method of "one test paper, two hours, 60 points", give full play to the educational, guiding and guiding role of examination and evaluation in teaching and talent training, and reflect the pertinence, timeliness and creativity of teaching; Build an assessment and evaluation system with equal emphasis on post ability, knowledge and skills; According to the nature and characteristics of different courses, diversified assessment and evaluation schemes such as project assessment, experimental design, course design, actual creation, hands-on operation, simulation projects and vocational skill appraisal are adopted. For example, the course "electronic circuit CAD" disassembles engineering projects and discipline competition circuits into several projects and integrates them into the course teaching from simple to deep, Each project is a complete engineering project in Teaching: schematic drawing - PCB layout and wiring - circuit board production - circuit board debugging. The evaluation results of each project are obtained by evaluating and summarizing the four parts of each project. Finally, the comprehensive evaluation results are obtained by calculating each project in proportion.

## **4. Significance and Practical Application Value**

### **4.1. Improve the Comprehensive Competitiveness of The Profession**

The proposal of "1+x" certificate system provides a new construction idea for the development of vocational colleges. The implementation of the "1+x" certificate system in vocational colleges will certainly deepen the reform of the training mode of high-level applied talents, build a new mode of organic integration of "academic certificates and vocational skill level certificates", improve the demand-oriented professional dynamic adjustment mechanism, and speed up the training of all kinds of high-quality technical and skilled talents urgently needed by the national development; Further deepen the reform of education and teaching, integrate industry and education throughout the whole process of talent training and development, and build a new mechanism of school enterprise collaboration and cooperative education; Increase the construction of hardware facilities such as training bases and vocational skills training bases[5]. Therefore, the implementation of the "1+x" certificate system in vocational colleges will promote the development of Vocational Colleges and help improve the overall strength of vocational colleges.

#### 4.2. It Is Conducive to Alleviating the Structural Employment Contradiction

With the progress of science and technology, the adjustment of economic structure and the continuous acceleration of industrial transformation and upgrading, the demand for high-level technical talents in various industries is becoming more and more urgent. New economy, new business forms, new processes, new technologies, etc. have spawned a series of new occupations. New occupations have higher requirements for new technical skills, knowledge and practical ability, and require employees to have higher academic qualifications or high-level technical skills. This requires vocational colleges to vigorously carry out high-quality technical skills training and engineering skills practice on the basis of academic education, improve students' Vocational and technical skills, increase the effective supply of high-level technical talents, and cultivate urgently needed high-level technical talents for regional economic development. The implementation of the 1+x certificate system strengthens the integration of industry and education and school enterprise cooperation. Its purpose is to cultivate interdisciplinary and compound engineering and technical talents and alleviate the structural employment contradiction between "difficult employment" and "labor shortage". Improve students' skills, expand employment channels, and realize the transformation from "good employment to good employment".

#### 4.3. It Is Conducive to Improving the Modern Vocational Education System

At present, China's vocational education provides a large number of technical and skilled talents for social and economic development, but there is still a certain gap compared with the rapid development of social economy in the new era, the demand for high-level technical and skilled talents in the transformation and upgrading of industrial economy, and the requirements of building a modern educational power. There are problems such as the imperfect vocational education system, the lack of in-depth integration of industry and education, and the low participation of industry and enterprises[6]. "1+x" certificate system is a new academic certificate system, which will promote the reform and development of vocational education. The implementation of the "1+x" certificate system in vocational colleges will further improve the construction of academic education and vocational skill training system, promote the reform of applied talent training mode, the comprehensive integration of production and education, practical teaching reform, talent evaluation mode reform, etc. these new changes will help to improve the modern vocational education system and improve the level of vocational education serving regional economic development.

### References

- [1] Zhang Yunliang. Reform of accounting computerization curriculum based on the "post, certificate, course and competition" model [j]. contemporary educational practice and teaching research, 2016 (8).
- [2] Zhang Yazhi, Li Yuhong. Research on Curriculum Optimization of accounting computerization specialty in Higher Vocational Education Based on "post course certificate competition integration" [j]. China Township Enterprise Accounting, 2015 (5).
- [3] Yang AI. Exploration on talent training mode of integration of accounting professional post courses and certificate competitions [j]. education and occupation, 2013:11-21.
- [4] Wang Yin. Practical research on the combination of competition and education in the course of "Application of construction engineering budget software" [j]. China Building Materials Science and technology, 2018:2-25.

- [5] Huang Chunli. Innovative research on the training mode of new media marketing talents in Higher Vocational Marketing Major - Taking Xi'an University of translation as an example [j]. China business theory, 2016 (z1): 203-205.
- [6] Liu min. research on the training mode of marketing talents in Modern Higher Vocational Colleges under the new media environment [j]. modern marketing (next ten days), 2017 (3): 80-81.