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# Study on the Model of Integrated Education of Vocational Electrical Automation Technology "Post-course Competition Certificate" Under the Integration of School and Enterprise

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**Abstract:** Based on the perspective of university-enterprise integration, this paper first analyzes the post ability demand of electrical automation technology and reconstructs the course system and multi-dimensional evaluation system of the deep integration of post, competition, certificate and creation course. Then, according to the curriculum settings, from the aspects of teaching resource allocation, school-enterprise cooperation mechanism reform, teachers, teaching methods, and teaching materials reform, enable the implementation of "post-course competition certificate creation" integrated education mode, effectively improve the quality of talent training and better serve the new quality productivity.

**Keywords:** School-enterprise integration; "Post class competition certificate" accommodation; "Three-education" reform; Education model

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## 1. Introduction

Major connects the curriculum, teachers and students is the carrier to support the positioning of the school and the goal of talent training, reflecting the teaching ability and level of teachers and the effectiveness of professional talent training. The curriculum is the way for students to obtain the knowledge system for all-round development, which is suitable for the law of students' physical and mental development, and directly affects the quality of personnel training [1]. Higher vocational colleges have advocated curriculum reform for many years and achieved good results. However, with the expansion of higher vocational colleges, the quality of students has declined and the learning ability and concentration of students in higher vocational colleges are not as good as those in previous years. Especially under the impact of various new media, the time students devote to study has gradually decreased and the attraction of classes to them has also gradually declined. The "Opinions on Promoting the High-quality Development of Modern Vocational Education" pointed out that deepening the

reform of education and teaching, strengthening the construction of double-qualified teachers and innovating teaching models and methods [2]. Teachers will improve teaching content and teaching materials, improve the comprehensive education mechanism of "post-course competition certificate," develop courses according to production and post needs, and incorporate technical standards for vocational skill competitions and assessment standards for vocational skill grade certificates into teaching content and personnel training plans [3]. "Post-course competition certificate" comprehensive education should first be based on post-courses, which must promote the integration of school and enterprise. However, because the school expects to comprehensively improve the quality of talent training and the level of school education through in-depth cooperation between industry, university and research institutes, enterprises lack the motivation to participate in this aspect and they are more interested in the pursuit of interests and hope to get support from scientific research and human resources, instead of focusing on the purview of school and enterprise, leading to the school and enterprise finance and discord. In this paper, through deepening the cooperation between schools and enterprises, the reform of three education, enabling the comprehensive education of "post-class competition certificate," and promoting the success of students in career development.

## 2. "Post-course competition certificate" integrates the connotation of educating students

"Post-course competition certificate" integrated education refers to integrating the core quality and ability of post groups, the standards of various vocational skills competitions at all levels and vocational qualification certificates (including "X" certificate) into the professional personnel training program. To promote the professional curriculum system and vocational ability relative, curriculum teaching project and vocational skills competition project docking, professional course content and vocational skills level certificate content integrate three-dimensional, multi-dimensional and compound talent training model [4].

## 3. Pay attention to students' vocational ability

### 3.1. Talent training objectives and employment positions

Colleges deepen school-enterprise cooperation, keep close contact with enterprises with a high degree of automation in the region, fully investigate the development needs of industry enterprises through field visits, platform exchanges, questionnaires and other means, as well as the development needs of professional talents in the industry enterprises. It is important to determine the core job requirements of electrical equipment and automatic production line operation and maintenance, electrical engineering construction, electrical equipment assembly and commissioning, electrical equipment, automatic production line transformation and non-standard research and development, as well as the installation, commissioning, operation, maintenance, fault diagnosis and processing capabilities of conventional electrical equipment and automatic production line [5]. As well as the ability of integrate and transform electrical equipment, automated production lines and systems, and the ability of marketing, after-sales service and technical guidance of automated equipment and intelligent products.

### 3.2. Determine student development standards

According to the research on market demand, combined with the teaching standards of electrical automation technology majors and the training objectives of professional talents, the development standards of students are

determined to be three dimensions: quality objectives, quality and ability [6]. The quality objectives are that the passing rate of students' vocational skills certificate should reach more than 90%; The employer's satisfaction with the graduates reaches 80% [7]. Students are required to have professional ethics, individual and team cooperation, application of modern tools, engineering knowledge, and problem analysis, research on design and development solutions, engineers and society, environment and sustainable development, communication and other qualities. Have the ability to understand and apply knowledge, problem analysis ability, understanding and application of social knowledge, design and development of solutions, evaluation ability, social protection, professional ethics, laws and regulations, judgment and decision-making responsibility, engineering management, lifelong learning, etc. [8,9]

## 4. Reconstruct the course system of the "post-course competition certificate"

Centering on the development standards of students majoring in electrical automation technology, the education model of promoting courses by competition, integrating courses with certificates and testing courses should be constructed according to the situation of students and students' professional ability. The course system of the "post-course competition certificate" should be constructed to promote students' all-round development, so that students' knowledge, ability and quality can develop together.

### 4.1. Set up "professional group platform course + humanistic quality course" to determine the course by post

According to the target position group, the training objectives of talents should be accurately positioned. Based on the determination of training goals in the fields of electrical automation engineering technology, manufacturing, and technical services, as well as the basic capabilities, core capabilities, and cutting-edge capabilities required for the job can be used to determine the job competency course group, and set up ideological and political, labor education, Chinese excellent traditional culture, to cultivate students' morality [10]. It has set up professional group platform courses such as basic electrical engineering, basic mechanical and mechanical drawing, analog electronic technology, digital electronic technology, etc., to cultivate students' skills and train college students in the new era who combine German skills.

### 4.2. Courses of vocational skills competition are set up to promote courses through competition

Taking the assessment points of vocational skills competition as a reference, the professional quality of enterprise posts as the starting point and the training goal of electrical automation technology professionals as the core, the knowledge, skills and qualities that students must master are related to the installation and debugging of modern electrical control system, digital twin simulation and debugging technology, etc. The competition process, technical requirements, evaluation standards, competition task environment and other competition content are embedded in the teaching of professional courses to make the competition project and teaching project docking and integration. The ideological and political, project-oriented, modular and digital teaching reform of professional courses, the implementation of "learning, training and competition in one" new model of course competition integration, to achieve zero distance docking between the teaching process and the competition process, to achieve teaching and competition in the same direction, mutual promotion and common growth.

### 4.3. Set up vocational skills certificate courses to prove the integration of courses

Teachers can revise the teaching content of relevant courses, deeply integrate the knowledge content of vocational skill level certificates such as programmable controller system application programming and maintenance electrician with teaching objectives, teaching content, assessment content, teaching resources and equipment, teaching scenes, etc., so that students can master the content and requirements of vocational skill level certificates while learning and completing the regular course content [12]. Students successfully pass the relevant vocational skill certificate examination.

### 4.4. Multi-dimensional evaluation of "post-course competition certificate" to achieve "promoting reform by evaluation"

With the training of new quality workers required by new quality productivity as the starting point, build a diversified pre-, mid-post evaluation and reform mechanism composed of school teachers, enterprise-related personnel, competition expert committee, skill certification institutions and students represented by post-course competition certificate. Conduct a multidimensional evaluation of the objectives, teaching content, teaching methods and means, resources and settings, curriculum standards, teachers' teaching and other conditions of the "post-course competition certificate" curriculum system. Based on the evaluation, results and dynamic feedback, it is important to understand the needs of all parties, timely adjust the teaching content and methods, revise the talent training program, and promote the docking of the curriculum with the needs of industrial enterprises [13]. Teachers can promote the implementation effect of the integrated education model of "post-course competition certificate," and improve the quality of talent training.

## 5. Allocate teaching resources for professional courses

Professional course teaching resources mainly refer to the resources, facilities and equipment required for professional construction and course teaching, and the teaching team. According to the teaching needs of the electrical automation technology "post-course competition certificate," teaching resources are equipped to meet the teaching needs to support the implementation of talent training programs and the implementation of curriculum teaching reform. To provide the necessary teaching foundation for vocational skills competition courses and vocational certificate courses, teachers can attract students' learning attention, and promote and improve the quality of talent training.

### 5.1. Resources and facilities

According to the curriculum system, the standards of teaching infrastructure and conditions have been formulated [4]. It mainly includes teaching facilities and equipment to meet the needs of the implementation of talent training programs such as vocational skills competition and vocational skills certificate verification, facilities and equipment inside and outside the campus to meet the needs of student groups' learning and activities. Network systems and related course resources, blackboard, projection and other common equipment, teaching resources shared by the society, etc., are also important to utilized by teachers to meet the needs of the implementation of the training program for electrical automation technology professionals and to meet the needs of students' learning.

### 5.2. Professional teaching team construction objectives

According to the characteristics of the electrical automation technology major and the development needs of new quality productivity, the quality goals of teacher construction must adapt to the requirements of new business formats, new technologies, and new models. The goal of teacher construction is scientifically designed from seven dimensions, including overall requirements, professional leaders (double teacher leaders) people), key teachers, dual-teacher team building, dual-teacher quality, teacher development and teacher management mechanisms, etc. It is important to establish a teacher team mechanism for mutual recruitment, sharing and sharing between schools and enterprises, and create a teaching team that adapts to the requirements of on-the-job, competitive recruitment and certified teaching.

## 6. Strengthen top-level design and build a school-enterprise cooperation platform

Colleges should strengthen top-level design, recruit enterprises to attract capital for education and competition, promote sustainable development of schools and enterprises, integrate more deeply, give full play to their respective advantages in education, scientific research, industry and other aspects, combine local industrial characteristics and "post-course competition certificate" integrated education mode, school and enterprise co-construction course workshops, master studios, workshops, etc., to build a real scene of vocational skills competition and vocational skills certificate examination. Teachers should allocate appropriate equipment, strengthen cooperation and exchanges in personnel training, professional group construction, curriculum construction, practical teaching, employment and social services, form a mechanism for talent co-education and resource sharing, ensure that all parties give full play to their respective advantages, focus on the purview of schools and enterprises, and jointly build a five-in-one training base for the integration of production and education with "production, learning, competition, certification and innovation" [14], to cooperate in cultivating talents for new quality productivity.

## 7. Deepen the reform of the "three-education," and enable the "post-course competition certificate" to integrate and educate people

### 7.1. Build a high-level structured teacher innovation team

Teachers are the key to the effective implementation of the integrated education mode of "post-course competition and certificate." Through mutual employment and sharing between schools and enterprises, teachers integrate high-quality talents inside and outside the school, introduce provincial experts in the storage of electrical automation technology as the leader of professional group construction, hire industry experts inside and outside the province and senior technical experts from enterprises as industry mentors, and cooperate with schools and enterprises for joint training. At the same time, it is also important to build a "double teacher" teaching innovation team with "strong teacher ethics, strong teaching, strong scientific research and strong service", and effectively improve teachers' curriculum ideological and political ability, teaching design and implementation ability, scientific and technological innovation and key research ability, and industrial development serviceability in aspects of professional construction, curriculum development and technology research and development, skills competition and vocational certificate [15]. In addition, the school teachers through post visits, post practice, the combination of mentoring and projects and other ways, enterprises real post practice, improve the professional teachers' skill level.

### 7.2. Characteristic teaching materials are jointly developed by the school and enterprises

According to the curriculum system of "post-course competition certificate," follow the principle of "from production, for production," compile corresponding teaching materials for matching professional competition standards and professional certificate contents, and create and match new technologies, new models, new industries, new formats, new fields, new racetracks, new momentum and new advantages. Colleges can cooperate with enterprises to develop local characteristic textbooks, industry-applicable textbooks and school-based professional textbooks for corresponding courses, and ensure that each major will complete at least 1–2 textbooks for school-enterprise cooperation development that are suitable for enterprise post knowledge needs, and the developed textbooks can meet the intermediate (senior) vocational standards of the industry, provincial skills competition standards, school curriculum standards and enterprise employment skills standards. For example, the development of "modern electrical control system installation and commissioning," "digital twin simulation and debugging technology," and "PLC principle and application" textbooks.

### 7.3. Promote the reform of teaching methods

Given the characteristics of electrical automation technical vocational positions, teachers should fully explore the ideological and political aspects of the professional level, curriculum ideological and political lines, content ideological and political points and other ideological and political elements. Teachers can integrate with professional knowledge and professional skills, develop project-style teaching carriers, formulate curriculum standards and the design of curriculum ideological and political, project-based and situational work, promote the standardization and standardization of knowledge points, and develop digital ideological and political resources. In the aspect of teacher, it is important to realize the integration of project-based teaching, modular teaching, scenario-based teaching and ideological and political education, and promote the reform of student-centered, ideological and political, project-based, modular, standardized and situational teaching mode. Through the practice of project tasks, the attraction of the course will be enhanced and students will devote more energy to their studies.

## 8. Conclusion

In short, teachers can keep up with the development needs of vocational education on "post-course competition certificate," implement the "post-course certificate competition" four-in-one talent training mode, reform the traditional talent training mode, keep pace with the era and integrate industry enterprises, schools, skill competitions, certificates, four in one consideration, restructure the curriculum, form a professional talent training system and curriculum system to improve the current situation of students' lack of skills. Multi-dimensional, diversified and comprehensive talent assessment and evaluation mechanism with higher objectivity and fairness can mobilize students' enthusiasm for learning, promote the formation of an "endogenous" education system, and achieve seamless docking between graduation and employment, with certain innovation.

## Disclosure statement

The author declares no conflict of interest.

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