

DISCUSSION ON THE MODE OF PRODUCTION TRAINING IN NEW UNDERGRADUATE COLLEGES UNDER THE BACKGROUND OF INTEGRATION OF PRODUCTION AND EDUCATION

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Abstract: This paper takes the development and practical analysis of production training in newly established undergraduate colleges and universities under the background of industry-education integration as the research object, aiming to explore the challenges and countermeasures brought by the post-epidemic to the steady advancement of higher education training. Through combing the current research status at home and abroad, this paper investigates the development of practical training in new undergraduate colleges from the perspectives of practical training mode, practical training content and practical training effect. And further from the training platform construction, teaching methods, quality assurance and other aspects of practical analysis, summed up the experience and shortcomings of the training work during the epidemic period. The study found that the combination of online and offline hybrid training mode, the use of virtual simulation training platform and the comprehensive monitoring and evaluation of the training process have become the key factors to ensure the quality of training. However, there are still some problems such as insufficient training resources, weak teachers, imperfect training system and imperfect evaluation system. Taking the electrical specialty of Minjiang University as an example, this paper puts forward the development direction of strengthening resource construction, improving teachers' level, perfecting training system and establishing and perfecting training evaluation system. This study provides a theoretical basis and practical guidance for the new undergraduate colleges to effectively carry out production training under the epidemic situation.

Keywords: Integration of production and education; Newly established undergraduate colleges; Production training; Model exploration; Multi-party collaboration

1 INTRODUCTION

Since the introduction of the policy of integration of industry and education, it has had a profound impact on all walks of life in the world, and the field of higher education is no exception. Especially for newly-established undergraduate colleges, their production training has undergone a huge test. Production training is usually an important practical teaching link in undergraduate education. It not only helps students consolidate theoretical knowledge, but also improves students' practical operation ability and problem-solving ability. However, during the epidemic period, due to changes in economic, social and educational policies in various regions, the traditional training teaching mode is difficult to continue, and the shortage of training resources and the weakness of teachers are becoming more and more serious. Therefore, how to effectively carry out production training under the epidemic situation has become an important issue to be solved urgently. With the rapid development of information technology, the introduction of some new technical means, such as online training platform and virtual simulation training platform, provides a new path for the development of production training. Practice has proved that these technical means can help overcome the limitations of the traditional training mode in the epidemic situation. For example, online training platform can break the geographical and time constraints, provide a flexible learning and training environment; the virtual simulation training platform can simulate the real production environment, so that students can practice in a safe virtual environment.

In order to carry out and practice online and virtual training teaching, a series of new problems need to be solved, such as how to ensure the training effect and teaching quality, how to monitor the training process and evaluate the training results. This not only requires the school's investment in technology and facilities, but also needs to make corresponding adjustments and innovations in the teaching system and evaluation standards. At the same time, for the new undergraduate colleges, due to their limited development stage, there is still much room for improvement in effective teacher training and resource allocation.

In summary, starting from the impact of the epidemic on higher education, this paper discusses the characteristics and challenges of production training in newly-established undergraduate colleges, and puts forward the concrete practice

plan and development direction of how to effectively carry out and optimize production training in the new coronavirus epidemic environment. It is hoped that this study can provide some useful references for the teaching practice of new undergraduate colleges in special periods.

1.1 The Characteristics and Challenges of Production Training in New Undergraduate Colleges under the Background of Integration of Industry and Education.

Under the background of the integration of production and education, the production training of newly established undergraduate colleges has distinct characteristics and faces many challenges[1-4].

First of all, due to the short establishment time, new undergraduate colleges often start late in school-enterprise cooperation and integration of industry and education, but because of this, they have certain flexibility and innovation. One of the characteristics of the new undergraduate colleges in the production training is closely integrated with the local economy and industry. Through cooperation with local enterprises, these new institutions can quickly build training bases, so that students can get exercise in the real production environment. In addition, because the cooperative relationship between universities and enterprises has not been solidified, the cooperation between universities and enterprises in the way of problem orientation, project management and collaborative innovation can better meet the needs of both sides.

Secondly, new undergraduate colleges usually pay more attention to the exploration and practice of diversified training mode. Combined with the development of modern information technology, the mixed training mode of online and offline combination is gradually popularized. New technical means such as online training platform, virtual simulation system and remote laboratory have been fully utilized in new undergraduate colleges, which not only improves the vividness and interactivity of training, but also breaks the limitation of time and space and provides students with a more flexible learning environment. However, new undergraduate colleges also face many challenges in production training.

1.2 The Purpose and Significance of the Research on the Increase of Practical Class Hours and the Decrease of Theoretical Class Hours

At present, with the deepening of higher education reform, especially in the context of "integration of industry and education," new undergraduate colleges pay more and more attention to practical teaching. However, too many theoretical courses in the traditional teaching mode often lead to students' lack of practical operation experience, which can not meet the requirements of employers for graduates' practical ability. Therefore, the research on the increase of practical class hours and the decrease of theoretical class hours has important practical significance and far-reaching academic value.

First of all, increasing the practice class hours helps to improve students' comprehensive ability and professional quality. By adding practical links, students can not only apply theoretical knowledge to practical operations, but also cultivate practical ability, problem-solving ability and teamwork spirit. These are indispensable skills in the modern workplace, in the long run, help to improve students' employment competitiveness.

Secondly, the reduction of theoretical class hours does not mean that the quality of theoretical teaching is weakened. On the contrary, the reasonable adjustment of the theoretical class can make the theoretical teaching more streamlined and efficient. Teachers can focus on explaining the core knowledge points, and make students understand the theoretical knowledge more deeply through practical cases and project-driven teaching methods. This kind of teaching method not only enhances the classroom teaching.

Third, the increase of practical class hours is conducive to the in-depth cooperation between schools and enterprises. Through the linkage with enterprises, schools can provide students with a real production and working environment, so that students can be exposed to the latest industry trends and technological trends during school. In addition, enterprises can also find and cultivate the talents needed by enterprises through cooperation with schools to achieve a win-win situation.

Finally, it is of certain academic significance to study the increase of practical class hours and the decrease of theoretical class hours. Through systematic research and exploration, we can summarize the practical teaching mode and system that adapt to the characteristics of new undergraduate colleges, and provide reference for other educational institutions. At the same time, it can also provide a scientific basis for the formulation of education policies and promote the healthy development of higher education.

In a word, in the context of the integration of production and education, increasing the research of practical class hours and reducing the research of theoretical class hours will not only help to improve students' professional ability, promote the in-depth cooperation between universities and enterprises, but also promote the innovation and reform of the teaching mode of higher education, and provide strong support for the cultivation of high-quality and applied talents. This research direction has important practical needs and broad development prospects, which is worthy of in-depth exploration and continuous attention.

2 CURRENT SITUATION OF PRODUCTION TRAINING IN NEW UNDERGRADUATE COLLEGES UNDER THE BACKGROUND OF INTEGRATION OF PRODUCTION AND EDUCATION

2.1 The Contradiction between General Education Curriculum and Professional Quality

With the deepening of the integration of production and education, the production training of new undergraduate colleges has become an important part of improving students' professional quality. However, the contradiction between the current general education curriculum and students' professional quality has gradually become prominent. General courses aim to broaden students' knowledge and improve their comprehensive quality, but their effects are often limited in cultivating specific vocational skills.

First of all, (high standards and long-term investment of the pro-industry model in general education courses): The original intention of general education courses is to cultivate students' comprehensive literacy, including critical thinking, social responsibility and interdisciplinary knowledge reserve. These qualities are extremely important for students' personal development and future career. However, in the new undergraduate colleges, due to the limited teaching resources and teaching time, it is sometimes difficult for general education courses to take into account the cultivation of vocational skills, resulting in students' lack of skills after entering the workplace.

Secondly, the production training course emphasizes practical operation ability and pays attention to students' adaptation and performance in the real working environment. It requires students to master specific vocational skills and can effectively solve practical problems. However, this practical training mode often ignores the students' comprehensive ability. In foreign countries, many scholars and educational institutions have been aware of this contradiction. For example, colleges and universities in the United States actively introduce industry cooperation while promoting 'comprehensive education', and strive to find a balance between general education and vocational education. Enterprises and universities jointly develop courses so that students can master the necessary vocational skills while receiving comprehensive quality education. The German 'dual system' education model also focuses on cultivating students' vocational skills and comprehensive quality through the combination of school learning and enterprise practice. The domestic situation is more complicated. On the one hand, with the deepening of education reform, more and more new undergraduate colleges begin to pay attention to the establishment of production training courses. On the other hand, the contradiction between general education courses and professional quality training still exists. In recent years, some domestic colleges and universities have begun to learn from foreign experience and try to integrate the content of general education courses into the curriculum system of vocational education, such as adding critical thinking training and team cooperation projects to practical training courses, and adding practical content to general education courses.

In general, to solve the contradiction between general education courses and professional quality, it is necessary for new undergraduate colleges to innovate in curriculum design and implementation. First of all, the design of the curriculum system should comprehensively consider the overall development needs of students, not only pay attention to the breadth of knowledge, but also emphasize the depth of skills. Secondly, the implementation of practical training courses should be flexible and diverse, and the close combination of theory and practice can be realized through school-enterprise cooperation and project-based teaching. In addition, the improvement of the evaluation system is also the key to solving this contradiction. Through a scientific and reasonable evaluation mechanism, students are promoted to comprehensively improve their comprehensive quality and professional skills.

2.2 The Double-sided Effect of Enterprise Resources on General Education Curriculum

Under the background of the integration of industry and education, enterprise resources have a significant double-sided effect on general education courses, bringing positive and negative multiple effects.

First of all, from the positive point of view, enterprise resources provide rich practical cases and practical opportunities for general education courses, so that the course content is more in line with the actual needs. By introducing the actual projects and problems of enterprises into teaching, students can better understand the practical application of theoretical knowledge and improve the pertinence and practical ability of learning. For example, business cases, technical equipment and industry expert lectures provided by enterprises can enable students to have access to the real workplace environment on campus and adapt to future work requirements in advance. In addition, internship programs and project courses carried out in cooperation with enterprises can also help students accumulate valuable work experience and enhance their employment competitiveness.

In order to balance the dual role of enterprise resources in general education courses, universities and enterprises need to establish a closer and long-term cooperative relationship, while maintaining the independence and academic nature of educational institutions. Colleges and universities should strengthen the evaluation and selection of enterprise resources to ensure that the introduced resources can truly promote the overall development of students, rather than being limited to meeting short-term skill needs. In the course design, it is necessary to maintain the core concept of general education, taking into account the cultivation of theoretical knowledge and practical skills. In addition, the government and education management departments should also play a regulatory and guiding role in formulating relevant policies to promote the fair distribution and coordinated development of educational resources.

To sum up, the application of enterprise resources in general education courses is not only conducive to improving the practicality and employment orientation of the discipline, but also may bring about the deviation of educational objectives and the problem of uneven resources. Through scientific resource integration and policy guidance, the integration of industry and education can better serve the long-term goal of general education and achieve a win-win situation among education, enterprises and students.

2.3 Construction of off-campus practice base for electrical engineering of Minjiang University (Fujian Electric Power Survey and Design Institute, Automation Electric Power Technology Co., Ltd., Shengxing Group Co., Ltd., Fuda Automation, Zhongneng Electric Co., Ltd., Shichuang Electronics)

As an important part of electrical engineering major in Minjiang University, the construction of off-campus practice base plays a vital role in the process of student training. These practice bases not only provide students with the opportunity to directly contact the cutting-edge technology of the industry and practical engineering projects, but also effectively promote the integration of production and education between schools and enterprises, and improve the pertinence and practicability of talent training. In this process, enterprises such as China Power Construction Fujian Electric Power Survey and Design Institute, Aotong Maisheng Electric Power Technology Co., Ltd., Shengxing Group Co., Ltd., Zhongneng Electric Co., Ltd. and Shichuang Electronics Co., Ltd. played a key role.

First of all, China Electric Power Construction Fujian Electric Power Survey and Design Institute, as an enterprise with high influence in the field of electric power survey and design, its powerful technical force and rich project experience provide a broad practice platform for students. Here, students can be exposed to the complete process from survey and design, system planning to project management, and comprehensively improve their practical ability and engineering literacy.

Secondly, Aotong Maisheng Power Technology Co., Ltd. provides students with opportunities for hands-on experiments and project development with its advanced technology in power technology research and development and application. Through the practice in the enterprise, students can deeply understand the research and development process and market application of power equipment, and cultivate their innovative thinking and ability to solve practical problems. As a leading enterprise in the field of smart grid and power automation, Shengxing Group Co., Ltd. provides students with the opportunity to participate in smart grid projects. During the internship, students can learn about smart grid architecture, power automation control system and new technology application, and deepen their understanding of modern power system.

The construction of the practice base of China Energy Electric Co., Ltd. is focused on power quality management and power system maintenance and optimization. During the internship here, students can participate in the actual power quality solution development and system optimization work to improve their professional skills and practical experience. Finally, Guorui Zhongke Co., Ltd. provides students with practical opportunities in power engineering construction, installation and commissioning. Through personally participating in the work of the construction site, students can understand the whole process of the power engineering project from design to implementation, and constantly practice their skills in actual operation.

To sum up, the off-campus practice bases constructed by these enterprises not only provide rich practical resources for students majoring in electrical engineering in Minjiang University, but also bring new impetus to the talent training and technological innovation of enterprises. Through school-enterprise cooperation, resource sharing and complementary advantages are realized, which provides a successful example for the production training of new undergraduate colleges.

3 THE DEVELOPMENT OF ELECTRICAL PRODUCTION TRAINING IN NEW UNDERGRADUATE COLLEGES

In recent years, with the deepening of China's higher education reform, the production training of new undergraduate colleges has received more and more attention. Under the background of the integration of production and education, how to effectively carry out production training has become an important issue to be solved urgently in new undergraduate colleges. Taking the electrical specialty of Minjiang University as an example, this paper will discuss the development of production training in newly established undergraduate colleges from three aspects: training mode, training content and training effect.

In terms of practical training mode, various newly established undergraduate colleges and universities have explored a variety of innovative practical training modes to meet the needs of the integration of production and education.

The first is the school-enterprise cooperation model. By building a training base with the enterprise, students can directly participate in the real project of the enterprise and improve their practical operation ability. For example, some schools have established off-campus practice bases in cooperation with well-known enterprises, and students enter enterprises under the guidance of instructors for months of practical training. This model not only enhances students' practical ability, but also cultivates their professional quality and teamwork ability.

The second is the simulation model. Through the virtual simulation training platform, students can carry out operation exercises in a realistic simulation environment, which makes up for the shortcomings of field training.

In addition, there is also a project-based teaching model (scientific research back-feeding teaching). By setting up specific project tasks, students learn and practice in the process of completing the project, and improve their comprehensive ability.

3.1 The Practical Characteristics of Minjiang University

In terms of practical training content, each newly established undergraduate college has set up a variety of practical training courses in combination with its own subject characteristics and enterprise needs.

First of all, the basic skills training should be combined with soft and hard, with sufficient credits, enough class hours, and training in place: this type of training mainly covers the basic operational skills that students need to master before entering the professional field, such as engineering training, machining, 3D printing, MATLAB programming, etc. Secondly, professional skills training is the core part of the training content. For different majors, there are corresponding professional training courses, such as programming training for computer science and technology majors, material testing training for material engineering majors, etc. These courses directly correspond to the actual work content in the industry and are highly practical. In addition, there are comprehensive quality training, through some comprehensive projects or tasks, to cultivate students' innovative thinking and problem solving ability.

3.2 Training Mode

Under the background of the integration of production and education, the production training mode of new undergraduate colleges is an important means to cultivate students' practical ability, improve their professional quality and realize the combination of theory and practice. The construction of electrical production training mode should pay attention to the following aspects:

First, the school-enterprise cooperation model. The newly established undergraduate colleges and universities should actively establish long-term and stable cooperative relations with local and surrounding power enterprises, jointly formulate training programs, and clarify the training objectives and contents. Through the training equipment and technical support provided by the enterprise, students can personally participate in the design, installation, commissioning and maintenance of power projects, so as to improve their practical operation ability.

Secondly, task-driven mode. Integrate the actual project tasks into the training process, task-oriented, and promote students' active learning. Each training task has a clear goal, content and steps, and is completed through teamwork. In the process of completing the task, students not only learn the relevant professional knowledge and skills, but also cultivate the ability of teamwork and problem solving. Third, the mentoring model. During the training period, enterprise tutors with rich practical experience and on-campus teachers should be arranged to guide together. The enterprise tutor is mainly responsible for practical operation guidance, teaching application technology and experience ; on-campus teachers are responsible for theory and practice.

Fourth, diversified evaluation model. The evaluation of students' practical training results should be carried out in a diversified way, including the usual operation assessment, task completion, comprehensive project defense and personal summary report. Through multi-angle and multi-dimensional evaluation, the performance of students in practical training is comprehensively measured, so as to improve the effect of practical training and the enthusiasm of students.

Finally, step by step mode. Production training should be designed from easy to difficult, from single to comprehensive training projects according to students' learning process and ability level. The training project in the primary stage focuses on the mastery of basic operational skills, the project in the intermediate stage focuses on the combination of practical operation and theoretical knowledge, and the project in the advanced stage requires students to complete more complex comprehensive projects independently or in teams. This step-by-step approach can effectively help students improve their ability in practice.

In a word, the development of electrical production training in new undergraduate colleges needs to be closely combined with the actual situation of the integration of production and education. Through the exploration and application of diversified training modes, students' application ability and professional quality should be comprehensively improved, so as to lay a solid foundation for their future career development.

3.3 Content Integration of Practical Training Courses

The content of electrical production training in new undergraduate colleges mainly focuses on the practical operation skills and engineering application ability that students can master in the process of practice. The following is a detailed description of the training content:

3.3.1 *Electronic process practice and PCB principle design drawing (Jingjing Su, Zhenhua Shao)*

Students need to design and draw electrical schematic diagrams through professional software, including but not limited to single-line diagrams, system diagrams, power distribution diagrams, etc. In this process, students not only need to master the use of software, but also need to understand and apply electrical design standards and specifications.

3.3.2 *Medium voltage switch technology and related training (Zhenhua Shao, Xuhai Chen)*

Students will learn how to operate and maintain common electrical equipment, such as transformers, high and low voltage switch cabinets, motors and control equipment. Through hands-on operation, students can understand the working principle of the equipment and master the daily inspection and maintenance skills of the equipment.

3.3.3 *Electrical engineering construction and installation (Zhenhua Shao, Lilin Lin)*

The training content also includes 3d printing and model installation of electrical equipment. Students need to carry out cable laying, pipeline laying, positioning and installation of electrical equipment, etc., to cultivate team spirit and on-site construction ability.

3.3.4 *Electric comprehensive training and on-site debugging (Zhixiong Zhong, Wenying Huang)*

Students need to carry out electrical system debugging and troubleshooting exercises. In a real or simulated engineering environment, students need to find and solve problems in the circuit and cultivate their ability to analyze and solve practical problems.

3.3.5 PLC programming and control system (Dongliang Lin)

Practical training requires students to master the basic knowledge and programming skills of programmable logic controller (PLC). The content includes the application of PLC software, the use of programming language, the design and implementation of actual control system, etc., so that students can independently complete simple automatic electrical control projects.

3.4 Safety Procedures and Standard Specifications

In electrical training, the learning and application of safety operating procedures and standard specifications is very important. Students need to master relevant national and industry standards, learn safety protection measures in electrical construction and operation, and strictly abide by them in practical training to ensure personal and equipment safety. On the basis of theoretical teaching, through specific projects and experimental operations, the above training content enables students to apply the knowledge they have learned to practical projects, improve their engineering practice ability and professional quality, and lay a solid foundation for future career development.

4 DEVELOPMENT DIRECTION OF PRODUCTION TRAINING IN NEW UNDERGRADUATE COLLEGES UNDER THE EPIDEMIC SITUATION

Under the background of the new coronavirus epidemic, the production training of new undergraduate colleges is facing unprecedented challenges. Therefore, in the future development direction, it is necessary to start from the following aspects:

4.1 Strengthen the Construction of Training Resources.

Due to the limitation of offline training caused by the epidemic, the construction of online training resources is particularly important. Schools should actively cooperate with enterprises and other educational institutions to develop and share online training platforms and virtual simulation software. This can not only make up for the shortage of offline resources, but also simulate the real production environment through technical means, so as to improve the training effect of students. In addition, it is necessary to pay attention to the update and maintenance of hardware resources to ensure the balance and complementarity of online and offline resources.

4.2 Improve the Strength of Training Teachers

In order to cope with the challenges brought by the epidemic, it is necessary to strengthen the construction and training of practical training teachers. On the one hand, schools should provide various forms of training opportunities to improve the online teaching and virtual simulation teaching ability of existing teachers ; on the other hand, part-time teachers with rich practical experience in enterprises can be introduced to improve the professionalism and practical application of practical training guidance through the way of 'school-enterprise cooperation'. At the same time, establish and improve the teacher incentive mechanism, encourage teachers to actively participate in training courses.

4.3 Improve the Training System

The epidemic situation has promoted the reform of practical training teaching mode, so it is particularly important to build a flexible and sustainable practical training system. Schools should actively promote the mixed training mode of online and offline combination, and form a diversified training teaching system through the combination of online courses, virtual simulation and offline operation. In addition, it is necessary to strengthen the connection between the curriculum system and industry standards, ensure that the training content keeps up with the development trend of the industry, meet the actual needs of enterprises, and enhance students' employment competitiveness and job adaptability.

4.4 Establish and Improve the Training Evaluation System

In order to comprehensively evaluate the training effect of students, it is necessary to establish a scientific and perfect training evaluation system. The evaluation system should include process evaluation and result evaluation. It should not only pay attention to students' participation, performance and problem solving ability in the training process, but also pay attention to the final training results and application level. The introduction of multiple evaluation subjects, including enterprise tutors, school teachers and students self-assessment, through multi-dimensional evaluation methods to ensure the objective, fair and comprehensive evaluation results. At the same time, the big data analysis technology is used to continuously monitor and feedback the evaluation data, adjust the training teaching strategies and contents in time, optimize the training teaching process, and improve the overall training quality.

Through the above measures, the newly-established undergraduate colleges can still effectively carry out production and training activities under the limitation of the epidemic situation, ensure the quality of practical training teaching, and thus transport applied talents with high quality and practical ability for the society.

5 CONCLUSION

This paper makes an in-depth discussion on the production training mode of new undergraduate colleges under the background of the integration of industry and education, and puts forward specific suggestions on the existing problems and future development direction based on the actual cases and the training practice under the epidemic situation. The following are the main conclusions of our research and prospects for the future: First of all, this paper summarizes the current situation of production training in newly established undergraduate colleges under the background of integration of industry and education, and focuses on the analysis of the training mode, content and effect of electrical engineering specialty. The research shows that the integration of industry and education promotes the sharing of resources between schools and enterprises and improves the practical training effect of students, but there are also problems such as the contradiction between general education courses and professional quality. In addition, the construction of online and virtual simulation training platforms during the epidemic period has innovated the training mode and teaching methods, but it still needs to be further improved in terms of training resources, teachers and system construction.

Secondly, in view of the problems exposed by the epidemic, such as insufficient training resources, weak training teachers, imperfect training system and imperfect evaluation system, we put forward the corresponding development direction. It includes strengthening the construction and strengthening of training resources, improving the strength of training teachers, improving the training system and establishing a sound training evaluation system. Looking forward to the future, with the development of industry and the continuous demand for education.

1) Deepen the cooperation between industry and education: further strengthen the cooperation between schools and enterprises, build a long-term and stable cooperation mechanism, ensure the timely updating and optimization of training resources and contents, and promote the diversification and practicability of training mode.

2) Improving the level of teachers: Through teacher training, further education and enterprise practice and other ways, teachers' practical training guidance ability and professional technical level should be continuously improved to ensure the quality of practical training teaching.

3) Improve training facilities: increase investment in training facilities and platforms, especially in the construction of information technology and virtual simulation training platforms, to meet the needs of different training content and forms.

4) Improve the evaluation system: Establish a scientific and systematic training evaluation system, covering the training process and results, and objectively evaluate the training effect and ability level of students through diversified evaluation methods.

Through in-depth analysis of the existing problems and solutions, we hope that the new undergraduate colleges can better cope with the challenges in the future practical teaching, give full play to the advantages of the integration of production and education, and cultivate more high-quality and practical talents for the society. We also hope that these studies and practices can provide useful reference for other colleges and universities to jointly promote the reform and development of higher education.

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