

Training Strategies of Innovative Practice Ability for Students of Electronic Information Major in Higher Vocational Colleges under the Background of Emerging Engineering Education

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Abstract

Based on the cultivation of innovative practical abilities in electronic information majors in vocational colleges under the background of Emerging Engineering Education, we analyzes many problems that exist in the process of cultivating students' innovative practical abilities in vocational colleges, and proposes a series of measures to provide guidance for the cultivation of innovative practical abilities in vocational college students.

Keywords

Vocational Education; Electronic Information; Innovative Practical Ability; Emerging Engineering Education.

1. Introduction

With the emergence of emerging technologies such as the Internet of Things, big data, and artificial intelligence, in order to actively adapt to the new round of technological revolution and industrial transformation, the Ministry of Education has actively promoted the construction of Emerging Engineering Education disciplines since 2017, forming the "Fudan Consensus", "Tianda Action", and "Beijing Guidelines". In the context of Emerging Engineering Education, diversified talents are required not only to master professional knowledge and skills, but also to possess innovation ability, engineering practice ability, and international competitiveness [1-3]. Vocational education is an important part of higher education, undertaking the important mission of cultivating high-quality technical and skilled talents. Vocational education is closely related to socio-economic development, and vocational education places greater emphasis on hands-on practical skills in facing specific problems. In the face of today's industrial transformation and emerging technological fields, higher level requirements have been put forward for talent cultivation in vocational colleges. In the context of the Emerging Engineering Education discipline, it is necessary to focus on cultivating vocational students' innovative practical abilities, integrating innovative spirit into the entire process of learning and education, and improving the professional quality of vocational students. Only in this way can students make greater progress in their future work and adapt to the new demand for talents in the new era.

2. The Significance of Cultivating Innovative Practical Abilities of Vocational College Students in the Context of Emerging Engineering Education

In the context of Emerging Engineering Education, the cultivation of innovative talents has become more urgent. Innovative practical ability refers to the ability to discover, analyze, and solve specific engineering problems. It is a core ability that must be possessed in response to

the new technological revolution and industrial upgrading, and has also become an important part of talent cultivation in universities[4]. Most students in vocational colleges lack active and innovative thinking, unable to adapt to the ever-changing and complex engineering practical problems, and lack job competence. Therefore, in the process of talent cultivation, vocational colleges should pay more attention to the cultivation of students' innovative practical abilities. From multiple aspects such as talent cultivation plans, curriculum standards, teaching content, teaching methods, assessment and evaluation, they should fully consider the concept and methods of innovation, subtly cultivate students' innovative spirit throughout the entire process of talent cultivation, provide diversified innovative practical platforms, and encourage students to dare to practice, Utilize their professional knowledge and innovative thinking to solve practical problems, cultivate students' habits of independent exploration and active thinking, and encourage them to dare to think, be good at thinking, and be willing to innovate. The cultivation of innovative practical abilities can also help students establish self-confidence, enabling them to enrich and improve themselves through continuous learning of emerging technology knowledge, thereby comprehensively improving their professional literacy, better adapting to job requirements, having better competitiveness in the field of emerging technology, and laying a solid foundation for future career development.

In order to become high-quality talents who can adapt to future challenges, students are required to possess strong innovative and practical abilities in order to cope with new technologies such as intelligent manufacturing, cloud computing, and artificial intelligence, thereby assisting in the transformation and upgrading of manufacturing enterprises[5]. The construction of Emerging Engineering Education majors is the upgrading and transformation of traditional engineering majors using intelligent manufacturing, artificial intelligence, robotics technology, etc., which requires a large number of composite engineering and technical talents with practical ability and innovative spirit. At the same time, vocational colleges mainly cultivate technical and skilled talents. As a key major supporting intelligent manufacturing technology, the electronic information major has high requirements for students' technical level and innovative practical ability. Therefore, in the context of the Emerging Engineering Education discipline, taking the electronic information major as an example, exploring the innovative practical ability of vocational college students is of great significance, and provides important reference for the cultivation and research of innovative practical ability of vocational college students.

3. The Current Situation of Cultivating Innovative Practice Ability for Students Majoring in Electronic Information in Vocational Colleges

3.1. Insufficient Understanding of the Importance of Innovation Ability and Weak Innovation Awareness

Innovation ability is the core competitiveness of personal development and an inexhaustible driving force for personal growth and progress. Students majoring in electronic information in vocational colleges are generally able to master the required professional skills in professional courses, but there are phenomena such as weak awareness of self-directed learning, low learning enthusiasm, weak innovation awareness, and insufficient comprehensive abilities between professional course knowledge. At the same time, some vocational teachers only focus on students' proficiency in knowledge and skills, and do not pay attention to cultivating students' independent exploration and innovation awareness, resulting in insufficient understanding of the importance of innovation ability among students.

3.2. The Teaching Content is Relatively Lagging and Cannot Adapt to the New Requirements for Students in the Context of Emerging Engineering Education Disciplines

Enterprises are constantly applying the latest technologies and processes in the industry during transformation and upgrading, requiring graduates not only to master solid professional knowledge, but also to have strong practical and innovative abilities in order to adapt to the new technological revolution and industrial transformation. At present, the teaching content of the electronic information major in vocational colleges is relatively lagging behind, mainly focusing on the installation and debugging of traditional electronic equipment, fault diagnosis, and other parts. There is less involvement in intelligent product design and manufacturing, intelligent factories, and other content. There is less teaching of relevant knowledge for cultivating students' innovation ability, which cannot meet the new needs of enterprises for high-end intelligent and digital talents in the context of Emerging Engineering Education.

3.3. The Teaching Method is Single and Cannot Fully Utilize Students' Autonomous Learning and Innovation Abilities

Vocational education is mainly taught by teachers, with students passively learning. Students have low enthusiasm for learning, lack the spirit of actively exploring knowledge, and cannot fully utilize their independent learning and innovation abilities. The teaching methods of teachers are single, and although they have practiced professional skills, students lack the hands-on practical ability to face real projects and solve practical problems, as well as the innovative application of knowledge and skills.

3.4. Lack of Innovative Ability Training Platform, Insufficient Cultivation of Students' Innovative Practical Ability

At present, vocational colleges have offered courses on innovation and entrepreneurship, conducted lectures and training on innovation, and achieved some results. However, most teachers lack practical experience in innovation and entrepreneurship education, lack solid theoretical knowledge of innovation, and lack the cultivation of students' innovation awareness in professional courses. The integration between innovation concepts and professional knowledge is low, and students' mastery of professional skills is mostly limited to proficient application, rather than innovative design and application development. The school lacks an innovation ability training platform that combines professional skills, a practical platform for learning innovative courses, and insufficient support for cultivating students' innovation ability.

4. Implementation Path for Cultivating Innovative Practical Abilities of Vocational Electronic Information Major Students

In response to the current situation of cultivating innovative practical abilities for students majoring in electronic information in vocational colleges, a "four element integration" approach has been proposed, which includes "integrating enterprise needs with curriculum teaching", "integrating innovation and entrepreneurship education with professional education", "integrating professional knowledge with innovation practice", and "integrating innovation and entrepreneurship projects with technical services". The cultivation path for innovative practical abilities of vocational electronic information major students with "understanding technology, being able to apply, and good at innovation" and "three-step progression".

4.1. Deepening Teaching Reform and Realizing the Integration of Enterprise Needs and Curriculum Teaching

4.1.1. Clarify New Job Requirements and Improve the Curriculum System for Cultivating Innovative Abilities

When formulating a talent training plan for electronic information professionals, the professional teacher team needs to grasp the new trends and technologies of industry development, and add core courses that are suitable for innovative practical training. In the first year of college, courses such as "Innovation Fundamentals" and "Mechanical Design" will be offered, while in the second year, courses such as "Mechanical Product Innovation Design" and "Mechanical and Electrical Product Innovation Design Methods" will be offered. In the third year, courses such as "Professional Innovation Comprehensive Practice" and "Innovation Entrepreneurship Practical Training" will be offered, forming a tiered and continuously improving innovation curriculum system, and cultivating students' innovation and practical abilities throughout the entire process.

4.1.2. Increase Innovative Methods and Theories, and Restructure Course Teaching Content

With the continuous growth of enterprises' demand for high-end manufacturing and digital talents, the teaching content of electronic information majors in vocational colleges needs to closely follow the new requirements for technical and skilled talents in the context of Emerging Engineering Education, break the traditional knowledge system, integrate new trends, new formats, and new models, restructure the course content into modules, and integrate emerging technology content such as intelligent product innovation design and intelligent factories. In the teaching of electronic information majors, TRIZ innovation theory knowledge can be introduced, and through reorganization and integration of TRIZ theory and professional knowledge, students can achieve integrated innovation of the subject knowledge system and achieve interdisciplinary integration innovation. At the same time, students can also actively apply TRIZ theory to enterprise technology research and development and practice, gradually cultivating their innovation ability[6].

4.1.3. Explore Students' Endogenous Potential and Optimize Teaching Methods

In the teaching process, change the roles of teachers and students, actively explore various teaching methods, adopt task driven methods, situational teaching methods, etc., and stimulate students' interest in active learning. Before class, teachers release resources, students learn independently and upload learning results, cultivating students' proactive exploration spirit of knowledge. In the classroom, teachers introduce real enterprise projects, students collaborate in groups, and through specific practical tasks, strengthen students' innovative thinking ability in practice. After class, teachers release innovative expansion tasks, students independently choose task content, and upload creative product design plans, Cultivate students' innovative practical abilities from multiple perspectives.

4.2. Strengthen the Linkage between Education and Teaching Staff, and Achieve the Integration of Innovation and Entrepreneurship Education with Professional Education

In the context of Emerging Engineering Education, the demand for talents not only requires professional knowledge and skills, but also strong innovation and practical abilities. Therefore, vocational colleges should pay attention to integrating innovation and entrepreneurship education into professional curriculum practice. When teaching relevant professional knowledge, teachers need to integrate elements and concepts of innovation education in a timely manner. Teachers not only need to continuously improve their professional skills, but also need to understand cutting-edge technology and innovative theoretical methods.

Professional course teachers should strengthen communication with innovation and entrepreneurship course teachers, play a collaborative role, conduct joint research, and subtly integrate innovative thinking and concepts to improve training effectiveness.

4.3. Establish an Innovation Practice Platform to Achieve the Integration of Professional Knowledge and Innovation Practice

4.3.1. Relying on the Second Classroom to Explore Students' Innovative Thinking

Students majoring in electronic information in vocational colleges should, on the basis of mastering the professional knowledge and skills of electronic information, join the Electronic Design Innovation Association, Electrical Maintenance Association, etc. Through the second classroom, fully explore their personal advantages and professional strengths. Students should participate in club activities according to their interests, hobbies, and professional strengths, tap their personal potential, stimulate innovation vitality, and use professional theoretical knowledge to design creative products, Realize the organic integration of theory and practice.

4.3.2. Using Skill Competitions as a Starting Point to Strengthen Students' Innovation Awareness

Skills competitions focus on students' abilities to analyze, solve, and innovate specific problems, and use competitions as a driving force to promote students' learning of new knowledge and skills. Organize students to participate in electronic design competitions, the Internet+Innovation and Entrepreneurship Competition, and the Challenge Cup Innovation and Entrepreneurship Competition, and apply their theoretical knowledge to practice, highlighting the cultivation of students' innovation and practical abilities.

4.3.3. Building an Innovation and Entrepreneurship Platform to Improve Students' Innovative Practice Ability

Encourage students to explore innovative points in their professional knowledge, actively apply for patents, actively participate in teachers' research projects, and demonstrate their innovative practical abilities in specific practical projects. At the same time, through forms such as entrepreneurship assistance, entrepreneurship subsidies, and skill training, we will build a platform for college students' innovation and entrepreneurship, promote student innovation and entrepreneurship incubation projects, and comprehensively promote the effective improvement of students' innovation ability. Collaborating with schools and enterprises, interacting with multiple parties, to build a new platform for innovation and entrepreneurship for college students, and achieving interaction among government, enterprises, and universities is a powerful attempt to deeply promote entrepreneurship and innovation. Innovation leads entrepreneurship, entrepreneurship drives employment, and students' innovation and practical abilities are improved through multiple channels.

4.4. Carry Out Comprehensive Practice Through Multiple Channels to Achieve the Integration of Innovation and Entrepreneurship Projects and Technical Services

Fully tap into students' professional strengths and innovative thinking, achieve role-flipping in the teaching process, prioritize students, leverage the quality of self-directed learning and exploration, integrate professional characteristics, establish entrepreneurship project training classes across majors and disciplines, and further expand the channel for achievement transformation. The school provides hardware facilities such as research and development venues and equipment, and forms a research and development team for teachers and students. As team members, students participate in actual real projects and engage in production, debugging, and research and development positions in intelligent manufacturing enterprises. They transform innovative research and development products and process results into intellectual property, and feed back project content into the teaching process. Students'

innovation ability is also subtly improved, and the educational effect is significantly improved. Relying on collaborative innovation platforms, we can undertake external technical service training and skill appraisal work to jointly enhance students' innovative practical abilities.

5. Conclusion

In the context of the Emerging Engineering Education discipline, by improving the curriculum system for cultivating innovative abilities, restructuring course teaching content, and optimizing teaching methods, we will deepen teaching reform and achieve the integration of enterprise needs and course teaching. Relying on the second classroom and using skill competitions as the starting point, we will build an innovation and entrepreneurship platform to improve the effectiveness of education and achieve the integration of professional knowledge and innovative practice. Strengthen the linkage between education and teaching staff, and achieve the integration of innovation and entrepreneurship education with professional education. By conducting comprehensive practice through multiple channels, we aim to integrate innovation and entrepreneurship projects with technological services. By deepening teaching reform, establishing innovative practice platforms, and carrying out comprehensive practical implementation paths through multiple channels, we aim to cultivate students into diversified talents who understand technology, are capable of application, and are good at innovation.

Acknowledgments

This work was supported by Special research topic on labor education of Suzhou Vocational Institute of Industrial Technology (Grant No. 2022ldjy35).

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