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Exploration on the Construction of Integrated Teaching Innovation Teams for Secondary Vocational and Higher Vocational Education in Industrial Robot Technology under the Digital Background

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Abstract: In the current global digital wave, industrial robot technology is flourishing at an unprecedented speed. This article focuses on the construction of teaching teams for industrial robot technology professionals. Taking digitalization as the starting point, deeply analyze the current situation and problems of integrated team building in secondary and higher vocational education. This chapter proposes strategies for improving team collaboration mechanisms, enhancing teachers' digital literacy, strengthening the cultivation of practical teaching abilities, deepening school enterprise cooperation, and digitizing teaching evaluation. Aiming to enhance the digital teaching level of the teaching team, create a high-quality teaching team that can accurately meet the needs of the industry and possess the spirit of digital innovation, and lay a solid foundation for cultivating high-quality technical and skilled talents who can adapt to the needs of the industry in the new era.

Keywords: Digitization; Industrial Robot Technology; Integration of Secondary and Higher Vocational Education; Teaching Innovation Team.

1. Introduction

Under the wave of digitization, industrial robots are experiencing rapid development and are widely used in fields such as manufacturing and electrical engineering. As an important component of digital manufacturing, industrial robots have received widespread attention in their technological research and application [1]. On the production line, industrial robots can excel in precision mounting of electronic components and assembly of electrical products. In the circuit board manufacturing process, it relies on high-precision robotic arms to complete the placement of small electronic components at extremely high speed and accuracy, greatly improving production efficiency and reducing manual operation errors. With the advancement of technology, the intelligence level of industrial robots continues to rise. Robots have visual recognition capabilities and can automatically identify electrical parts of different specifications. They can also optimize production processes through data analysis to achieve more efficient production scheduling. At the same time, collaborative robots have emerged, which can safely collaborate with electrical workers to complete complex assembly tasks and enhance human-machine collaboration efficiency.

Industrial robots help the electrical industry move towards a new era of intelligent and automated production, promoting rapid development of the industry. With the rapid development of the industry, there is an urgent need for a large number of professional talents who master advanced technology. At the same time, the demand for industrial robot technology professionals in the industry is showing diversified characteristics. Not only do skilled talents need to master robot operation, programming, and maintenance, but also composite talents with system integration and project management capabilities. Meanwhile, with the advancement of intelligent manufacturing, there is an increasing demand for digital literacy and innovation among talents. [2-4]

The integrated development of secondary vocational education and higher vocational education is an important battlefield for cultivating technical and skilled talents, and it is crucial to build an integrated teacher teaching team. This article is based on the background of digital development, taking the development of the electrical industry in the service area as the starting point. Through the construction of the industrial robot technology professional team and the integration of vocational education resources in the direction of digitalization, effective connection between teaching content, methods, and evaluation is achieved to improve the quality of talent cultivation and meet the demand of the electrical industry for industrial robot technology professionals. [5-7]

2. The Current Situation and Problems of Integrated Teaching Team Construction in Secondary Vocational and Higher Professional Education

2.1. Composition of Integrated Teaching Team

The integrated teaching team for secondary and higher vocational education in industrial robotics technology is composed of teachers from secondary and higher vocational education, covering multiple disciplines such as mechanical, electrical, and automation., At the same time, the team also introduced enterprise engineers and skill masters to enrich the practical teaching strength.

At present, the team collaboration mechanism is not perfect in the construction process, and there is a lack of effective communication and collaboration platforms among middle and vocational college teachers. It is difficult to form a joint

force in curriculum system construction, teaching plan formulation, teaching evaluation, and other aspects. At the same time, due to the different management systems of vocational and higher vocational education, there are differences in team management and incentive mechanisms, which affect the enthusiasm of teachers to participate in team building.

2.2. Current Situation of Integrated Teaching

In terms of teaching content, there is a certain degree of repetition and disconnection in secondary and vocational courses. The secondary vocational stage focuses on the cultivation of basic skills, while the higher vocational stage pays more attention to the improvement of comprehensive abilities, but there is a lack of effective connection between the two. In terms of teaching methods, although some teachers have tried to use digital teaching methods such as virtual simulation teaching and online courses, the overall application level needs to be improved.

The Industrial Robot Technology major is a highly practical field, but some teachers lack practical experience in enterprises and have insufficient practical teaching abilities. When guiding students in practical aspects such as robot operation, programming, and maintenance, it cannot meet their learning needs. In addition, there is a gap between the on-campus training equipment and the actual production equipment of enterprises, which also affects the effectiveness of practical teaching.

2.3. Application of Digital Teaching Resources

At present, the industrial robot technology major has developed some digital teaching resources, such as teaching videos, virtual training software, etc. However, the sharing and integration of these resources between secondary and vocational schools is insufficient, and the advantages of digital resources in integrated teaching of secondary and vocational schools have not been fully utilized. Some teachers lack sufficient mastery of digital teaching tools and technologies, and are unable to fully utilize digital resources to carry out teaching activities. The inadequate abilities of teachers in virtual simulation teaching, online teaching platform applications, and digital textbook development have hindered the advancement of teaching reform in the digital context.

2.4. Insufficient Depth of School Enterprise Cooperation

In terms of industry education integration and school enterprise cooperation, although most vocational schools have established cooperative relationships with enterprises, the depth of industry education integration and school enterprise cooperation is not enough. The enthusiasm of enterprises to participate in talent cultivation is not high. The participation in course development, teaching guidance, internship and practical training is relatively low. The lack of a long-term mechanism for school enterprise cooperation makes it difficult to achieve mutual benefit and win-win outcomes.

3. Strategies for Building an Integrated Teacher Teaching Team

3.1. Improve Team Collaboration Mechanism and Build a High-Level Structured Dual Teacher Team

Guided by the comprehensive implementation of the spirit of the National Vocational Education Conference and the "National Vocational College Teacher Teaching Innovation Team Construction Plan" and other documents, with the goal of serving the reform of integrated talent cultivation for industrial robots in the province, focusing on the demand for regional electrical industry talents, we aim to create a high-level, structured industrial robot technology integrated teacher teaching innovation team with provincial and regional influence, radiating and driving the connotative development of integrated talent cultivation for similar majors in the city and even the whole province, and playing a demonstrative and leading role.

Improve the teacher team collaboration mechanism and establish a regular communication and exchange mechanism for middle and vocational school teachers, such as conducting teaching seminars, joint lesson preparation, etc., to jointly discuss issues such as curriculum system construction and teaching content optimization. Develop a unified team management system and incentive mechanism, reward teachers based on their contributions in team building, and enhance their enthusiasm for participating in team building.

3.2. Improve the Teaching Standard System and Actively Promote the Pilot Implementation of Integrated Achievements

Guided by the construction of the national standard system for industrial robot technology, with integrated curriculum reform as the core and exploration of integrated training mechanisms as the mainline, we will fully leverage the role of electrical industry enterprises. Through joint revision of integrated talent training plans and effective teaching implementation, we will build an integrated curriculum system, textbook system, and practical training system that connects and progresses between secondary and higher vocational education. By fully integrating resources, enhancing the degree of close cooperation between vocational and secondary school teachers, and establishing an effective collaborative work mechanism for vocational and secondary school teachers. To effectively improve the quality of cultivating high-quality technical and skilled talents, and meet the urgent demand of high-end industries for high-quality technical and skilled talents. Promote the construction of a modern vocational education system that is vertically interconnected and horizontally integrated.

Strengthening standards plays a fundamental role in improving the quality of integrated talent cultivation. Focusing on the integrated design and systematic training of secondary and higher vocational education, following the laws of long-term talent cultivation and the growth of high-quality technical and skilled talents. Led by leading universities, vocational schools, and industry enterprises, based on a provincial perspective and combined with actual needs, we will conduct talent demand research, clarify the work tasks and professional abilities of corresponding positions in the major, connect with professional ability

standards, clearly define the talent training goals of middle and higher vocational levels, and formulate integrated professional teaching standards, core course standards, training condition construction standards, and on-the-job internship standards accordingly. Through the research and improvement of the provincial integrated teaching standard system for secondary and higher vocational education, we aim to enhance team members' understanding and awareness of teaching standards, develop and transform their abilities, and actively cultivate teaching achievements at the provincial and municipal levels.

3.3. Enhance Teachers' Digital Literacy and Build A "Digital+" Curriculum Teaching Resource Library

Carry out the training of teachers' digital literacy of industrial robots, including the application of digital teaching tools, online course development, virtual simulation teaching and so on. Encourage teachers to participate in digital teaching competitions to promote teaching and improve teachers' digital teaching ability. At the same time, a platform for co-construction and sharing of digital teaching resources of industrial robots will be established to promote resource sharing and communication among teachers in middle and higher vocational colleges.

Fully mobilize the industry, enterprises, vocational college experts and other forces. According to the core curriculum standards of industrial robotics, and in accordance with the principles of scenario-based and progressive course design, we jointly develop and compile integrated course materials. Timely incorporation of new technologies, new processes and new norms into the teaching content. Strengthen the construction of high-quality teaching resource library for industrial robot majors, accelerate the construction of intelligent practical training teaching sites, and improve course resources to meet the diverse needs of students. Implement the requirements of post course competition certificate, promote the docking of curriculum setting, teaching content with vocational post ability, vocational skill competition, and vocational skill level certificate, enhance the pertinancy of talent training, and improve the adaptability of vocational education.

3.4. Strengthen the Cultivation of Teachers' Practical Teaching Ability and Explore the Implementation of Team Collaboration Modular Teaching

Establish a teacher enterprise practice system, regularly arrange teachers to practice in enterprises, understand the actual production of enterprises and the development of industrial robot technology, and improve practical teaching ability. Strengthen the construction of industrial robot training bases on campus, introduce actual production equipment of enterprises, simulate the production environment of enterprises, and provide conditions for teachers to carry out practical teaching. In addition, teachers are encouraged to participate in enterprise technology research and development projects to improve their technical service capabilities.

Guide team teachers to use new teaching methods such as "action-oriented" teaching, project-oriented teaching, scenario-oriented teaching and process-oriented teaching to form characteristic teaching style. Team teachers fully participate in the industrial robot professional talent demand research, curriculum standards development, curriculum system construction, teaching evaluation and other personnel training reform work. Organize the team members of higher vocational schools to develop modular courses and teaching resources, carry out teaching design and teaching discussion activities, implement modular teaching, break the problem of separation between traditional education theory and practice, and train students to use professional knowledge to solve practical problems.

3.5. Deepen School Enterprise Cooperation, Serve Local Socio-Economic Development and Industrial Transformation and Upgrading

Build a community of integration of industry and education, establish a long-term mechanism for school-enterprise cooperation, and strengthen in-depth cooperation between schools and enterprises by building industrial colleges and order classes. Electrical and manufacturing enterprises participate in the whole process of talent training, including course development, teaching guidance, practical training, employment recommendation, etc. The school provides technical support and personnel training services for enterprises to achieve mutual benefit and win-win results. At the same time, the technical backbone of enterprises is invited to serve as part-time teachers, enrich the teaching team of teachers, and improve the practicality and pertinence of the teaching content.

Serve the national electrical industry cluster, strengthen the training of high-quality and skilled talents in industrial robots and electrical technology, provide new momentum for the upgrading of the national electrical industry cluster, and promote the integration of professional and local economic and social development. Through the cooperation with high-quality enterprises to carry out field engineers, the construction of high-level professional production and education integration training bases and other methods, shorten the training cycle of enterprise reserve talents.

3.6. AI Empowers Team Building, School Enterprise Cooperation Promotes Digital Transformation of Teaching Evaluation

Big data, artificial intelligence and other information technologies are used to transform the teaching mode and education mode, effectively carry out learning situation analysis, process monitoring, academic evaluation, learning resources development, etc., and promote the deep integration of information technology and teaching. Focus on the application of AI technology, the reform of AI enabling evaluation, enabling students' learning situation analysis, curriculum evaluation analysis, teacher teaching evaluation analysis, and professional construction analysis. The data of various learning platforms, teaching platforms and practical training platforms are collected using the comprehensive teaching evaluation data intelligence platform to form a database of the whole process of teaching, student learning and teacher growth. The AIGC large model is applied to automatically generate personalized learning summary report for each student, accurately analyze learning situation, teach students according to their aptitude, and guide students to explore independently and learn deeply.

Deepen the integration of production and education and

strengthen enterprise evaluation. For professional (group) training specific positions, joint enterprises can easily and efficiently design post competency models and assessment question banks with the help of the post capability map and AIGC capabilities. After the phased assessment, students can obtain value-added evaluation data, enterprise evaluation data, competency data report, dynamic planning learning path recommendation learning resources, etc. The real realization of AI new technology to enable vocational education, enabling the deep integration of new double high-yield education, high-level construction of hardware, and digital reform has achieved remarkable results. At the same time, personalized training direction learning, learning path and learning resources are recommended for the evaluation results of standard posts, so as to achieve innovative course evaluation methods, increase the evaluation weight of enterprises, combine process evaluation and result evaluation, and promote the continuous improvement of classroom teaching quality.

4. Conclusion

Under the background of digitalization, the construction of integrated teachers' teaching team is the key to improve the quality of vocational education personnel training. By improving the team cooperation mechanism, improving the digital literacy of teachers, strengthening the training of practical teaching ability, deepening the cooperation between schools and enterprises and the digitalization of teaching evaluation and other strategies, we can effectively solve the problems existing in team building, build a high-quality and professional teacher teaching team, and train more excellent technical talents for the professional development and industrial upgrading of industrial robot technology. In the future, with the continuous development of digital technology, the construction of integrated teachers' teaching team in middle and higher vocational colleges needs to be explored and innovated continuously to meet the new education and teaching needs.

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