

Research and practice on the practical teaching system of intelligent manufacturing engineering under the integration of industry and education

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Abstract: The pace of intelligent development in the manufacturing industry is constantly accelerating. In such an environment, the optimization and upgrading of the industry poses a huge challenge for teachers majoring in intelligent manufacturing engineering in universities to break the traditional mode of talent cultivation. As manufacturing engineering professional teachers, we should establish new teaching concepts and implement teaching reforms. In the process of practical teaching in the field of intelligent manufacturing engineering, the integration of industry and education is adopted to cultivate talents. In specific work, it is necessary to construct a new practical teaching system, innovate teaching methods, and efficiently utilize teaching resources to improve students' professional qualities, and cultivate composite talents required by the intelligent manufacturing engineering industry. This paper conducts research on the practice of the intelligent manufacturing engineering practical teaching system under the integration of industry and education.

Key words: intelligent manufacturing engineering; integration of industry and education; practical teaching system

1 Introduction

The current education field actively introduces advanced scientific and technological achievements to innovate teaching models. While highlighting the sense of the times in the discipline, it allows students to understand the forefront of the discipline and have confidence in the development of their major, which plays an important role in stimulating students' positive learning awareness. The application of virtual reality technology, artificial intelligence technology, and other technologies in education and teaching, as well as updating teaching plans according to the talent quality requirements of enterprises, and further deepening the integration of industry and education, are the fundamental foundation for the sustainable development of this course. The systematic operation of practical teaching in intelligent manufacturing engineering adopts a model of integrating industry and education, and establishes a good cooperative relationship between universities and enterprises. Students can have access to advanced technology from enterprises, receive guidance from professional technical personnel, clarify the measurement standards of talents in enterprises, and improve themselves based on this. Such teaching is more conducive to implementing moral education and achieving results.

2 The demand of intelligent manufacturing industry and talent cultivation situation

2.1 Industrial demand

After the transformation of the intelligent manufacturing industry, integrated and systematic operation has been achieved. Due to the use of intelligent technology, operational efficiency becomes higher and the equipment used is more precise. In industrial production, a single cycle is completed using various types of robots. Correspondingly, core personnel must possess higher professional and technical levels and professional qualities. Employees in basic positions should have creative thinking, high comprehensive transformation ability, and good adaptability to various work environments. To understand the needs of industries, universities need to adjust their education system in a timely manner, integrating economic development elements and scientific and technological elements, in order to cultivate talents with strong comprehensive abilities. In addition, in the process of improving the education system, it is necessary to timely grasp cutting-edge knowledge in the professional field. Based on this, it is necessary to formulate a talent cultivation plan to improve the professional skill level of talents from the source [1].

2.2 Talent cultivation situation

The establishment of the intelligent manufacturing engineering program in universities aims to meet the modern production needs of the manufacturing industry and achieve sustainable development. The field of intelligent manufacturing engineering covers a wide range of topics, including mechanical research and development, information technology, and robot design. However, from the current development situation of this major, there are still shortcomings and there is no independent disciplinary construction ability. In addition, the knowledge of intelligent manufacturing engineering has not been updated in a timely manner, and there is a significant lag in educational content compared to actual production. Professional teachers have not mastered the forefront of the intelligent manufacturing industry, resulting in the inability to achieve the expected results in talent cultivation in this field.

3 Effective measures for optimizing the practical teaching system of intelligent manufacturing engineering

3.1 Establishing a practical teaching system of "alternating learning and training"

Firstly, the university will form a professional team consisting mainly of researchers in the field of intelligent manufacturing engineering and school teachers. The team should regularly enter the enterprise to conduct research work, and have a comprehensive understanding of the new technology processes, advanced new equipment, technical standards, and talent quality requirements applied in the enterprise. When returning to school for teaching, the information obtained should be integrated into the teaching of intelligent manufacturing engineering, providing professional teaching and vocational training for students [2].

Secondly, in the teaching process, real enterprise projects should be adapted into cases and introduced into the classroom, initiating a project teaching model to enable students to acquire knowledge during the research project process. As a teacher, we should design teaching product projects and production process projects based on theoretical teaching content and obtained project materials. When using modular courses for teaching, continuous optimization should be carried out according to actual needs to cultivate students' practical abilities.

Thirdly, in the practical teaching system of intelligent manufacturing engineering, separate project teaching links should be set up to provide students with the opportunity to access various projects in modern enterprises. Alternating between teaching activities and training enables students to acquire knowledge and apply it in projects, improving practical abilities. At the same time, in the project, it can also expand the theoretical knowledge learned, play a role in supplementing and improving knowledge, thereby improving students' knowledge application ability and practical operation ability [3].

3.2 Actively developing modular project courses

In the process of intelligent manufacturing engineering teaching, students should not only master course knowledge, but also master job skills, so that they have the ability to solve practical engineering problems. In practical teaching activities, teachers introduce advanced design, production process technology, and manufacturing testing used in the intelligent manufacturing engineering industry into the classroom, guiding students to develop intelligent manufacturing engineering research projects based on above. Excellent and feasible projects can be recommended to enterprises to stimulate students' active learning and project development awareness. At the same time, from the perspective of one's own profession, the simplicity of enterprise equipment upgrading and transformation can be proposed. To cultivate the talents needed by enterprises, teachers need to innovate teaching models, making the job competency standards and assessment standards of employees important teaching content, and students can regulate their behavior in project activities based on this. In the design of specific teaching projects, it is necessary to clarify students' cognitive patterns and strictly follow them. The projects should be simplified first, and then gradually become complex, transitioning from a single project to a comprehensive project. Each project training is equipped with two teachers, one is a school teacher, and the other is a professional technical personnel from the enterprise as a mentor. This course combines project based teaching with vocational training to improve students' overall quality [4].

3.3 Combining course projects with semester projects

To provide vocational training for students majoring in intelligent manufacturing engineering, it is necessary to innovate the teaching practice system and carry out practical teaching through skill training. Schools should accurately position their educational goals based on the quality requirements of enterprise for talents, enter into the practical teaching process, and implement professional skills teaching for students under the guidance of theory. The teaching content should change from easy to difficult and adopt a step-by-step approach. In the initial stage, basic theoretical knowledge and skills are the main focus. Teachers mainly use analytical methods and gradually transition to practice. After students have a certain foundation of professional knowledge, teachers should cultivate their ability to independently solve problems by applying knowledge, and then the difficulty gradually increases. Ultimately, students are allowed to independently solve comprehensive problems using the knowledge they have mastered, so that their knowledge is no longer limited to a single application, and they can expand their thinking and apply the skills they have mastered comprehensively [5].

4 Conclusion

Through research, it is clear that the technical application of intelligent manufacturing engineering is very strong, and practical teaching is the main focus in the teaching process. In the process of cultivating practical talents in this major, in order to provide students with the opportunity to interact with the corporate environment, the university has adopted a model of integrating industry and education, which establishes a cooperative relationship between the university and the enterprise for talent cultivation, accurately grasps the direction of enterprise transformation, and adjusts the talent cultivation plan based on this to ensure that students can successfully graduate and improve the competitiveness of employment. In order to ensure the systematic implementation of practical teaching in intelligent manufacturing engineering, corresponding systems will be established and operated in an integrated industry education environment. Enterprise projects will be introduced into the classroom and combined with professional theories. In order to ensure that this teaching model achieves significant results, teachers need to improve their professional abilities and possess the "double-position teachers" quality, so that the trained students not only have professional qualities, but also have high professional abilities, and become the talents needed in the field of intelligent manufacturing engineering in the future.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- [1] Pan JX, Fan WJ, Chen W. 2023. Research on the practical teaching system of intelligent manufacturing in higher vocational engineering machinery from the perspective of industry education integration. *Times Automotive*, 14:87-89.
- [2] Liu MH, Yang WC, Li X. 2021. Research and practice of intelligent manufacturing engineering practical teaching system based on the integration of industry and education. *Computer Knowledge and Technology: Academic Edition*, 3: 108-109.
- [3] Su Y. 2022. Research on the cultivation of intelligent manufacturing new engineering talents in Jiangsu Vocational Colleges under the background of industry education integration - Taking Wuxi Vocational College as an example. *Office Business*, 9:81-83.
- [4] Liu F, Tang XG. 2022. Exploration and practice of an effective model for industrial education integration in the transformation and upgrading of intelligent manufacturing professional group service enterprises. *Computer Park*, 7:1-3.
- [5] Song XK, Liu RW. 2021. Exploration of production practice teaching reform for intelligent manufacturing engineering majors based on the integration of industry and education. *Agricultural Machinery Use and Maintenance*, 7: 109-110+114.