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Research on Optimization Strategies of Curriculum System in the New Quality Teaching Reform of Intelligent Control Technology Specialty

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Abstract

This research focuses on the optimization strategies of the curriculum system of the intelligent control technology major under the background of the new quality teaching reform. Through a comprehensive and in-depth analysis of the numerous problems existing in the current curriculum system, and in close combination with the latest demands of industry development and cutting-edge educational and teaching theories, a series of highly targeted and practically operable optimization strategies are proposed. The fundamental purpose is to significantly improve the teaching quality of the intelligent control technology major and spare no effort to cultivate high-quality professionals who can fully adapt to the requirements of the times.

Keywords

Intelligent Control Technology Major; New Quality Teaching Reform; Curriculum System Optimization; Industrial Network and Configuration Application Technology.

1. Introduction

The intelligent control technology major, as a discipline deeply integrated with modern technology, plays a vital role in promoting the vigorous development of the social economy and leading scientific and technological innovation. With the rapid progress of technology and the rapid development of the industry, the requirements for the quality and ability of professionals in the intelligent control technology major are also increasing. In order to successfully cultivate high-quality talents with an innovative spirit and solid practical ability, the teaching reform of the intelligent control technology major is extremely urgent, and the optimization of the curriculum system is undoubtedly the core and key link of the teaching reform.

In the current torrent of technological development, intelligent control technology is constantly evolving and is widely applied in many fields such as intelligent manufacturing, intelligent transportation, and intelligent home. This requires that the education of the intelligent control technology major can keep pace with the times and update teaching contents and methods in a timely manner to cultivate professionals who can adapt to the rapid changes in the industry and solve actual complex problems. However, the current curriculum system has deficiencies in many aspects and cannot meet the high requirements for talent cultivation in the new era. Therefore, in-depth research and optimization of the curriculum system have extremely important practical significance and far-reaching strategic value for improving the teaching quality of the intelligent control technology major and enhancing the level of talent cultivation.

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2. Problems Existing in the Current Curriculum System of Intelligent Control Technology Major

2.1. Outdated Curriculum Contents

In the field of intelligent control technology, the speed of technological update and replacement is remarkable. However, some curriculum contents fail to keep pace with this rhythm, resulting in an obvious disconnection between the knowledge students have learned and practical applications. Taking textbooks as an example, the content about traditional electronic circuit design occupies a large proportion in some textbooks, while the coverage of cutting-edge fields such as emerging integrated circuit design and system-on-chip (SoC) technology is relatively scarce. This situation makes students often feel at a loss when facing technical problems in actual work after graduation, and the knowledge they have learned is difficult to be effectively applied. For example, in modern intelligent product design, SoC technology has become the mainstream. However, due to the lag and disconnection of curriculum contents, students fail to fully master this key technology in school, thus facing greater competitive pressure when seeking employment.

2.2. Unreasonable Curriculum Structure

The curriculum structure plays a crucial role in the teaching of the intelligent control technology major. However, the current proportion among basic courses, professional courses, and practical courses has not reached an ideal coordinated state, and practical courses are relatively weak. This unbalanced curriculum structure seriously affects the cultivation of students' comprehensive quality and ability, especially for vocational higher education oriented towards vocational skills. In addition, there are problems of content repetition or poor connection between some courses, which not only wastes valuable teaching time but also greatly weakens the teaching effect and students' learning enthusiasm. For instance, in the two courses of Circuit Principles and Fundamentals of Electronic Technology, there is a situation of repeated explanations of some basic circuit theory content. And between Fundamentals of Electronic Technology and subsequent professional courses such as Programmable Controllers, there is a phenomenon of insufficient connection, causing students to feel confused and perplexed during the learning process.

2.3. Lack of Interdisciplinary Integration in Courses

The intelligent control technology major itself is highly comprehensive, covering multiple disciplinary fields such as electronic technology, control theory, and computer science. However, the existing curriculum system has obvious deficiencies in the effort of interdisciplinary integration. In the curriculum setting, related courses such as electronic technology and control theory are often relatively independent, lacking comprehensive interdisciplinary courses. This makes it difficult for students to establish an interdisciplinary thinking mode during the learning process and unable to integrate the knowledge of different disciplines. Thus, when facing complex practical problems, they lack the ability to solve problems by comprehensively applying multidisciplinary knowledge. For example, in the design of intelligent control systems, it is necessary to simultaneously apply knowledge in multiple aspects such as electronic technology, control theory, and computer programming. However, due to the lack of interdisciplinary integration in the curriculum system, students often have difficulty integrating these knowledge effectively, affecting the quality and efficiency of system design.

2.4. Monotonous Curriculum Evaluation Method

Curriculum evaluation is an important link in the teaching process. However, currently, examination scores are mainly used as the sole basis for evaluating students' learning outcomes,

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and this single evaluation method has many drawbacks. It ignores students' performances in practical ability, innovative thinking, and comprehensive quality, and cannot reflect students' real levels and abilities comprehensively and objectively. This evaluation method is not conducive to stimulating students' learning interest and cultivating students' innovative ability. It easily leads students to rote learning for high scores and ignores in-depth understanding and application of knowledge. For example, in the courses of the intelligent control technology major, students' practical operation ability and innovative design ability are crucial for future career development. However, the single examination evaluation method cannot effectively evaluate these abilities, thus unable to provide targeted feedback and improvement suggestions for teaching.

3. Principles for the Optimization of the Curriculum System of Intelligent Control Technology Major

3.1. Oriented by Market Demand

In today's highly competitive job market, understanding industry trends and enterprise demands is crucial for the optimization of the curriculum system of the intelligent control technology major. This means we need to closely monitor the development trends of the industry, promptly capture the specific requirements of the market for professionals in intelligent control technology, and reflect these demands in the design of the curriculum system. For example, with the rapid rise of the intelligent manufacturing industry, the demand for industrial network control technology talents is increasing. In this case, we should add relevant courses and practical links, such as Industrial Control Network and Configuration Application, and Intelligent Manufacturing System Integration, to ensure that students can quickly adapt to market demands after graduation and have the ability to work in the field of intelligent manufacturing.

3.2. Focus on Interdisciplinary Integration

In the era of rapid technological development, the boundaries between disciplines are becoming increasingly blurred, and interdisciplinary knowledge and skills have become the key to solving complex problems. The intelligent control technology major involves multiple disciplinary fields such as electronic technology, control theory, and computer science. Therefore, breaking disciplinary boundaries and integrating the knowledge of related disciplines is of great significance for cultivating students' interdisciplinary thinking and comprehensive application ability. We can offer a series of interdisciplinary courses, such as "Intelligent Control Technology and Artificial Intelligence" and "Embedded Systems and Network Communication", so that students can integrate the knowledge of different disciplines during the learning process and form a complete knowledge system. At the same time, through interdisciplinary teaching and research activities, students' innovation ability and ability to solve practical problems are cultivated.

3.3. Strengthen Practical Teaching

Practical teaching is an important part of the teaching of the intelligent control technology major and plays an irreplaceable role in cultivating students' practical ability and ability to solve practical problems. Therefore, in the process of optimizing the curriculum system, we should significantly increase the proportion of practical teaching links and provide students with more practical opportunities. For example, in professional courses, theoretical teaching and practical teaching can be combined, and links such as course experiments and course designs can be set up to allow students to consolidate and deepen the theoretical knowledge they have learned in practice. In addition, we should also establish practical teaching bases in cooperation with enterprises to allow students to exercise practical skills in a real working

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environment, understand the production process and management mode of enterprises, and make full preparations for future employment.

3.4. Highlight the Cultivation of Innovation Ability

Innovation is the core driving force for promoting scientific and technological progress and social development, especially in the field of intelligent control technology. In order to cultivate students' innovation awareness and innovation ability, we should set up a special innovation education module in the curriculum system and encourage students to actively participate in scientific research projects and discipline competitions. For example, offer courses such as "Reverse Development and Innovation of Intelligent Products" and "Innovative Design of Electronic Products" to cultivate students' innovative thinking and design ability. At the same time, the school can establish innovation laboratories and entrepreneurship incubation bases to provide students with necessary resources and platforms to support them in transforming innovative ideas into actual products and projects.

4. Strategies for the Optimization of the Curriculum System of Intelligent Control Technology Major

4.1. Improve Quality through Novelty and Optimize Curriculum Contents

Curriculum contents are the core of the curriculum system and directly affect the teaching quality and students' learning effects. In order to make the curriculum contents more contemporary and practical, we need to update teaching materials in a timely manner, improve quality through novelty, and incorporate the latest technologies and research achievements in the field of intelligent control technology into the teaching contents. For example, we can add application cases of processing and manufacturing in the "Computer-Aided Design" course to form a closed loop for product design and manufacturing, thereby enabling students to understand each link of the intelligent manufacturing industry from the multi-dimensional design of products in 2D/3D to CAPP, NC programming, and various manufacturing-related activities such as processing, assembly, inspection, storage, and transportation, and integrate the simple course design into the production link of digital manufacturing. At the same time, for those outdated and obsolete contents, they should be decisively deleted to streamline the curriculum system and highlight key points and difficulties. By optimizing the curriculum contents, students can learn the most cutting-edge and practical knowledge and skills, laying a solid foundation for their future career development.

4.2. Adjust the Curriculum Structure

A reasonable curriculum structure is an important prerequisite for ensuring teaching quality and students' learning effects. When adjusting the curriculum structure, we need to fully consider the proportional relationship among basic courses, professional courses, and practical courses to ensure their mutual coordination and promotion. For example, appropriately increase the class hours of practical courses to allow students to have more time for practical activities such as experiments, internships, and course designs. At the same time, organically combine theoretical teaching and practical teaching in professional courses, and set up links such as course experiments and course designs to enable students to deepen their understanding and mastery of knowledge through practice while learning theoretical knowledge. In addition, optimizing the course sequence is also crucial. The sequence of courses should be reasonably arranged according to the internal logic of knowledge and students' cognitive laws to ensure smooth connection between courses and form an organic whole.

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4.3. Promote Novelty through Quality and Strengthen the Construction of Interdisciplinary Courses

The construction of interdisciplinary courses is an important way to cultivate students' interdisciplinary thinking and comprehensive application ability. In order to strengthen the construction of interdisciplinary courses, we can offer a series of interdisciplinary elective courses and encourage students to choose according to their interests and career plans. For example, set up interdisciplinary courses such as "Intelligent Control Technology and Furniture Product Design and Manufacturing" and "Intelligent Control Technology and Biomedical Engineering" to allow students to understand the basic principles and applications of other related fields while learning professional knowledge of intelligent control technology.

At the same time, establish interdisciplinary teaching teams composed of teachers from different disciplinary backgrounds to jointly carry out teaching research and practical activities. Through the collaboration of interdisciplinary teaching teams, teaching resources and teaching methods of different disciplines can be integrated to provide students with higher-quality teaching services. For instance, in the context of the deep integration of industrialization and informatization, reconfigure the contents of professional core courses such as "Configuration Control Technology", introduce network communication technology into courses mainly focusing on human-computer interaction industrial control, complete the transformation of the "Industrial Network and Configuration Application Technology" course, and realize the curriculum construction reform of promoting industrialization with informatization and promoting informatization with industrialization, as shown in Figure 1.

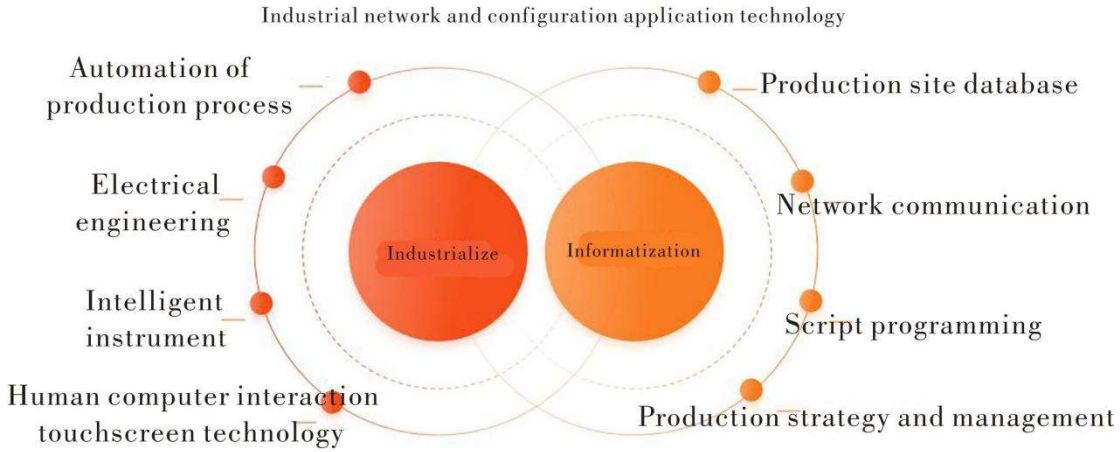

Figure 1. Promoting Novelty through Quality and Completing the Curriculum Construction Reform of the Deep Integration of "Two Transformations"

4.4. Improve the Curriculum Evaluation System

The curriculum evaluation system plays an important guiding role in improving teaching quality and students' learning enthusiasm. In order to establish a scientific, reasonable, and diversified curriculum evaluation system, we need to comprehensively consider multiple aspects such as students' examination scores, practical performances, innovation achievements, and teamwork. For example, adopt a combination of process evaluation and terminal evaluation, and focus on the monitoring and evaluation of students' learning processes. In process evaluation, students can be evaluated through classroom performance, homework completion, and experimental reports; in terminal evaluation, students can be comprehensively assessed through examinations, project designs, and papers. At the same time, introduce

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enterprise evaluation and social evaluation, involve enterprises and society in the curriculum evaluation, and make the curriculum evaluation more objective and comprehensive.

5. Implementation Guarantees for the Optimization of the Curriculum System

5.1. Construction of the Teaching Staff

The teaching staff is the implementation subject of the optimization of the curriculum system, and their professional quality and teaching level directly affect the effect of the optimization of the curriculum system. In order to strengthen the construction of the teaching staff, we should take various measures to improve teachers' professional quality and teaching ability. First of all, organize teachers to participate in relevant training courses, academic seminars, and enterprise practical activities, so that teachers can timely understand the latest trends and cutting-edge technologies in the industry, update their knowledge structure, and improve their practical ability. Secondly, introduce teachers with interdisciplinary backgrounds and practical experience to enrich the teaching staff. These teachers can bring new teaching concepts and methods and inject new vitality into the optimization of the curriculum system. In addition, establish a teacher incentive mechanism to encourage teachers to actively participate in the optimization of the curriculum system, and give recognition and rewards to teachers who have achieved outstanding results in teaching reform.

5.2. Construction of Teaching Resources

Teaching resources are an important support for the optimization of the curriculum system, including laboratories, practical teaching bases, teaching equipment, teaching software, etc. In order to strengthen the construction of teaching resources, the school should increase investment in teaching resources, purchase advanced experimental equipment and instruments, and establish modern laboratories and practical teaching bases. For example, establish an intelligent control technology innovation laboratory, an intelligent manufacturing training center, etc., to provide students with a good practical environment. At the same time, develop high-quality digital teaching resources such as online courses, teaching courseware, and teaching cases to enrich teaching methods and improve teaching effects. In addition, strengthen cooperation with enterprises to jointly develop teaching resources to make teaching resources closer to actual production and application.

5.3. School-Enterprise Cooperation

School-enterprise cooperation is an important way to optimize the curriculum system and can achieve seamless connection between school education and enterprise demands. In order to strengthen school-enterprise cooperation, the school should establish an industry-university-research cooperation mechanism and jointly formulate talent training programs and curriculum systems with enterprises. Invite enterprise experts to participate in course design and the update of teaching content to make the curriculum content more in line with the actual needs of enterprises. At the same time, provide students with internship and employment opportunities to allow students to conduct practical exercises in enterprises and improve their practical ability and professional quality. In addition, carry out cooperative scientific research projects to promote the close combination of teaching and practice and promote the transformation and application of scientific and technological achievements.

6. Conclusion

The optimization of the curriculum system in the new quality teaching reform of the intelligent control technology major is a complex and systematic project. It is necessary to

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comprehensively consider various factors, follow the principles of being oriented by market demands, focusing on interdisciplinary integration, strengthening practical teaching, and highlighting the cultivation of innovation ability. Through strategies such as optimizing curriculum contents, adjusting the curriculum structure, strengthening the construction of interdisciplinary courses, and improving the curriculum evaluation system, the optimization and upgrading of the curriculum system can be achieved. At the same time, it is necessary to strengthen the construction of the teaching staff, teaching resources, and school-enterprise cooperation to provide strong guarantees for the implementation of the optimization of the curriculum system. Only in this way can we cultivate high-quality intelligent control technology professionals who adapt to the needs of the times and have an innovative spirit and practical ability, and make positive contributions to the development of the intelligent control technology field.

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