Research and Practice on the Relationship between Employment Positions and Education for Students in Mechanical Manufacturing and Automation at Vocational Colleges

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Abstract: This study aims to explore the relationship between employment positions and education for students majoring in mechanical manufacturing and automation at vocational colleges. It analyzes the intrinsic connections between teaching content, methods, and students' employability from a theoretical perspective. Employing literature review and theoretical analysis, the research constructs a theoretical framework encompassing four dimensions: teaching objectives, content, methods, and student employability. Under this framework, the study delves into how teaching objectives influence content selection, how content is transformed into employability through various teaching methods, and how these abilities are manifested in the job market. The findings suggest that vocational colleges should consider industry demands and future job characteristics when designing the curriculum for mechanical manufacturing and automation, optimizing content and methods to enhance students' professional skills and overall quality, thereby boosting their employability. Additionally, the study highlights that the close integration of education and employment aids in increasing student employment rates, and reflects the adaptability of vocational education to socio-economic development needs.

Keywords: Vocational Education; Mechanical Manufacturing; Automation; Employability; Teaching Methods

1. Introduction

1.1 Research Background and Significance

In the context of globalization and rapid technological advancement, the manufacturing sector is undergoing profound transformations. Particularly in China, as the global hub of manufacturing, the demand for technical talents is escalating with the industry's transformation and upgrading. Vocational colleges, as pivotal bases for cultivating technical and skilled talents, play a critical role in aligning their mechanical manufacturing and automation programs with employment opportunities. Currently, there is a disconnect between societal demand for high-skilled talents and the talent cultivation models of vocational colleges, which not only affects students' employment quality but also hinders the development of the manufacturing sector. Therefore, investigating the relationship between employment positions and education for students in mechanical manufacturing and automation at vocational colleges is of significant theoretical and practical importance for optimizing the educational system, enhancing talent cultivation quality, and promoting student employment.

Vocational colleges need to adjust and optimize the curriculum of mechanical manufacturing and automation majors in line with the trends and market demands of the manufacturing industry. This includes incorporating the latest manufacturing and automation technologies such as smart manufacturing, robotics, and 3D printing, as well as strengthening students' practical operational skills through laboratory training and corporate internships, enabling them to better grasp skills required in real-world jobs.

Vocational colleges should enhance collaboration with enterprises, establishing mechanisms for school-enterprise cooperation. This involves jointly formulating talent cultivation plans, developing curriculum content, and implementing teaching activities to ensure a high match between teaching content and enterprise needs. Additionally, by establishing internship bases, students can learn and practice in authentic work environments, enhancing their employment competitiveness.

Vocational colleges should emphasize the cultivation of students' professional ethics, teamwork, and communication skills—soft skills crucial for their future career development, aiding them in better adapting and growing in the workplace.

Vocational colleges should establish effective employment guidance and service systems, providing students with career planning, employment information, and interview skills guidance and support. Through regular career planning seminars, employment market analysis, and mock interviews, students can better understand market dynamics and enhance their employment readiness.

The alignment of teaching with employment positions for mechanical manufacturing and automation majors at vocational colleges is a systematic project that requires comprehensive consideration and optimization from multiple aspects including curriculum setting, school-enterprise cooperation, professional ethics cultivation, and employment guidance. The implementation of these measures can effectively enhance talent cultivation quality, facilitate smooth student employment, and provide robust talent support for the development of the manufacturing sector.

1.2 Review of Domestic and International Research Status

Domestically, the teaching models and talent cultivation strategies for mechanical manufacturing and automation majors at vocational colleges have been a focal point of research. Li Nan (2015) pointed out that vocational colleges should adopt more flexible and practical talent cultivation models to adapt to market demand changes [1]. Wu Xiaoliu (2015) emphasized the importance of teaching innovation, proposing to enhance students' practical and innovative abilities through innovative teaching methods and content [2]. Ai Cuirong (2020) explored how project-driven approaches could enhance students' comprehensive application abilities through project curriculum development [3]. Liu Shiying (2019) investigated the application of situational simulation teaching methods in mechanical manufacturing and automation, believing this method could effectively improve students' practical operation and problem-solving abilities [4]. Qu Haijun (2018) focused on practical teaching, suggesting that strengthening practical teaching could enhance students' vocational skills and employment competitiveness [5]. Zhu Tao et al. (2015) studied the teaching model for the connection between secondary and higher vocational education, emphasizing the coherence and integration of the education system [6]. Ding Hui (2017) discussed the construction of experimental and training teaching systems, believing that a sound experimental and training system was key to improving students' practical abilities [7]. Hu Xiangyun (2016) proposed differentiated cultivation plans, emphasizing personalized teaching and guidance based on students' characteristics and needs [8]. Su Songlin (2017) discussed the "order-based" cultivation model, which he believed could better align with enterprise needs and improve students' employment rates [9]. Yi Biao et al. (2010) studied the deep integration of school-enterprise cooperation in teaching practice, emphasizing its importance in enhancing teaching quality and students' employment capabilities [10]. Shu An (2019) focused on safety education, proposing that safety awareness should be strengthened during the teaching process [11]. Hao Liang (2017) and Yu Yanhui (2017) discussed teaching innovation from different perspectives, exploring how innovative teaching methods and content could enhance teaching effectiveness and students' overall quality [12][13].

Internationally, vocational education is also highly regarded, particularly in the field of mechanical manufacturing and automation. Foreign scholars generally believe that vocational education should closely align with industry needs, cultivating students' practical and innovative abilities through practical teaching and school-enterprise cooperation. For example, Germany's "dual system" education model ensures that students acquire the skills and knowledge needed for real work through joint participation by schools and enterprises.

In line with the spirit of the Two Sessions, the Chinese government places high importance on the development of vocational education, emphasizing that it should serve national strategies and industrial development needs. In terms of social hotspots, with the advancement of smart manufacturing and Industry 4.0, the teaching and employment positions of mechanical manufacturing and automation majors face new challenges and opportunities. Therefore, vocational colleges should continuously innovate teaching models, strengthen cooperation with enterprises, enhance students' practical and innovative abilities, and adapt to the future development needs of the manufacturing sector. In summary, extensive research has been conducted both domestically and internationally on the relationship between teaching and employment positions in mechanical manufacturing and automation majors. Domestic research mainly focuses on teaching model innovation, practical teaching, and school-enterprise cooperation, while international research places greater emphasis on the cultivation of practical and innovative abilities. In line with the spirit of the Two Sessions and current social hotspots, vocational colleges should further deepen teaching reforms, strengthen cooperation with enterprises, enhance students' comprehensive qualities and employment competitiveness, and adapt to the future development needs of the manufacturing sector.

1.3 Research Objectives and Questions

This study aims to construct a systematic theoretical framework to explore the relationship between employment positions and education for students majoring in mechanical manufacturing and automation at vocational colleges. Specific research questions include: How do teaching objectives align with employment positions? How does teaching content translate into students' employability? How do teaching methods influence students' employability? By addressing these questions, this study intends to provide theoretical support and practical guidance for the teaching reform of vocational colleges.

2. Theoretical Framework Construction

2.1 Relationship between Teaching Objectives and Employment Positions

Teaching objectives are the starting point and endpoint of educational activities, directly influencing the selection of teaching content and methods. In the field of mechanical manufacturing and automation, teaching objectives should be closely aligned with industry demands and the characteristics of employment positions. For instance, with the advancement of smart manufacturing and Industry 4.0, teaching objectives should focus on cultivating students' abilities in applying automation technologies, system integration, and innovation. By analyzing industry reports and employment data, it is evident that the current demand in the manufacturing sector for automation technology talents is primarily in positions such as equipment maintenance, system integration, and software development. Therefore, teaching objectives should clearly define the core skills and knowledge required for these positions to ensure that students can quickly adapt to the working environment upon graduation.

2.2 Relationship between Teaching Content and Employability

Teaching content serves as the vehicle for achieving teaching objectives and directly impacts students' employability. In the field of mechanical manufacturing and automation, teaching content should cover basic theories, professional knowledge, and practical skills. Basic theories include mechanical design, electronics, and computer science; professional knowledge includes automation technology, control systems, and smart manufacturing; practical skills include experimental operations, project development, and fault diagnosis. Through the optimization of curriculum and teaching content, students' professional skills and comprehensive qualities can be enhanced. For example, by adding industry-relevant courses such as smart manufacturing systems and industrial robotics, students' practical operational and problem-solving abilities can be strengthened. Additionally, through case analysis and project practice, students can better understand theoretical knowledge and apply it in real-world work.

2.3 Relationship between Teaching Methods and Employability

Teaching methods are the key means to

achieve teaching objectives and content, directly affecting students' learning outcomes and employability. In the field of mechanical manufacturing and automation, traditional teaching methods primarily focus on lecturing, lacking interaction and practice. With the development of educational technology, more innovative teaching methods are being introduced, such as flipped classrooms, project-driven, and virtual simulation. These methods enhance students' participation and practical abilities, fostering their innovative thinking and teamwork skills. For example, flipped classrooms, by having students preview before class and engage in discussions and practice during class, can improve their autonomous learning and problem-solving abilities. Project-driven teaching methods, by involving students in actual projects, can enhance their practical operational and teamwork skills. Virtual simulation technology, by simulating real work environments, helps students better understand and master professional knowledge.

2.4 Alignment of Practical Teaching with Employment Positions

Practical teaching is a crucial component of vocational education in mechanical manufacturing and automation, essential for students to master practical skills, understand professional knowledge, and adapt to future job positions. Practical teaching should be closely aligned with industry demands and employment positions, offering students diverse practical opportunities through on-campus laboratories, training bases, and off-campus internships. For instance, through cooperative training bases established with enterprises, students can learn and practice in authentic work environments, gaining insights into production processes, equipment operation, and maintenance, thereby enhancing their employment competitiveness. Additionally, by participating in actual projects of enterprises, students can better understand industry dynamics, master the latest technologies and processes, laying a solid foundation for future employment.

2.5 Relationship between Professional Ethics and Employability

Professional ethics refer to the qualities students need in their careers, including professional morals, attitudes, and behaviors. In the field of mechanical manufacturing and automation, the cultivation of professional ethics is equally important, as it relates to students' long-term development in the workplace. Vocational colleges should foster students' professional ethics through career planning education, professional moral education, and teamwork training. For example, through career planning seminars and counseling services, students can understand their career interests and development directions, setting reasonable career goals. Through professional moral education, students' integrity, sense of responsibility, and professionalism can be cultivated. Through teamwork training, students' communication and collaboration skills can be enhanced, enabling them to better adapt to team work environments.

2.6 Relationship between Employment Guidance and Employment Quality

Employment guidance is a crucial means for vocational colleges to help students achieve smooth employment, encompassing career planning, job information provision, and interview skills training. Vocational colleges should establish a comprehensive employment guidance system, providing students with holistic employment services. For instance, through regular career planning seminars, students can understand employment market dynamics and clarify their career objectives. Through job information platforms, students can access the latest recruitment information and employment opportunities. Through mock interviews and interview skills training, students' interview performance and employment success rates can be improved. These measures can effectively enhance students' employment quality and facilitate their smooth employment.

In summary, the alignment of teaching with employment positions for mechanical manufacturing and automation majors at vocational colleges is a multi-dimensional systematic project, requiring comprehensive consideration and optimization from various aspects including teaching objectives, content, methods, practical teaching, professional ethics, and employment guidance. The implementation of these measures can effectively enhance talent cultivation quality, facilitate students' smooth employment, and provide robust talent support for the development of the manufacturing sector.

3. Analysis of Teaching Objectives

3.1 Industry Demand Analysis

Against the backdrop of global manufacturing transformation and upgrading, the mechanical manufacturing and automation industry exhibits new characteristics in its demand for technical talents. With the rapid development of smart manufacturing and industrial internet technologies, the industry's demand for high-skilled talents is growing, particularly in areas such as automation equipment maintenance, system integration, and software development. According to the "2020 China Machinery Industry Development Report" released by the China Machinery Industry Federation, the demand for high-skilled talents in the mechanical manufacturing and automation industry is expected to increase by over 20% in the next five years [1]. This data indicates that vocational colleges must closely align with industry demands when cultivating students in mechanical manufacturing and automation, ensuring that they can quickly adapt to the working environment upon graduation.

3.2 Setting of Teaching Objectives

Based on the industry demand analysis, vocational colleges should focus on the following aspects when setting teaching objectives for mechanical manufacturing and automation:

Technical Skills Training: Teaching objectives should clearly define the core technical skills students need to master, such as operation and maintenance of automation equipment, design and debugging of control systems, development and application of industrial software. These skills form the basis for students' future employment and are the basic requirements of the industry for talents.

Innovation Capability Training: With continuous technological advancements, the industry's demand for innovative talents is increasing. Teaching objectives should emphasize cultivating students' innovative thinking and capabilities, encouraging them to explore and practice during their studies. Through project practice, innovation competitions, and other methods, students' innovative awareness and capabilities can be enhanced.

Comprehensive Quality Enhancement: In addition to professional skills and innovation capabilities, students' comprehensive qualities are also an important component of teaching objectives. This includes teamwork skills, communication and coordination abilities, problem-solving skills, etc. Through curriculum and teaching activities, students' comprehensive qualities can be cultivated, making them compound talents that meet societal development needs.

3.3 Relationship between Teaching Objectives and Curriculum Design

The achievement of teaching objectives requires support from specific curriculum design. In the field of mechanical manufacturing and automation, curriculum design should be closely aligned with teaching objectives to ensure that each course effectively promotes the enhancement of students' skills and qualities. For example, to cultivate students' technical skills, courses such as "Automation Equipment Operation and Maintenance," "Control System Design and Debugging," and "Industrial Software Development and Application" can be set up. These courses, combining theoretical learning with practical operations, enable students to master the core technologies required by the industry.

To cultivate students' innovation capabilities, courses such as "Innovation Practice" and "Project Development" can be established, encouraging students to engage in innovative exploration and practice within the courses. By participating in actual projects, students not only apply theoretical knowledge to solving practical problems but also exercise their innovative thinking and teamwork skills.

To enhance students' comprehensive qualities, courses such as "Professional Ethics" and "Teamwork and Communication" can be set up. Through case analysis, role-playing, team projects, and other methods, students' communication and coordination abilities and problem-solving skills can be cultivated. These courses help students better adapt to the work environment in their future careers and demonstrate outstanding professional ethics.

3.4 Matching of Teaching Objectives with

Teaching Methods

Teaching methods are the key means to achieve teaching objectives. In the field of mechanical manufacturing and automation, the choice of teaching methods should be closely matched with teaching objectives to ensure the maximization of teaching effects. For example, for the cultivation of technical skills, practical teaching methods can be adopted, allowing students to learn and operate in real work environments through laboratory training and enterprise internships, thereby enhancing their technical skills.

For the cultivation of innovation capabilities, project-driven teaching methods can be employed, involving students in actual projects to stimulate their innovative thinking and practical abilities. Additionally, modern teaching methods such as flipped classrooms and virtual simulation can be introduced to enhance students' participation and interactivity, strengthening their autonomous learning and problem-solving abilities.

For the enhancement of comprehensive qualities, interactive teaching methods such as case teaching and role-playing can be used. By simulating real work scenarios, students' teamwork and communication and coordination abilities can be cultivated. The application of these teaching methods helps students comprehensively enhance their qualities during their studies, laying a solid foundation for future employment and career development.

4. Curriculum Content Design

4.1 Construction of the Curriculum System

The curriculum system serves as the foundation for curriculum content design, directly influencing students' knowledge structure and capability development. In constructing the curriculum system for mechanical manufacturing and automation, the following principles should be adhered to:

Modular Design: Divide the curriculum content into several modules, each corresponding to a specific knowledge domain or skill requirement. For instance, the curriculum can be segmented into basic theory modules, professional knowledge modules, and practical skill modules. This modular design aids students in systematically mastering knowledge and skills while also facilitating curriculum adjustments and optimizations based on industry demands.

Practice-Oriented: The curriculum system should emphasize a practice-oriented approach, increasing the proportion of experimental, training, and project-based practical sessions. Through practical teaching, students can apply theoretical knowledge to real-world work, enhancing their ability to solve practical problems. For example, courses such as automation equipment training, control system design projects, and industrial software development practices can be established to allow students to learn and grow through hands-on experience.

Dynamic Updating: With continuous technological advancements and changes in industry demands, the curriculum system should maintain dynamic updating. Regularly assess and adjust the curriculum content to ensure it remains in sync with industry needs. For instance, emerging fields such as smart manufacturing, industrial internet, and big data analysis can be incorporated into the curriculum based on industry trends.

4.2 Optimization of Curriculum Content

On the basis of constructing the curriculum system, further optimize the curriculum content to enhance teaching effectiveness and students' employability. Curriculum content optimization should focus on the following aspects:

Introduction of Cutting-Edge Technologies: Incorporate industry-leading technologies and latest research findings into the curriculum content, enabling students to promptly understand and master the latest technological trends. For example, introduce knowledge from frontier areas such as smart manufacturing systems, industrial robotics technology, and internet of things technology to broaden students' knowledge horizons.

Case-Based Teaching: Integrate theoretical knowledge with practical applications through case-based teaching, enhancing students' interest in learning and application abilities. For instance, select typical industry cases for students to analyze and discuss, allowing them to learn and master problem-solving methods and techniques.

Interdisciplinary Integration: The field of mechanical manufacturing and automation involves multiple disciplines, such as mechanical engineering, electronic engineering, and computer science. In curriculum content design, interdisciplinary integration should be emphasized to cultivate students' comprehensive abilities and innovative thinking. For example, combine mechanical design with electronic technology to offer mechatronics courses; integrate computer science with automation technology to offer intelligent control systems courses.

Through the construction and optimization of the curriculum system, vocational colleges can ensure that the teaching content aligns closely with industry demands, enhancing students' professional skills and comprehensive qualities, and boosting their employment competitiveness.

5. Selection of Teaching Methods

5.1 Limitations of Traditional Teaching Methods

In the teaching of mechanical manufacturing and automation at vocational colleges, traditional teaching methods primarily focus on lecturing, where teachers systematically explain theoretical knowledge in the classroom, and students passively receive information. Although this method has certain advantages in imparting basic theories, it has significant limitations in cultivating students' practical operational and innovative abilities.

Traditional teaching methods lack interactivity, placing students in a passive receiving state, which is challenging to stimulate their interest and initiative in learning. The knowledge system in mechanical manufacturing and automation is complex, involving mechanical design, electronic technology, control systems, and other fields, making it difficult for students to comprehensively understand and master these areas through mere lecturing.

Traditional teaching methods emphasize theory over practice, with students primarily learning theoretical knowledge in the classroom and lacking practical experience. Students in mechanical manufacturing and automation need to possess strong practical operational and problem-solving abilities in their future work, which requires extensive practice and hands-on experience.

Traditional teaching methods struggle to adapt to rapidly changing industry demands. With the continuous emergence of new technologies such as smart manufacturing and industrial internet, the requirements for talent in the industry are also evolving. Traditional teaching methods struggle to update content in a timely manner, failing to meet the demands for new technologies and skills in the industry.

5.2 Exploration of Innovative Teaching Methods

To overcome the limitations of traditional teaching methods and enhance teaching effectiveness and students' employability, vocational colleges are actively exploring and applying innovative teaching methods in the field of mechanical manufacturing and automation. These methods emphasize student participation and practice, fostering students' practical operational and innovative abilities through various forms of teaching activities.

Flipped Classroom is a novel teaching method that combines traditional classroom instruction with out-of-class learning to enhance students' autonomous learning abilities and classroom participation. In flipped classrooms, teachers create instructional content in the form of videos or other learning materials, which students study independently before class. During class, students engage in discussions, practical activities, and other forms of knowledge deepening and application. Flipped classrooms not only increase students' interest and initiative in learning but also enhance their practical operational and teamwork abilities.

Project-Driven Teaching Method involves students in actual projects to improve their practical operational and problem-solving abilities. In this method, teachers design projects based on teaching objectives and industry demands, and students complete project tasks through teamwork. During project implementation, students need to apply their theoretical knowledge and skills comprehensively to solve real-world problems. This teaching method not only enhances students' practical operational abilities but also cultivates their innovative thinking and teamwork skills.

Virtual Simulation Technology holds significant application value in the teaching of mechanical manufacturing and automation. Through virtual simulation technology, students can conduct experiments and operations in a virtual environment, simulating real work scenarios and processes. Virtual simulation technology not only improves students' practical operational abilities but also reduces experimental costs and risks. For example, through virtual simulation technology, students can operate and debug automation equipment in a virtual environment, understand the working principles and methods of the equipment, and enhance their practical operational and problem-solving abilities.

School-Enterprise Cooperation is a crucial component of teaching in mechanical manufacturing and automation at vocational colleges. By collaborating with enterprises, schools can integrate the actual needs and work environments of enterprises into teaching, enhancing students' practical operational abilities and employment competitiveness. School-enterprise cooperation takes various forms, including enterprise internships, enterprise mentors, and joint school-enterprise training. For instance, through enterprise internships, students can practice in the actual work environment of enterprises, understand the work processes and operational norms of enterprises, and enhance their practical operational abilities and employment competitiveness.

6. Cultivation of Employment Capabilities

6.1 Cultivation of Professional Skills

In the teaching of mechanical manufacturing and automation, the cultivation of professional skills is the core of students' employment capabilities. Professional skills include mechanical design, automation equipment operation and maintenance, control system design and debugging, industrial software development and application, etc. These skills form the foundation for students' future employment and are the basic requirements of the industry for talents.

To enhance students' professional skills, vocational colleges emphasize a practice-oriented approach in curriculum setting and content design, increasing the proportion of experimental, training, and project-based practical sessions. For example, in mechanical design courses, students design and fabricate mechanical parts to understand the basic principles and methods of mechanical design; in automation equipment operation and maintenance courses, students operate and maintain automation equipment to master the working principles and methods of the equipment; in control system design and debugging courses, students design and debug control systems to understand the basic principles and design methods of control systems; in industrial software development and application courses, students develop and apply industrial software to master the basic principles and methods of software development.

Vocational colleges also enhance students' professional skills and practical operational abilities through school-enterprise cooperation and enterprise internships. Through enterprise internships, students can practice in the actual work environment of enterprises, understand the work processes and operational norms of enterprises, and enhance their practical operational abilities and employment competitiveness. For example, through internships at automation equipment manufacturing enterprises, students can understand the manufacturing and maintenance processes of automation equipment, master the operation and maintenance methods of the equipment, and enhance their practical operational abilities and employment competitiveness.

6.2 Enhancement of Comprehensive Qualities

In addition to professional skills, comprehensive qualities are also an important component of students' employment capabilities. Comprehensive qualities include teamwork abilities, communication and coordination skills, problem-solving abilities, etc. These qualities not only affect students' employment competitiveness but also relate to their career development and personal growth.

To enhance students' comprehensive qualities, vocational colleges emphasize the cultivation of comprehensive qualities in curriculum setting and teaching activities. For example, through team cooperation projects, students' teamwork abilities and communication and coordination skills are cultivated; through case analysis and problem-solving, students' problem-solving abilities and innovative thinking are cultivated; through professional ethics courses, students' professional morals and professional qualities are cultivated.

Vocational colleges also enhance students' comprehensive qualities and employment competitiveness through school-enterprise cooperation and enterprise mentors. Through enterprise mentors, students can understand the work processes and operational norms of enterprises, learn enterprise management experience and professional ethics, and enhance their comprehensive qualities and employment competitiveness. For example, through guidance from enterprise mentors, students can understand the team cooperation and communication and coordination methods of enterprises, learn enterprise management experience and professional ethics, and enhance their teamwork abilities and communication and coordination skills.

7. Strategies for Integrating Teaching with Employment

7.1 School-Enterprise Cooperation Model

School-enterprise cooperation is a crucial strategy for integrating teaching with employment in the field of mechanical manufacturing and automation at vocational colleges. Through deep collaboration with enterprises, schools can incorporate the actual needs and work environments of enterprises into their teaching, enhancing students' practical operational abilities and employment competitiveness. School-enterprise cooperation takes various forms, including enterprise internships, enterprise mentors, and joint school-enterprise training.

Enterprise internships are a significant form of school-enterprise cooperation. Through internships, students can practice in the actual work environments of enterprises, understand the work processes and operational norms, and enhance their practical operational abilities and employment competitiveness. For example, students can intern at automation equipment manufacturing companies, gaining insights into the manufacturing and maintenance processes of automation equipment, mastering the operation and maintenance methods, and improving their practical operational abilities and employment competitiveness.

Enterprise mentors represent another form of school-enterprise cooperation. Through enterprise mentors, students can learn about the work processes and operational norms of enterprises, acquire management experience and professional ethics, and enhance their comprehensive qualities and employment competitiveness. For instance, enterprise mentors can guide students in project practices, assist them in solving practical problems, and improve their practical operational and problem-solving abilities.

Joint school-enterprise training is an advanced form of school-enterprise cooperation. Through this model, schools and enterprises can jointly develop talent cultivation plans, participate in teaching activities, and jointly evaluate students' learning outcomes. For example, schools and enterprises can collaboratively design curriculum systems and teaching content, engage in curriculum design and implementation, and jointly assess students' learning achievements, thereby enhancing students' practical operational abilities and employment competitiveness.

7.2 Internship and Training Mechanisms

Internship and training are essential mechanisms for integrating teaching with employment in the field of mechanical manufacturing and automation at vocational colleges. Through internships and training, students can apply theoretical knowledge to real-world work, enhancing their ability to solve practical problems. Internship and training take various forms, including on-campus training, off-campus internships, and project-based training.

On-campus training serves as the foundational form of internship and training. Through on-campus training, students can practice in the school's training bases, gaining an understanding of the operation and maintenance methods of mechanical manufacturing and automation equipment, and improving their practical operational and problem-solving abilities. For instance, students can undergo training at the school's automation equipment training base, learning about the operation and maintenance methods of automation equipment, and enhancing their practical operational and problem-solving abilities.

Off-campus internships are a crucial form of internship and training. Through off-campus internships, students can practice in the actual work environments of enterprises, understand the work processes and operational norms, and enhance their practical operational abilities and employment competitiveness. For example, students can intern at automation equipment manufacturing companies, gaining insights into the manufacturing and maintenance processes of automation equipment, mastering the operation and maintenance methods, and improving their practical operational abilities and employment competitiveness.

Project-based training represents an advanced form of internship and training. Through project-based training, students can participate in actual projects, enhancing their practical operational and problem-solving abilities. For instance, students can engage in the design and manufacturing projects of automation equipment, gaining an understanding of the design and manufacturing processes of automation equipment, mastering the design and manufacturing methods, and improving their practical operational and problem-solving abilities.

8. Conclusion and Recommendations

8.1 Research Conclusions

This study, by analyzing the relationship between employment positions and education for students majoring in mechanical manufacturing and automation at vocational colleges, has constructed a systematic theoretical framework and proposed corresponding strategies for integrating teaching with employment. The research conclusions are as follows:

Teaching objectives should closely align with industry demands and the characteristics of employment positions, focusing on cultivating students' abilities in applying automation technologies, system integration, and innovation.

Teaching content should cover basic theories, professional knowledge, and practical skills, with the optimization of curriculum setting and content aimed at enhancing students' professional skills and comprehensive qualities.

Teaching methods should emphasize student participation and practice, employing innovative teaching methods such as flipped classrooms, project-driven approaches, and virtual simulation to improve students' practical operational and innovative abilities.

School-enterprise cooperation and internship and training are crucial strategies for integrating teaching with employment, enhancing students' practical operational abilities and employment competitiveness through school-enterprise cooperation models and internship and training mechanisms.

8.2 Policy Recommendations

Based on the research conclusions, the following policy recommendations are proposed:

Vocational colleges should strengthen cooperation with enterprises, establish stable school-enterprise cooperation relationships, jointly develop talent cultivation plans, participate in teaching activities, and jointly evaluate students' learning outcomes.

Vocational colleges should optimize curriculum systems and content, increase the proportion of practical sessions, and enhance students' practical operational and problem-solving abilities.

Vocational colleges should explore and apply innovative teaching methods, improve students' interest and initiative in learning, and cultivate their innovative thinking and teamwork abilities.

Vocational colleges should establish comprehensive internship and training mechanisms, provide ample internship and training resources, and ensure students have sufficient practical opportunities.

8.3 Future Research Directions

This study provides a certain theoretical and practical foundation for the research on the relationship between employment positions and education for students majoring in mechanical manufacturing and automation at vocational colleges, but there are still many issues that need further investigation:

How to further optimize teaching content and methods to enhance students' practical operational and innovative abilities.

How to establish more effective school-enterprise cooperation models and internship and training mechanisms to improve students' employment competitiveness.

How to assess and monitor the effectiveness of integrating teaching with employment, and timely adjust and optimize teaching strategies.

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