

Application and Exploration of Matrix Production Line in Vocational Education Practice Teaching

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Abstract: This paper focuses on the application of matrix production line in the practical teaching of vocational education and analyzes its characteristics, advantages, and a series of challenges and problems in the implementation process. Given the various problems encountered in the implementation process, this paper will put forward a series of practical solutions, aiming at providing a useful reference for educators and promoting the steady improvement of the quality of vocational education practical training.

Keywords: Matrix production line; Vocational education; Practical teaching

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1. Introduction

As an important part of the education system, the core goal of vocational education is to cultivate professionals with practical operation ability and good professional quality ^[1]. In this process, practical teaching plays a crucial role, which provides a platform for students to transform theoretical knowledge into practical skills. As an efficient and flexible form of production organization, it is of great significance to introduce matrix production lines into the practical teaching of vocational education. This innovative training model can not only simulate the real work scene but also better adapt to the modern manufacturing industry's demand for diversified and interdisciplinary talents, thus laying a solid foundation for student's future career development.

2. The characteristics of the matrix production line

The matrix production line is an efficient and flexible production organization mode, which arranges and combines production equipment with different functions according to specific logical relations, thus building an organic overall production system of collaborative operation ^[2]. The characteristics of this production line layout

are remarkable. In the compact production process, each process is closely connected, reducing the flow time and loss of materials and products in the production process. The equipment layout of the matrix production line is flexible and changeable, and the equipment configuration can be quickly adjusted according to the production demand to cope with different batches or types of production tasks. This flexibility not only improves the adaptability of the production line but also significantly optimizes the efficiency of resource utilization and achieves a high degree of resource sharing. This mode is convenient for production management and quality control. Due to the clear logical relationship between the production equipment, managers can easily monitor the production progress, timely detection, and resolution of potential problems, to ensure stable and reliable product quality.

3. The application advantages in vocational education practical training teaching

3.1. Improving students' comprehensive vocational ability

Students in the matrix production line for practical training can access the complete production process from raw material processing to finished product output, and master the operation skills of a variety of equipment, such as mechanical processing students can learn CNC lathes, milling machines, machining centers and other equipment collaborative use, to improve the comprehensive practical ability and professional quality, after graduation can quickly adapt to the complex production environment of enterprises.

In the process of teamwork in the completion of production tasks, students learn to communicate, coordinate, and cooperate in the division of labor, and enhance team consciousness and problem-solving ability. For example, in the assembly line of electronic products, each group is responsible for the assembly and testing of different parts, and jointly completing the final assembly and debugging of products, which cultivates students' collaborative spirit and global concept ^[3].

3.2. Optimize the allocation of practical training teaching resources

Matrix production line integrates diversified practical training equipment, avoids the disadvantages of scattered equipment resources and repeated construction in traditional practical training teaching, significantly improves the utilization efficiency and sharing level of equipment, and makes full use of limited teaching resources ^[4]. For example, in the field of mold manufacturing training, the model will be mold design, precision machining, strict testing, and other key equipment centralized layout, build an efficient collaborative matrix production line, not only fully meet the diversified needs of teaching and training, but also greatly save valuable space, reduce unnecessary equipment procurement costs.

In addition, the matrix production line also helps the school to carry out centralized management and professional maintenance of practical training equipment. The school can assign professional and technical personnel to implement unified maintenance operations for the entire production line, to effectively reduce the failure rate of equipment and ensure the smooth and orderly development of practical training and teaching activities. At the same time, this mode is also convenient for schools to update and upgrade equipment in a timely manner, and constantly improve the modernization level and technological advancement of practical training teaching ^[5].

3.3. Improve the authenticity and effectiveness of practical training teaching

As an innovative teaching mode, a matrix production line successfully simulates the real production scene and

process flow of enterprises, providing students with a practical training platform that is close to actual combat ^[6]. On this platform, students can not only feel the intense and orderly production atmosphere and unique corporate culture of the enterprise but also deeply understand and experience the specific responsibilities and skill requirements of different career positions, thus greatly enhancing the cognition and understanding of future career roles ^[7]. This immersive training experience has stimulated students' strong interest in learning and high enthusiasm, laying a solid psychological and technical foundation for their future career development. Taking automobile manufacturing training as an example, matrix production lines are laid out in strict accordance with the core process processes of automobile production, such as stamping, welding, painting, and final assembly, so that students can personally experience the rigorous workflow and high standard quality control requirements of automobile production enterprises in actual hands-on operation ^[8]. This not only deepens the students' comprehensive understanding of the automotive manufacturing industry but also exercises their professional skills and teamwork ability in different production links.

In addition, teachers can also rely on the production tasks and process flow of matrix production lines to design a series of practical training projects and teaching cases that are closer to reality and more complex and changeable ^[9]. By guiding students to comprehensively apply their theoretical knowledge and practical skills to solve problems encountered in actual production, they can effectively improve their problem-solving ability and comprehensive quality, and ensure the effectiveness and high quality of practical training teaching.

4. Problems faced in the implementation process

4.1. The construction of teaching staff lags behind

The teaching mode of matrix production line puts forward more stringent professional requirements and practical challenges for teachers, who not only need to master the operation skills and maintenance knowledge of various production equipment but also must fully grasp the essence of organization management and quality control of the entire production process. Unfortunately, at present, there are still many teachers in vocational colleges who lack in-depth enterprise practice experience, and it is difficult to effectively assume the heavy responsibility of matrix production line practical training teaching, which restricts the improvement of teaching quality to a certain extent.

Teachers are also faced with challenges in terms of teaching methods and teaching organization. They need to change from the traditional teaching mode of single equipment to the comprehensive teaching mode based on matrix production line. Teachers need to conduct in-depth exploration and practice on how to reasonably arrange students' practical training posts, design teaching tasks and evaluation standards.

4.2. The difficulty of practical training teaching management increases

Matrix production line involves many production links and a variety of equipment, which makes the security management challenges faced by students in practical training more severe. For example, in the machining production line, high-speed rotating sharp tools and dense electrical equipment are hidden safety risks. Therefore, schools must build a complete set of safety management systems and emergency plans, strengthen safety education and practical training for students, so that they can always tighten the safety string, learn to standardize operation and self-protection in practical training, and ensure the safety of the entire practical training teaching ^[10].

The production task of a matrix production line has the characteristics of continuity and complexity, which makes it more difficult for schools to arrange teaching progress and evaluate students' practical training results. How to ensure the smooth progress of production tasks, while allowing each student to obtain sufficient practical training and effective guidance, as well as how to measure the performance and ability growth of students in the whole course of practical training fairly and accurately, these are the key issues to be solved urgently by the school, which requires the school to develop a scientific and reasonable teaching management system and evaluation system.

4.3. High equipment investment and maintenance costs

The construction of matrix production lines is undoubtedly a major investment, which not only requires the initial purchase of a large number of advanced equipment but also requires sophisticated layout design and installation and commissioning work, so the required capital is quite large. More importantly, with the rapid development of science and technology, the upgrading speed of equipment technology is extremely fast, to ensure that the production line always remains competitive, continuous upgrading funds are also essential, which for vocational colleges with limited financial strength, undoubtedly constitutes no small economic pressure.

The maintenance of matrix production line equipment is also a complex and arduous task, which cannot be separated from professional technical personnel and advanced maintenance tools, coupled with the high cost of replacement and maintenance of equipment parts, once the equipment fails and cannot be quickly repaired, it will not only affect the normal progress of practical training and teaching, but also reduce the utilization rate of equipment and the overall investment benefit. This will bring additional losses to vocational colleges ^[11].

5. Solutions

5.1. Improving the teaching staff

Vocational colleges should strengthen cooperation with enterprises, regularly select teachers for enterprises for temporary training and practical training, so that teachers can deeply understand the production process and technology application of enterprises, master the practical operation and management experience of matrix production lines, and improve teachers' practical teaching ability.

Actively introduce technical and management talents with enterprise work experience as part-time teachers to enrich the teaching staff and optimize the teaching structure ^[12]. Part-time teachers can introduce the actual production cases and projects of enterprises into practical teaching and teach students the latest industry knowledge and technical skills. At the same time, they can also help teachers in the school to improve the overall quality of teachers.

Organize teachers to participate in relevant teaching training and academic exchange activities, encourage teachers to carry out teaching research and reform, explore teaching methods and teaching models suitable for matrix production line practical teaching, and improve teachers' teaching level and innovation ability.

5.2. Improve the management system of practical training

Establish and improve the safety management system of practical training teaching in matrix production lines, clarify safety responsibilities, strengthen safety education and training for students, standardize students' operational behaviors, and ensure the safe and orderly conduct of practical training teaching. For example, safety warning signs should be set up in the training workshop, necessary safety protection equipment should be

equipped, and equipment operation procedures and safety inspection systems should be formulated ^[13].

Optimize the teaching schedule arrangement and the evaluation method of students' practical training results, formulate detailed teaching plans and practical training assignments according to the production tasks of the matrix production line and the actual situation of students, and reasonably allocate students' practical training positions and time to ensure that each student can be fully trained in different production links. At the same time, the establishment of a diversified evaluation system, comprehensive consideration of students' operational skills, teamwork ability, problem-solving ability, professional quality, and other aspects of performance, and objective and comprehensive evaluation of students' practical training results.

Strengthen the management and monitoring of the practical training teaching process, establish teaching quality feedback mechanism, timely understand students' learning situation and teachers' teaching effect, find problems timely adjustment and improvement, and constantly improve the quality of practical training teaching.

5.3. Expand capital investment channels and reduce equipment costs

Vocational colleges should actively strive for the financial support and policy support of the government, increase the investment in practical training teaching equipment, and improve the practical training teaching conditions. At the same time, schools can cooperate with enterprises to build training bases, enterprises to provide some equipment or financial support, schools to provide personnel training and technical services for enterprises, to achieve mutual benefit and win-win situation, and to share equipment investment and maintenance costs ^[14].

Reasonable planning of equipment purchase and update plan, according to the school's professional Settings and teaching needs, choose cost-effective, adaptable equipment, to avoid blindly pursuing high-end equipment caused by waste of resources. At the same time, strengthen the daily maintenance and management of the equipment, extend the service life of the equipment, reduce the maintenance cost, and update the frequency of the equipment.

6. Conclusion

The application of a matrix production line in the practical teaching of vocational education has broad prospects and important value, which can effectively improve students' comprehensive vocational ability and the quality of practical teaching ^[15]. Although there are some problems in the implementation process, through strengthening the construction of teachers, improving the practical training teaching management system, and expanding capital investment channels, educators can give full play to the advantages of a matrix production line, train more high-quality technical and technical talents for vocational education to meet the development needs of modern manufacturing industry, and promote the development of vocational education.

Disclosure statement

The author declares no conflict of interest.

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