Research on the Application of MES Technology in Clothing Practice Teaching

Ying Fu

Shaanxi Fashion Engineering University, Xi'an, Shaanxi, China

Abstract: *With the continuous development of technology, the application of MES (Manufacturing Execution System) technology in industrial production is becoming increasingly widespread. In recent years, this advanced technology has gradually penetrated into the field of education, especially in clothing practical teaching. The application of MES technology has brought revolutionary changes to the improvement of teaching quality and innovation in practical teaching. This study aims to explore the application of MES technology in clothing practical teaching, analyze how it helps educators optimize the allocation of teaching resources, improve teaching quality, and explore its positive impact on the cultivation of students' practical abilities and innovative thinking. Through this study, we hope to provide new ideas and methods for clothing practical teaching, and promote the deep integration of education and technology.*

1. Introduction

In the context of digitalization and intelligence, MES technology, with its unique real-time data monitoring and analysis capabilities, is changing the traditional mode of clothing practical teaching[1]. The introduction of MES technology not only makes the allocation of teaching resources more scientific and reasonable, but also improves the accuracy of teaching quality monitoring, strengthens the management of practical teaching, and promotes the close integration of industry, academia, and research. This study will focus on the specific application of MES technology in clothing practical teaching, exploring how it can help educators achieve more efficient and personalized teaching, as well as how to stimulate students' learning interest and innovative spirit. Through in-depth analysis and case studies, we hope to reveal the enormous potential and broad prospects of MES technology in the field of clothing education[2].

MES system is a digital production control system specifically designed for manufacturing enterprises, which realizes the management and control of the entire business process from raw materials, production reporting, production process, quality inspection, equipment, warehouse, etc. It assists enterprises in arranging production plans reasonably, monitoring production in real-time, optimizing production processes, reducing adverse outputs and operating costs, improving the efficiency of manufacturing production operation management, and achieving lean production[3].

MES has the following 8 characteristics: (1) centered on skill training, emphasizing the importance of having limited knowledge and theories, and serving skill training; (2) Putting students at the center, the main responsibility of teachers is to demonstrate and provide guidance, without resorting to "cramming" or "one size fits all"; (3) The training methods are flexible, making it easy for self-learning and centralized training of different scales. The training progress can be adjusted flexibly; (4) Closely combining with practical work, meeting the needs of job operations, achieving practical application of what is learned, can improve teaching effectiveness; (5) It has a wide range of applications and can be used for both pre employment training and on-the-job improvement training. The professional coverage is extensive and basically applicable to various occupational fields; (6) There are comprehensive and rigorous feedback control measures to monitor and evaluate the progress and effectiveness of teaching, continuously improving the quality of teaching; (7) The teaching format and syllabus are systematic and adaptable, making it easy for communication, promotion, and application among countries; (8) Each learning unit or module can be flexibly arranged and combined according to different teaching objectives and forms to meet different requirements.

2. Utilizing MES technology to optimize teaching resources

MES (Manufacturing Execution System) technology, as an advanced production management tool, plays a crucial role in the practical teaching of clothing through its real-time monitoring function. This technology enables educators to monitor real-time data on production sites, including the operational status of equipment, the use and consumption of materials. These data not only provide valuable feedback to teachers, but also help them more accurately optimize the allocation of teaching resources. In the process of clothing practical teaching, it is crucial to allocate resources reasonably as it directly affects the quality of teaching and the effectiveness of student learning. With the help of MES technology, educators can manage practical equipment and material resources more efficiently, ensuring that they can be fully utilized when necessary. In addition, the data analysis function of MES technology can help teachers discover waste or defects in the use of resources, make adjustments and optimizations, and maximize the utilization and timely updating of teaching resources[4].

During the practical teaching process at a certain clothing college, significant changes occurred due to the introduction of MES. The school adopts an MES system to monitor the use and maintenance status of sewing machines in real time. The information provided by the system helps teachers discover that the frequency of equipment usage during peak hours increases abnormally, which not only accelerates equipment wear but also increases maintenance costs. To solve this problem, the school conducted a thorough analysis of the

information provided by MES technology and identified the root causes of uneven equipment usage. Based on this information, the proofreading device usage plan is adjusted and the usage time of each device is reasonably configured to effectively balance the device load. This practice not only extends the service life of the equipment, reduces maintenance costs, but also ensures the smooth implementation of student practical activities. With the support of MES technology, the teaching resources of our fashion college have been successfully optimized, the teaching quality has been improved, and the learning experience of students has been improved.

3. Strengthening Practical Teaching Management through MES Technology

MES technology, as a comprehensive production management tool, provides functions such as planning and scheduling, task allocation, and progress tracking. Teachers can cleverly apply these functions to clothing practical teaching, thereby strengthening the management of practical teaching. The use of MES technology enables teachers to systematically plan and arrange practical teaching activities, ensuring that each teaching task can be successfully implemented according to the predetermined plan. In addition, MES technology helps teachers to monitor the progress of student practice in real time, and timely discover and solve various problems that may exist in teaching. This management approach not only improves teaching efficiency, but also makes teaching practice more orderly and efficient. With the help of MES technology, teachers can have better control over the entire teaching process, thereby bringing students a higher quality and more planned practical teaching experience[5].

For example, a clothing major school clearly recognizes the significance of practical teaching management and has introduced MES technology to optimize the process. They use MES systems to generate practical lesson schedules based on the teacher's teaching plan and the actual intelligence of students. This schedule not only provides a detailed list of the time, location, content, etc. required for various practical activities, but can also be flexibly adjusted according to actual situations. At the same time, the system can monitor the progress of student practice in real time, providing valuable teaching feedback to teachers and students. With the help of MES technology, teachers can easily grasp the actual situation of each student, identify their difficulties and problems in learning, and provide targeted guidance. This management method greatly improves the orderliness and efficiency of practical teaching, and is highly praised by teachers and students.

4. Using MES Technology to Promote the Integration of Industry, Academia, and Research

MES technology not only plays a decisive role in the workplace, but also serves as an information bridge for enterprises and management. The proposal of this technology has brought a new opportunity for the integration of industry, academia, and research. Applying MES technology to clothing practical teaching can help teachers simulate the real environment of clothing production, allowing students to have a profound understanding of industry needs and production processes during their university years. This kind of practical teaching, which is highly similar to a real production environment, is conducive to students combining theoretical knowledge and practical operations well, promoting the improvement of their comprehensive quality. At the same time, schools can closely collaborate with enterprises to timely understand the latest trends and technological developments in the industry, and then adjust teaching content and methods to ensure the timeliness and practicality of education and teaching. The integrated teaching model of industry, academia, and research is crucial for cultivating students' innovative spirit and practical ability, and also helps to enhance their competitiveness in employment[6].

A well-known college of fashion design and engineering is actively seeking deep cooperation with enterprises to jointly build a practical teaching platform based on MES. This innovative measure has brought valuable opportunities to students. In this platform, students can not only systematically learn basic skills in clothing production, but also directly connect with real production data and management processes of enterprises. The MES system provides real-time data feedback, enabling students to have a clear understanding of the production situation in each link, and thus gain a deeper understanding of the entire clothing production process. This teaching model that combines industry, academia, and research not only provides students with a wealth of practical experience during their university years, but also greatly improves their practical abilities and employment competitiveness. After graduation, these students with practical experience will undoubtedly be outstanding talents in the industry, providing better services for the development of the clothing industry.

5. Implementing Simulation Teaching with MES Technology

With the continuous development of information technology, virtual simulation technology has been widely applied in multiple fields. In clothing practical teaching, the introduction of virtual simulation technology based on MES (Manufacturing Execution System) can simulate real clothing design, production processes, and management environments, enabling students to carry out practical operations in virtual environments, thereby improving their professional skills. This teaching method can not only reduce the cost of practical teaching, but also effectively avoid safety risks in practical operations. In addition, through the virtual simulation platform, students can practice repeatedly, deepen their understanding of the clothing production process, and improve their ability to solve practical problems. At the same time, teachers can also provide more targeted guidance and evaluation based on the performance of students in the virtual environment, thereby improving the quality of teaching.

In the practical teaching of clothing design at a certain university, teachers introduced virtual simulation technology based on MES. By building a highly simulated clothing design, production, and management process simulation platform, students can simulate real clothing production

processes in a virtual environment, including fabric selection, style design, process planning, and production planning arrangements. On this platform, students can not only freely design and innovate, but also instantly see the display effect of design results on virtual models. In a practical course, students were divided into groups to conduct a complete simulation from clothing design to production. They first selected fabrics on the platform and designed unique clothing styles. Then, they formulated the production process according to the design requirements and arranged a detailed production plan. During the simulation production process, students encountered various practical problems, such as insufficient fabric and technical difficulties. However, through team collaboration and continuous adjustment of plans, they successfully completed the production task. This practical teaching activity not only improved the professional skills of the students, but also cultivated their teamwork and problem-solving abilities.

6. Conclusion

Through exploring the in-depth application of MES technology in clothing practical teaching, this study reveals its significant role in optimizing teaching resources, improving teaching quality, strengthening teaching management, and promoting the cultivation of students' innovative abilities. With the continuous progress of technology and innovation in educational concepts, we believe that MES technology will play a more important role in clothing practical teaching. In the future, we look forward to seeing more educators utilize MES technology to provide more vivid and practical learning experiences for students majoring in clothing, cultivate more outstanding talents with practical abilities and innovative spirit, and jointly promote the sustainable development and progress of the clothing industry.

References

[1] Fu Xinfang. Application analysis of virtual simulation technology in practical teaching of clothing technology [J] Textile Industry and Technology, 2020, 49 (08): 176-177

[2] Huang Xiaojie. Exploration of Practical Teaching Reform in Clothing Design and Engineering Majors in Applied Technology Universities [J] Textile and Clothing Education, 2018, 33 (03): 249-251.

[3] Lu Yang. The Application of ERP and MES Integration Technology in the Clothing Industry [J]. Volkswagen Business (Second Half of the Month), 2010 (9).

[4] Tan Ou. Research on Application Methods of Workflow in MES [D]. Nanjing University of Aeronautics and Astronautics, 2024.

[5] Zhang Zhibin, Li Peng, Chen Shang. Research on Intelligent Manufacturing Innovation Engineering in Clothing Enterprises [J]. Woolen Textile Technology, 2016, 44 (5): 4.

[6] Xiao Xin. Reflections on the MES teaching mode of secondary vocational clothing [J]. Literary and Art Life: Midday Journal, 2016, 000 (006): 254-254.