

Reform and Practice of Project-Based Teaching Mode Based on Online Open Course Platform

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Abstract—Project-based practical teaching is an important part of the teaching reform of fashion design and intelligent manufacturing industry course in vocational colleges, and also an important measure to enhance the effectiveness of teaching. A good practical teaching base is a strong guarantee for the smooth development of project-based teaching. This paper explores the reform and innovation of project-based teaching of fashion design and intelligent manufacturing specialty, and further studies the construction of project-based base focusing on base practice teaching and online courses, to further integrate project-based teaching resources, give play to the role of network-based virtual platform, build perfect project processes, improve project-based teaching course resources of base, and realize co-building and sharing of teaching resources between colleges and enterprises, so as to further improve the teaching quality of project-based teaching of fashion design and intelligent manufacturing specialty, and develop more qualified technical talents.

Keywords—online courses, project-based teaching, fashion design and intelligent manufacturing, base

1 Introduction

The application of innovative technologies such as Internet, cloud platform and big data et al., together with the close integration of online education and information technology, transforming the traditional point-to-point spot teaching mode, to online project-based teaching mode are the direction of teaching development in vocational colleges [1–2]. Recently, the Ministry of Industry and Information Technology and the Standardization Administration jointly issued the Guidelines for the Construction of a National Smart Manufacturing Standards System to standardize the construction of digital resources of intelligent manufacturing in vocational colleges and, focused on the learning characteristics of the specialty and professional talent development plans of the vocational colleges, to fully advance regional industrial characteristics of colleges, and better serve the local economy and transform the local intelligent manufacturing enterprises [3–4]. Accordingly, it ensures the continuous optimization and upgrading of fashion design and intelligent manufacturing industry. At present, the

market demand for professional talents in fashion design and intelligent manufacturing has concentrated in high-quality skilled talents. To strengthen the innovation of high-quality skilled talent development, the “government-college-enterprise integration and industry-college-research integration” are an important mode of project-based talent development with deep involvement of governments, colleges, as well as enterprises, which, through close intercalation of teaching, scientific research, production, entrepreneurship and practical operation, promotes students’ practice, career and entrepreneurship level systematically [5–7].

The course planning for fashion design and intelligent manufacturing therefore aims to take advantage of the reform and practice of project-based teaching mode using the online open course platform. The goal of this research is to integrate the practical teaching with the project-based teaching in fashion design and intelligent manufacturing industry base, and using internet-based virtual platform to study and building an online open course resource library, so as to advocate the professional ability and innovation and entrepreneurship skills of vocational college students in fashion design and intelligent manufacturing.

2 Construction foundation

2.1 Construction of fashion design and intelligent manufacturing base

The era of intelligence has prompted vocational colleges to reform teaching. The integration of fashion design and intelligent manufacturing specialty with the intelligent manufacturing technology is the core of college teaching’s reform. To promote the integration of manufacturing and intelligent technology, since 2017, Wenzhou Polytechnic has integrated fashion enterprises and enterprises of big data technology, mobile network technology, cloud computing technology, and Internet of Things technology to co-build a fashion design and intelligent manufacturing base, redecorate the industrial allocation and optimization of the fashion design and intelligent manufacturing base, and build a digital education resource library empowered with a digital resource sharing membership.

The site sized 3,175 square meters, with the total value of asset being CNY 10,837,780 (USD), and the total initial investment from the enterprises is CNY 1,262,240. Through digital construction and practice of the base, Wenzhou Polytechnic has built its ability of fashion design and intelligent manufacturing specialty in talent development, teaching resource sharing and inheritance, and regional service, and made significant progress toward transforming and upgrading digital teaching of fashion design and intelligent manufacturing specialty, improving teaching efficiency, and receiving investment in enterprise base construction.

2.2 Financial support

The construction of the base is sponsored by Ouhai District Government. The functional department of Ouhai District Government (Ouhai Fashion Intelligent Manufacturing Town) invested CNY12,207,981 to modernized the equipment of the industry-education integration base. The construction platforms are comprised by: skill

inheritance platform, design master platform, and technology R&D platform. Wenzhou Polytechnic invested an additional about CNY 1 million in the construction of digital teaching resources, textbooks, faculty and other aspects of the training courses of the industry-education integration base. The cooperative enterprises provided about CNY 5 million in funding, including about CNY 4.4 million in intelligent design software and hardware, and about 0.60 million in training consumables.

2.3 System construction

For an initial layout of the base, Wenzhou Polytechnic issued relevant industry-education integration development plans and made institutional arrangements, including: Interim Measures of Wenzhou Polytechnic for Administration of Establishing and Funding an Industry-Education Integration Project, Interim Regulations of Wenzhou Polytechnic for Administration of Enterprises into Campus, Measures of Wenzhou Polytechnic for Administration of Operating Application Innovation and Entrepreneurship Incubation Base, Measures of Wenzhou Polytechnic for Administration of Training Base Cooperation and Co-building, Measures of Wenzhou Polytechnic for Supporting Funds for Scientific Research Projects, Rules of Wenzhou Polytechnic for Implementation of Scientific Research Project Management, etc.

3 Project-based online course construction path design

3.1 Innovate online project-based teaching of fashion design and intelligent manufacturing specialty

The main goal of the innovating the project-based teaching of fashion design and intelligent manufacturing specialty is to generate high-quality industry-education integration training project resource packages, including fashion product design and intelligent manufacturing virtual training projects, innovation and entrepreneurship (including competition) training projects, industry-education integration practice textbooks, fashion product design students' practice works collections, etc.

(1) Innovation of project-based teaching of fashion design and intelligent manufacturing specialty. The base innovates the “double first-class” construction into the driving force. Following the national “intelligent manufacturing” strategy and the local fashion design and intelligent manufacturing industry development direction, it integrates and co-builds the base enterprises, innovates the fashion design and intelligent manufacturing teaching project, establishes the vocational characteristics of its students, and reasonably constructs the teaching system for “project orientation and industry-education integration”, the “project setting – task building – material consulting – plan formulating – project implementing – project acceptance” teaching mode, and the talent development system with “project + enterprise + feedback”. The textbooks are based on real industrial cases, with carefully selected teaching content, teaching projects range from easy to difficult and layer-upon-layer, and practical projects throughout the knowledge system, so that students are encouraged to apply what they have learned [8].

(2) Modular operation of fashion design and intelligent manufacturing project teaching. Fashion design is a visual design which conveys fashion information. It refers to a design mode that convey visual perception information in a form of visual image through media [9]. The classic teaching mode has certain limitations. The teaching mode in the form of classroom lecture is to transmit individual knowledge with the short of integration and connection of them in design theory, resulting in a lack of whole picture in students' design thinking. In contrast, the modular course is more consistent and progressive, focusing on the process of design thinking, emphasizing the development and exercise of independent design ability, and attaching importance on students' design creativity, practical ability and social adaptability.

(3) Project-based teaching mode for online courses. The fashion design and intelligent manufacturing make use of the project training base. The project-based teaching integrates enterprises' real projects, and using computer platform and network platform. It constitutes an information platform to provide teaching services. The platform provides services such as upload of courses materials, search and accessing of teaching resources, online learning and testing. It further includes an on-demand teaching platform, a real-time broadcasting teaching platform and a recording platform, which greatly facilitating the effective implementation of online teaching.

3.2 Optimize industry-education integration system of fashion product design and intelligent manufacturing

In the fashion design and intelligent manufacturing base the production process of intelligent projects is used as teaching resources, with specific focusing on the online teaching of fashion design and intelligent manufacturing tasks, and the simulation of the real project operation scenarios through video teaching scene process reproduction to help students participate in enterprise project design, familiarizing themselves with design work process, practicing teaching management of intelligent platform for industry-education integration, utilizing the design master platform, technology R&D platform and skill inheritance platform to innovate the fashion design and intelligent manufacturing talent development system in a "project + enterprise + incubation + feedback" way.

(1) The building of the base's design master platform, technology R&D platform and skill inheritance platform. Following the trend of intelligent transformation and digital improvement in traditional industries, Wuhan Polytechnic, local government and enterprises jointly introduce the advanced intelligent manufacturing equipment in building an industry-education integration base which leads the transformation and upgrading of the fashion industry (as shown in Figure 1). To meet the needs of enterprises in the new era of develop versatile talents with professional intelligent customization technology and skills in fashion design and intelligent manufacturing, and to facilitate industrial upgrading. Through the design of the master platform, technology R&D platform, and skill inheritance platform, the base providing the target of develop craftsmen of the great country, by using virtual reality technology to record or broadcast online the course resources of practical training projects.

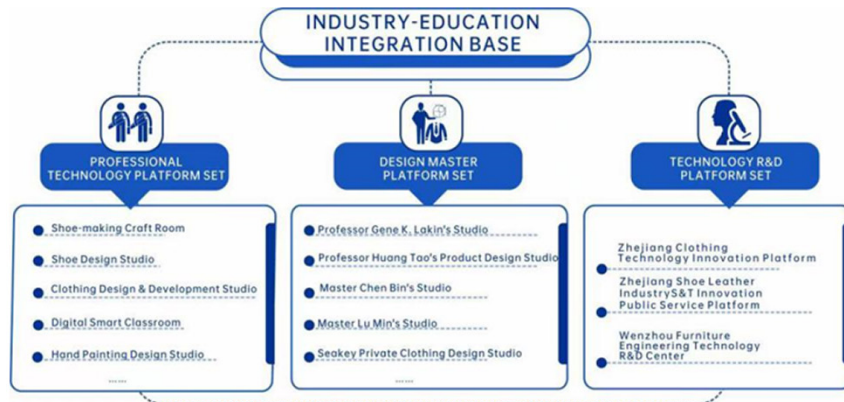


Fig. 1. Industry-education integration base of fashion product design and intelligent manufacturing

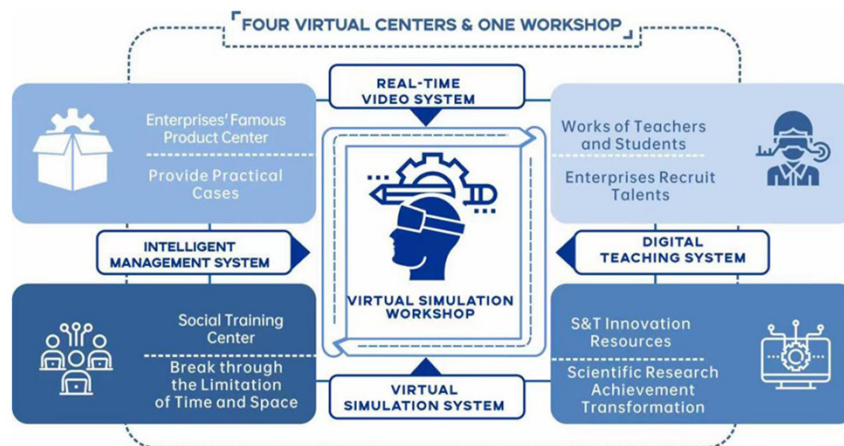


Fig. 2. Four virtual centers and one workshop

(2) **Establish an industry-education alliance and build a college-enterprise cooperation community.** The aim of the fashion design and intelligent manufacturing base is to develop highly technical talents for the society and fashion design and intelligent manufacturing industry. The teaching mode of vocational colleges should match the needs of enterprise. Establishing an industry-education alliance, building a college-enterprise cooperation community, and establishing a close cooperation mechanism between colleges and enterprises are essential to the promotion of enterprises to participate in every aspect of digital teaching resource library. With the continuous evolving of the new technologies, ensuring that the course teaching can be kept up-to-date and matches the iterative updating of teaching resources, follows the needs of fashion design and intelligent manufacturing and of talents, and ensuring the teaching

quality of vocational education, are essential factors to improving the social service ability and social influence of the base, and the co-building and sharing the fashion design and intelligent manufacturing talent base. Therefore, making the base a large platform for talent reserve in the fashion design and intelligent manufacturing industry.

(3) Innovate the collaborative practical teaching system of “learning – training – research – innovation – application”. Based on the industrial base, Wenzhou Polytechnic practicing a project-based training teaching, innovates its education and teaching research, closely oversea the needs of industrial transformation and development of fashion products such as shoes, clothing, and glasses, and improves the construction of virtual resources related to “four virtual centers and one workshop” model (as shown in Figure 2). Wenzhou Polytechnic innovates the presentation organization of students’ works center, social training center and S&T innovation resource center, re-configures high-performance computing storage resource pool and data center connected with basic data through fashion design and intelligent manufacturing course network virtual practice teaching platform, makes use of multi-terminal integrated digital teaching environment and cloud computing technology. With the advantage of multi-terminal integrated digital teaching through cloud service platform, the work center provides a whole-process practice system of “acquisition – management – application” integration of teaching resources, so as to realize the collaborative practice teaching system of “learning – training – research – innovation – application” integration (as shown in Figure 3).

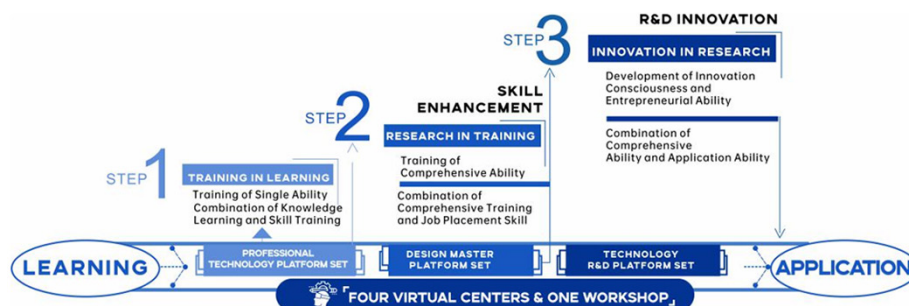


Fig. 3. “Learning – Training – Research – Innovation – Application” Integration

3.3 Construction of online open professional teaching resource library for fashion design and intelligent manufacturing

According to the National Vocational Education Reform Implementation Plan issued in 2019, Wenzhou Polytechnic plans to maintain and improve the resource certification standard and transaction mechanism of professional course resource library and re-building and sharing platform. The fashion design and intelligent manufacturing course teaching reform is inspired by the scientific research of base enterprises, and actively develops online course resources (including online video, technical experience, training projects, online class evaluation, etc.) by the base enterprises, to develop online courses systematically, and to implement the personalized “student-centered” study mode and multi-dimensional online open learning.

Based on the connection between enterprise needs and talent development, Wenzhou Polytechnic uses advanced technical approaches such as virtual technology and reverse engineering technology and refers to the hybrid digital media development teaching project platform (as shown in Figure 4) innovatively introduced by University of Kassel to construct an open digital teaching resource package and, following the needs of enterprises, provide supporting online courses, introduce real-time video system, intelligent management system, virtual simulation system, and digital learning system, thus enriching the depth and breadth of courses by improving the development and training efficiency. In systematic learning, it enhances learners' professional ability, planning ability and social coordination ability. Through recorded videos, it simplifies the complex vocational work flow and assimilates the work flow with the actual work situation. It uses cloud computing, cloud rendering technology, AR and VR technology and AI to solve the intelligent application problems of the online teaching platform of the teaching resource library, and demonstrating the working process of intelligent manufacturing, facilitates teachers and students' participating in the construction and application of teaching resources.

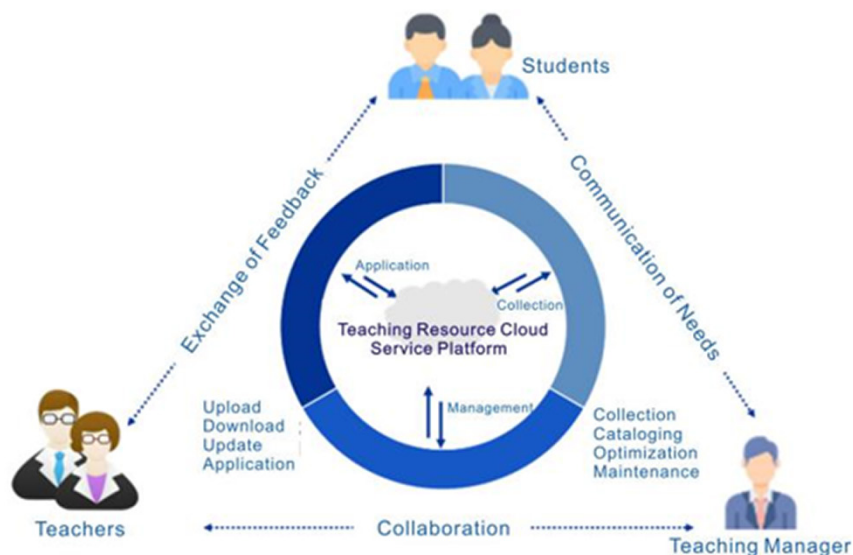


Fig. 4. Application mode of digital resource cloud service platform

4 Conclusion

With the implementing of online course teaching platform, AR and VR technology, MOOK and other information technology in teaching, the project-based teaching mode based using online open course platform integrates traditional classroom teaching and information technology application, which leading the development trend of digital teaching reform of fashion design and intelligent manufacturing. During the construction of fashion design and intelligent manufacturing practice training base,

more than dozens of fashion enterprises have participating, realizing the comprehensive connection between the new needs of the fashion industry and talent development, creating a regional demonstration intelligent manufacturing development and training highland, and benefiting the regional fashion industry. The innovation base has become an important service platform for provincial and municipal S&T innovation and a first-class technical and skill platform in China [10]. The online project-based teaching mode, which composed by specific cases, project simulation, task training, project teaching and other work flows, greatly improves students' enthusiasm for learning, self-inspired learning ability and professional skills, realizes the unity of knowledge and practice in the process of project simulation operation, and improves in the practical operation level. In the construction of industrial R&D such as Shoe Center of China and public training bases for regional high-quality skilled footwear and clothing talents, the construction of provincial-level characteristic town of Wenzhou industry-education incorporation service as a typical example provides rich cases for project-based teaching and creates a multi-dimensional teaching infrastructure for Wenzhou Polytechnic to roll out online and offline hybrid teaching.

The project-based teaching mode of the online open course platform is a comprehensive application-oriented talent development method that fulfills the needs of the era of intelligence. It, in conjunction with the college's priority of fashion design and intelligent manufacturing, will greatly benefit and deepen the construction of fashion design and intelligent manufacturing teaching base and the industry-education integration practical teaching system of "learning – training – research – innovation – application" integration of fashion product design and intelligent manufacturing, to realize the construction of an outstanding fashion product design and intelligent manufacturing industry-education integration base in line with the expectations of regional industry.

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