Textile & Leather Review

ISSN 2623-6281 | www.tlr-journal.com | 10.31881/TLR

Vocational Education Needs and Skill Cultivation Paths of Chinese Silk Culture and Fashion Designs

Wuwei Wang

How to cite: Wang W. Vocational Education Needs and Skill Cultivation Paths of Chinese Silk Culture and Fashion Designs. Textile & Leather Review. 2025; 8:454-477. https://doi.org/10.31881/TLR.2025.015

How to link: https://doi.org/10.31881/TLR.2025.015

Published: 1 July 2025

Vocational Education Needs and Skill Cultivation Paths of Chinese Silk Culture and Fashion Designs

Wuwei WANG
Zhejiang Fashion Institute of Technology, Ningbo 315211, Zhejiang, China
*lkxsc582@163.com

Article
https://doi.org/10.31881/TLR.2025.015
Received 10 May 2025; Accepted 17 June 2025; Published 1 July 2025

ABSTRACT
Chinese silk culture has a long history and occupies an important position in the global textile and clothing industry. However, in the current vocational education system, the inheritance of silk culture and the cultivation of clothing design talents have not yet formed a perfect integration mechanism. How vocational education can find a balance between modern design concepts and traditional craftsmanship, and cultivate professionals with both cultural literacy and technical ability has become an important issue to be solved. The purpose of this study is to analyze the current status of the current vocational education system of clothing design in the inheritance of silk culture and skill cultivation, to explore its problems, and to put forward optimization paths to enhance the matching degree of vocational education to the demand of talents in the silk clothing industry, and to promote the modernization of the application of traditional culture and the development of innovation. This study adopts research methods such as literature analysis, questionnaire survey, expert interviews, and case study analysis to systematically investigate the curriculum, teaching mode, integration of industry and education, and the status quo of the application of digital technology in many domestic vocational colleges and universities, and combines with the opinions of industry experts to put forward targeted optimization strategies. This study systematically analyses the current status of the application of silk culture in vocational education for fashion design and proposes a series of targeted optimization strategies to promote vocational education reform and improve the quality of talent training.

KEYWORDS
silk culture, vocational education, industry-teaching integration, curriculum system optimisation

INTRODUCTION

As an important part of Chinese civilization, Chinese silk culture carries profound historical deposits and craft wisdom and occupies an important position in the global textile and clothing industry [1]. With the development of the modern fashion industry and the national promotion of traditional culture revival, there is a growing demand for the application of silk culture in apparel design, which not only requires designers to have a solid knowledge of traditional craftsmanship but also needs to master the modern design concepts and techniques. Therefore, how to build a reasonable talent training model in the vocational education system to meet the industry's demand for high-quality clothing design talent has become an urgent problem to be solved [2]. Vocational education plays a key role in promoting the inheritance of silk culture and clothing design innovation. At present, the

garment industry is experiencing digital and intelligent transformation, and the skill requirements for designers are more diversified, covering fabric technology, digital design, market analysis, and other aspects. However, the existing vocational education system still has certain limitations in curriculum, practical teaching, and industry-teaching integration, resulting in a certain disconnect between talent cultivation and industry demand [3]. Therefore, it is of great practical significance to study in depth how vocational education can adapt to industrial demand and build a scientific skill cultivation path [4]. Starting from the uniqueness of Chinese silk culture, this paper analyses the current demand for vocational skills in the apparel design industry, explores the core role of vocational education in skill cultivation, and puts forward strategies to optimize the cultivation path [5]. The study will combine the current situation of the industry and educational practice to provide a theoretical basis and practical reference for building an efficient talent training system, to promote the innovative development and international dissemination of Chinese silk culture.

This study's theoretical framework integrates cultural transmission theory, vocational education theory, and industry-education cooperation theory. Through the lens of cultural transmission theory, incorporating silk culture into vocational education is seen as a dynamic way to preserve and promote this heritage via education and practice. Vocational education theory underpins the focus on skill development and knowledge acquisition, aiming to optimize Silk culture's integration into curricula to boost students' professional abilities. Industry-education cooperation theory emphasizes the necessity of collaboration between educational institutions and the silk garment industry to align vocational education with industry needs [6]. Guided by this framework, the study analyzes how vocational education can effectively inherit silk culture and cultivate design skills, offering a foundation for discussing findings and proposing strategies to enhance the vocational education system.

In the structural arrangement of this paper, the second part reviews the current situation of the research related to silk culture and vocational education of clothing design and analyses the main views and research trends of the current academic community in this field. The third part introduces in detail the methods of literature analysis, questionnaire survey, expert interviews, and case study analysis adopted in this study, and explains the specific process of data collection and analysis. Based on the results of the empirical study, the fourth part discusses the status quo and problems of the vocational education system in terms of the Silk culture curriculum, practical teaching, integration of industry and education, and application of digital technology, and puts forward the corresponding optimization path. The fifth part summarises the core findings of this study and points out the limitations and future research directions of the study, to provide lessons and references for subsequent related studies.

RESEARCH REVIEW

The relationship between Chinese silk culture and clothing design

Chinese silk culture has a long history, not only in exquisite weaving technology and unique dyeing and weaving techniques but also profoundly influenced the concept of clothing design in China and the world. From ancient court dress to modern high fashion, the application of silk fabric has always been an important part of clothing design [7]. In recent years, with the country's emphasis on the revival of traditional culture, the application of silk culture in the garment industry has ushered in new development opportunities [8]. Through the combination of traditional patterns, non-heritage techniques, and modern technology, many designers have made silk clothing with both traditional flavour and modern aesthetics, promoting the influence of Chinese clothing in the international market. In the vocational education system, the inheritance of silk culture and the cultivation of clothing design skills need to be closely integrated [9]. On the one hand, students need to master the basic characteristics, process, and historical and cultural value of silk; on the other hand, they also need to have the innovative ability of modern clothing design, such as digital plate making, intelligent manufacturing, and sustainable fashion concepts [10]. Therefore, vocational education plays a role in this process, not only to inherit the traditional craft but also to adapt to modern market demand.

Status and challenges of vocational education in fashion design

China's vocational education in apparel design has formed a relatively complete system, including higher vocational colleges and universities, technical schools, and enterprise training at various levels [11]. These educational institutions have played an important role in cultivating basic clothing design talents, but still face many challenges in responding to the inheritance of silk culture and the needs of modern industry:

Inadequate matching of the curriculum with industry needs

The existing curriculum system tends to focus more on basic skills training, such as pattern making, sewing, and design fundamentals, and less on in-depth understanding and practice of silk culture [12]. Although some colleges and universities have offered courses related to traditional crafts, they are more traditional in teaching methods and lack practical application, which makes it difficult for students to directly participate in the design and production of silk costumes after employment.

Poor integration of practical teaching and industry

The apparel design industry is highly dependent on practical experience, while the practical teaching resources of vocational colleges and universities are relatively limited, and the mode of enterprise

cooperation has yet to be optimized [13]. The practical training courses in many schools are still based on simulation exercises and lack in-depth cooperation with silk garment enterprises, resulting in insufficient students' practical ability in fabric application and market trend analysis [14]. Table 1 shows the current situation of the cooperation mode between vocational schools and enterprises and its limitations.

Table 1. Current status of the cooperation model between vocational colleges and enterprises and its limitations

Mode of cooperation	Specificities	Limitations
Internship	Students enter enterprises for short-term practical training to understand the basic operation mode of the industry.	Short internships and a lack of systematic training to master core skills
Joint University-Enterprise Program	Corporate participation in course design or delivery to enhance the practicality of the course	Uneven participation of enterprises and some courses are still based on theoretical teaching.
Order-oriented training	Cultivate talents according to the needs of enterprises, and the curriculum is closely related to the job requirements.	Restricted to the needs of specific enterprises, students' career development direction is relatively homogeneous.
Industry-University-Research Cooperation Program	Students participate in corporate R&D projects to develop innovation and practical skills.	Program opportunities are limited, and only a few students can participate in depth.
On-campus Corporate Studio	Establishment of corporate studios on campus to simulate real work environments	Equipment resources are limited, and the depth of enterprise participation still needs to be improved.

From Table 1, it can be concluded that the current modes of cooperation between vocational colleges and silk garment enterprises mainly include short-term internships, joint school-enterprise courses, order-based training, industry-academia-research cooperation projects, and on-campus enterprise studios [15]. These modes have enhanced the practicability of vocational education to a certain extent, but there are still more limitations. Although short-term internships can bring students into contact with the industry environment, it is difficult to effectively improve their core skills due to the short time and insufficient systematization [16]. Joint courses between schools and enterprises can improve the practicality of teaching, but the deep participation of enterprises still needs to be strengthened. Order-based training can accurately match the needs of enterprises, but there is the problem of the limited scope of application of students' skills. Industry-university-research cooperation programs provide students with opportunities for innovation research, and development, but fewer students can participate in depth [17]. Although the on-campus enterprise studio simulates a real working

environment, the in-depth cooperation of enterprises has not yet been fully realized due to the limitation of equipment resources. Overall, the current cooperation model still needs to be further optimized to enhance the practical ability and industry adaptability of students in vocational colleges and universities.

Insufficient combination of modern technology and silk clothing design

With the development of digital technology, 3D apparel design, smart fabrics, and sustainable processes have become hot spots in the industry [18]. However, the vocational education system is relatively lagging in terms of teaching resources in these areas, and some of the courses are still based on traditional design methods, failing to adequately introduce modern technological tools, resulting in the insufficient cultivation of students' digital design skills.

Related research and development trends

In recent years, scholars at home and abroad have conducted various research on the combination of silk cultural heritage, vocational education reform, and clothing design, and put forward many constructive opinions:

Modernization and application of silk culture

Research has shown that the combination of traditional silk craftsmanship and modern technology can effectively enhance market competitiveness [19]. For example, the Masterpiece brand adopts intelligent weaving technology to improve the durability and environmental performance of silk fabrics, making them more in line with modern consumer trends. Figure 1 shows how a brand combines traditional silk with modern technology.

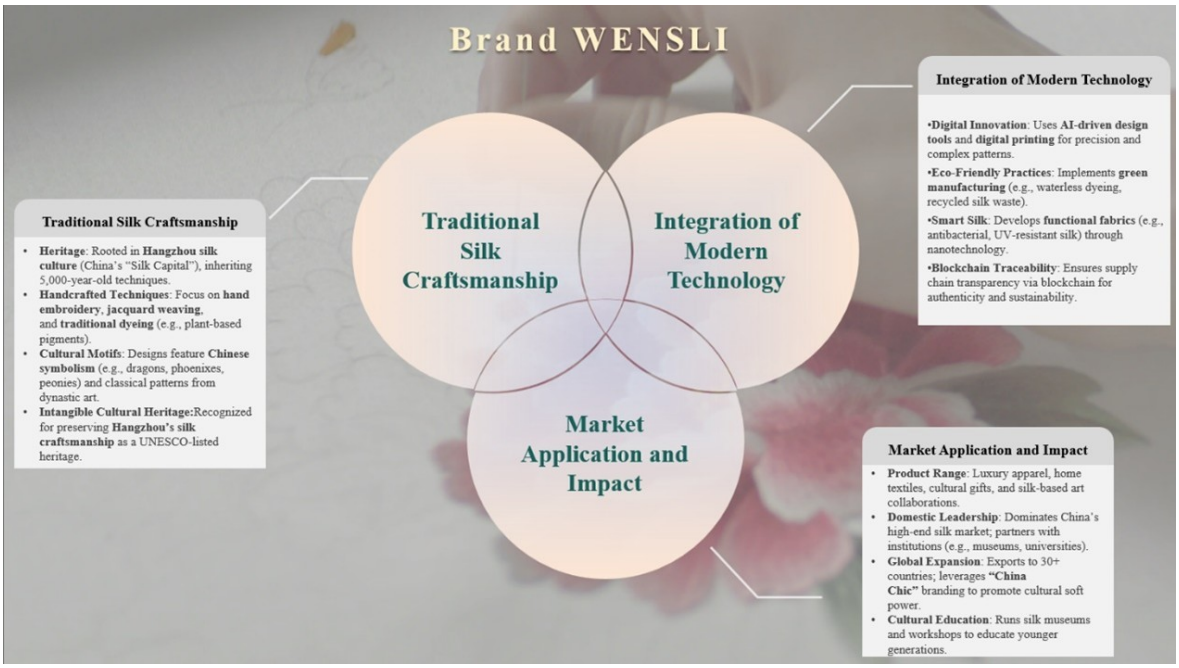

Figure 1. Masterpiece combines traditional silk with modern technology

In Figure 1, the Wensli brand demonstrates its innovation and market leadership in the silk industry by integrating traditional silk craftsmanship with modern technology. In terms of traditional silk craftsmanship, Wensli is deeply rooted in Hangzhou, China, the "Silk Capital", where it has inherited 5,000 years of traditional skills, specializing in hand embroidery, jacquard weaving, and vegetable-based dyes [20]. In addition, its designs are rich in Chinese symbols, such as dragons, phoenixes, and peonies, as well as motifs from classical art, which are not only aesthetically pleasing but also rich in cultural connotations [21]. Masterpiece's silk craftsmanship has been listed as an Intangible Cultural Heritage by UNESCO for its contribution to the preservation and transmission of intangible cultural heritage. In terms of the integration of modern technology, Marvel utilizes artificial intelligence-driven design tools and digital printing technology to achieve precise and intricate pattern designs. The brand also implements eco-friendly practices such as waterless dyeing and recycling of silk waste to minimize its impact on the environment. Through nanotechnology, Marvel has developed fabrics with functional properties, such as antimicrobial and UV-resistant silks. In addition, the brand employs blockchain technology to ensure transparency in the supply chain, thereby improving product authenticity and sustainability [22]. In terms of market applications and impact, Marvel's wide range of products includes luxury apparel, home textiles, cultural gifts, and silk-based art collaborations. Domestically, Marvel dominates the high-end silk market and works with museums, universities, and other organizations [23]. Globally, Masterpiece has exported its products to more than 30 countries, utilizing the "China Style" brand to promote cultural soft power. In addition, Masterpiece is committed to educating the younger generation, passing on and promoting Chinese silk culture by operating silk

museums and workshops [24]. Through these efforts, Masterpiece has not only achieved commercial success but has also made significant contributions to the preservation and dissemination of traditional culture.

Direction of reform of vocational education

It is generally agreed in the academic community that vocational education should strengthen the integration of industry and education, optimize the curriculum system, and enhance students' innovative and practical abilities. For example, some studies suggest that digital design software and virtual fitting technology should be incorporated into the curriculum system to enhance students' modern design capabilities.

Drawing on the experience of international fashion education

In Europe and the United States, vocational education emphasizes interdisciplinary integration, encouraging students to learn traditional skills while mastering comprehensive skills such as marketing and supply chain management. In contrast, China's vocational education system still has much room for improvement in interdisciplinary teaching and learning, and in the future, we can draw on international experience to build a more flexible teaching model.

In summary, the importance of Chinese silk culture in apparel design is becoming more and more prominent, and the role of vocational education in talent cultivation should not be ignored. The current vocational education system still has certain shortcomings in curriculum, practical teaching, and the application of modern technology, which need to be improved by deepening the integration of industry and education, optimizing the curriculum system, and introducing modern technology. The next study will focus on how to build an efficient skill cultivation path to better meet the needs of the industry and promote the inheritance and innovative development of Chinese silk culture.

RESEARCH METHOD

Based on the method of combining quantitative analysis and qualitative analysis, this study focuses on the relationship between Chinese silk culture and vocational education of clothing design, explores the specific problems of the current vocational education system in talent cultivation, and puts forward a plan to optimize the cultivation path. The research method mainly consists of four parts: literature analysis, questionnaire survey, expert interviews, and case study analysis to ensure the scientific and practical guidance value of the research conclusions.

Literature analysis

Literature analysis is the foundation of this study, which aims to systematically sort out the current research status of China's silk culture, vocational education in apparel design, and related industry development trends. This study selects academic papers, industry reports, and policy documents on silk culture, vocational education, clothing design, and related industry development trends at home and abroad in the past ten years to systematically analyze and summarize the main problems of vocational education in the inheritance of silk culture and the cultivation of clothing design skills. We searched databases such as China Knowledge Network (CNKI), Web of Science, Elsevier, SpringerLink, etc. for "silk culture", "clothing design education", "vocational education reform" and "vocational education". Vocational Education Reform, "Garment Industry Development" and other keywords, to screen the literature with high relevance. We classify the literature according to its type, including policy documents, academic research, industry reports, etc., and analyze the content [25]. Extract the key viewpoints in each type of literature, and summarise the advantages, problems, and future development trends of current vocational education in the cultivation of silk garment design talents. Combined with the research needs, typical case studies are selected to further verify the results of the literature analysis [26]. Through the literature analysis, clarify the deficiencies of the current vocational education system in curriculum, industry-teaching integration, skill cultivation mode, etc., and provide a theoretical basis for the subsequent empirical research.

Questionnaires

To comprehensively understand the current situation and problems of the vocational education system of apparel design in terms of silk culture and skill cultivation, this study adopts a questionnaire survey to investigate teachers and students of vocational colleges and universities, designers, and managers of apparel enterprises [27]. The survey investigates whether the institutions offer courses related to silk culture, the coverage of course content, teaching methods (theory vs. practice), student's satisfaction with the courses, and suggestions for improvement. Students' learning situation and self-assessment ability in silk fabric identification, traditional craft mastery, digital design skills, and other aspects. Enterprises' skill demand for apparel design talents, including silk fabric application ability, traditional craft mastery, and modern design technology application ability. Investigate the mode of cooperation between institutions and enterprises, the depth of cooperation, the participation of enterprises in talent training, and suggestions for improvement.

The questionnaire survey of this study covers 8 representative vocational colleges and universities (including national key higher vocational colleges and universities, provincial model higher vocational colleges and universities, and ordinary higher vocational colleges and universities) and 15 silk and

apparel-related enterprises (including large listed enterprises, famous design brands, and small and medium-sized OEM enterprises) in mainland China. The target respondents include 300 teachers and students of vocational colleges (teachers specializing in apparel design and students in the second year or above), and 150 designers and human resource managers of apparel enterprises. The questionnaires were distributed through an online platform (Questionnaire Star), and a total of 412 valid questionnaires were collected, with an effective recovery rate of 91.6%.

The development of the questionnaire was based on a literature review and initial expert consultation aimed at ensuring its content validity. After the first draft of the questionnaire was formed, we invited three vocational education experts and two business designers to pre-test the questionnaire and optimize its wording, structure, and options based on the feedback to improve its clarity and comprehensibility. The structure of the questionnaire was divided into four main sections: for basic information, it included respondents' identity (teachers, students, and enterprise personnel), type of institution or enterprise, professional background, and years of practice or study. In terms of curriculum and teaching perception, a Likert scale was used to measure respondents' satisfaction with the systematicness of silk culture courses, the proportion of practical teaching, and the adequacy of teaching resources. Sample question, "Do you think the current school curriculum enables you to systematically master the knowledge of silk culture?". In terms of industry-teaching integration and enterprise demand, the mode and depth of school-enterprise cooperation and enterprises' evaluation of graduates' skills are examined. Sample question: "At which of the following levels does the industry-education cooperation of your enterprise/institution mainly remain? (Optional: short-term internships, joint courses, order cultivation, joint workshops, no cooperation)". For digital skills mastery, the prevalence of digital design software (e.g. CLO 3D) in teaching and the degree of student mastery is assessed.

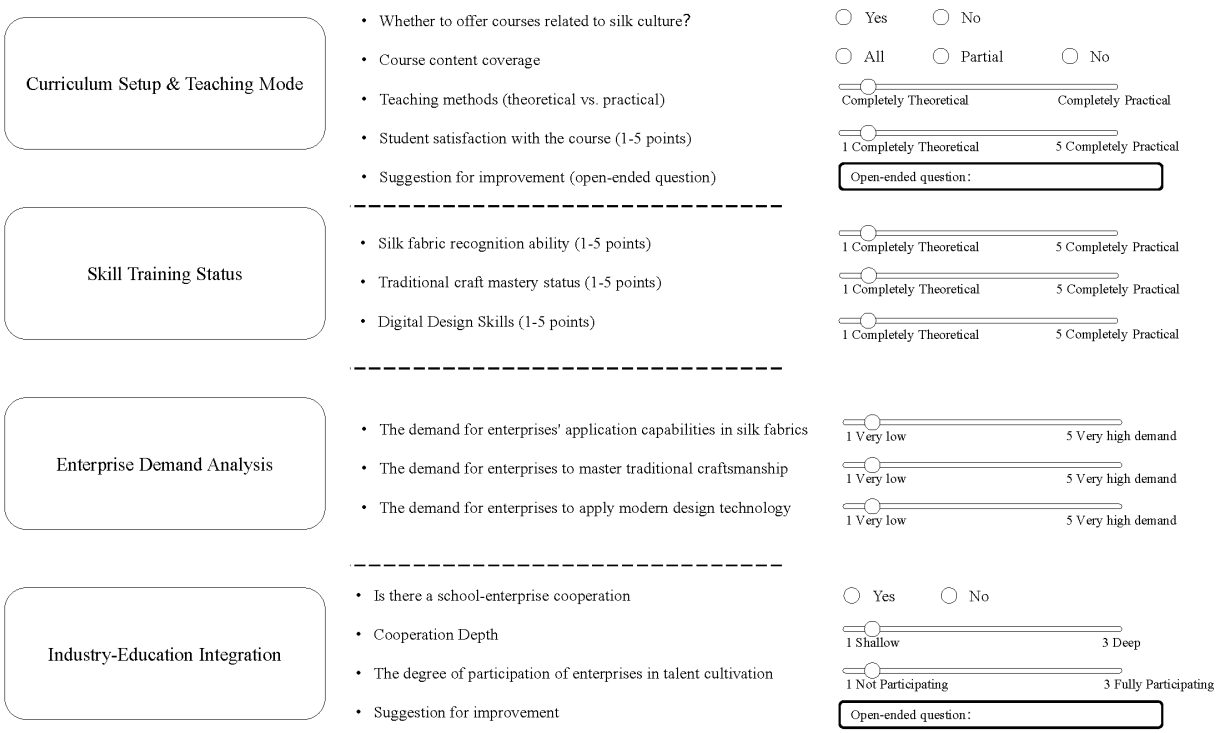

Figure 2. Schematic diagram of the questionnaire structure

Figure 2 illustrates the structure of a questionnaire designed to assess and collect information on silk culture education, skills training, enterprise needs, and the integration of industry and education [28]. Through a series of multiple-choice and open-ended questions, the questionnaire aims to gain insights into the current status of silk culture education, the effectiveness of skills training, the actual needs of enterprises, and the degree of integration between industry and education, to provide a basis for improving the education curriculum, upgrading the quality of training, meeting the needs of enterprises, and strengthening the cooperation between industry and education. The questionnaire data were analyzed using SPSS 26.0 statistical software. First, the reliability of the questionnaire was tested, and the overall Cronbach's Alpha (Cronbach's coefficient) was 0.87, indicating that the questionnaire had good internal consistency. Second, descriptive statistical analysis (frequency, mean, standard deviation) was performed to present the basic picture of the sample and the overall distribution of the variables. Finally, inferential statistics such as independent samples t-test and one-way analysis of variance (ANOVA) were used to test whether there were significant differences in the perceptions of different groups (e.g., faculty vs. students, different types of institutions) on the key issues to enhance the objectivity of the findings.

Expert interviews

To further deepen the understanding of the application of silk culture in the vocational education of apparel design and the optimization direction of the talent cultivation path, this study invites several industry experts to conduct interviews. The interviewees were selected by the purposive sampling method, and the criteria were that they had more than 8 years of work experience in the relevant fields and had a certain degree of industry influence or academic reputation. A total of 10 experts were invited for the interviews, and their specific backgrounds are as follows:

(1) Experts from vocational colleges (4 persons): the professional leader from Suzhou A Vocational and Technical College (focusing on silk craft and design), the deputy dean of the School of Clothing of Zhejiang B Vocational and Technical College, and the backbone teachers from two other provincial demonstration higher vocational colleges. They had an in-depth understanding of the curriculum, teaching dilemmas, and reform directions.

(2) Corporate experts (4 persons): including the design director of City C Silk Culture Co., Ltd, the manager of the R&D department of the Fabric of D famous listed women's clothing brand, and the founders of two independent designer brands. They can provide employment needs and skill requirements from the front line of the industry.

(3) Experts from industry associations or research institutes (2 persons): Researchers from the China Silk Association and the Suzhou Silk Museum, able to provide insights from the perspective of macro industry trends and cultural heritage.

The interviews were conducted in a combination of online (Tencent Conference) or offline mode, and each interview lasted about 60-90 minutes. The interviews were semi-structured and centred on the following themes: what are the core issues in the training of silk garment design talents in vocational institutions at present? Can the existing curriculum system meet the needs of the industry? What adjustments are needed? What is the best practice of industry-education integration? What are the main difficulties at present? How does digital technology contribute to silk clothing design? How can vocational education adapt to this trend? The transcripts produced during the interviews were analyzed using NVivo 12 software for Thematic Analysis. The analysis process included three steps: open coding, axial coding, and selective coding, and finally extracted "fragmentation of curriculum content", "disconnection between practical skills and industry", "formalization of enterprise participation" and "digitalization of education". The core themes of "fragmentation of course content", "disconnect between practical skills and industry", "formalization of enterprise engagement" and "lag in digital teaching and learning" were finally extracted to provide in-depth qualitative evidence to support the findings of the study.

Case studies

To further validate the findings, several typical cases were selected for in-depth analysis in this study, including the curriculum models of excellent vocational colleges and universities at home and abroad, and the successful experiences of enterprises' participation in vocational education. The case analysis focuses on:

The silk culture curriculum system of a well-known vocational college in China, this study analyzes its curriculum system in depth by analyzing the Talent Cultivation Program for Dyeing and Weaving Art and Design Majors (Version 2023), the course syllabus, and the student's graduation design works published on its official website. As shown in Figure 3, demonstrates a comprehensive silk design and craft education system, which is divided into five parts. The basic courses include design principles and methods, textile material science, culture and art fundamentals, and silk history and culture, providing students with a solid theoretical foundation [29]. Specialized courses cover silk fabric application and design, traditional silk craftsmanship, modern fashion design technology, and digital design and silk, helping students gain in-depth professional knowledge [30]. Practical courses enhance students' practical skills and industry adaptability through silk craft training, design project practice, industry cooperation practice, and digital design practice. The integrated project and innovation component encourages students to participate in silk culture innovation and design, school-enterprise cooperation projects, and project-based learning to cultivate innovative thinking and the ability to solve practical problems. Course assessment comprehensively examines students' learning outcomes and comprehensive abilities through theoretical examinations, practical assessments, and project reports.

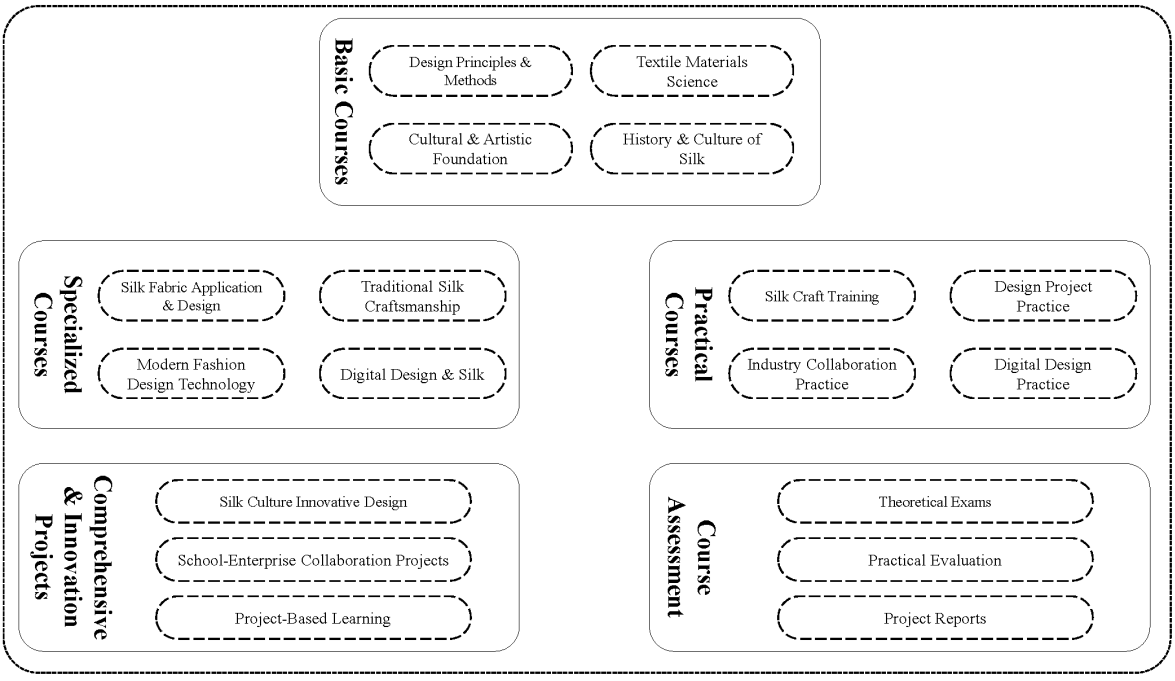

Figure 3. Schematic diagram of the course structure

A case study of an internationally renowned fashion school: London College of Fashion (LCF). By analyzing the course module and project introduction of "BA (Hons) Textile Design" on its official website, we focus on how it integrates traditional handicrafts with sustainable materials and digital fabrication in an interdisciplinary way, providing an international vision for domestic vocational education. The course module and program introduction of "BA (Hons) Textile Design" focuses on how it integrates traditional handicrafts with sustainable materials and digital fabrication, providing an international perspective for vocational education in China.

A case of cooperation between silk and garment enterprises involved in vocational education, such as how a leading domestic silk enterprise cooperates with vocational colleges and universities to jointly cultivate high-skilled talents needed by the industry[31]. By reviewing the news reports on the cooperation between the two sides, the annual teaching report of the college, and interviewing the relevant persons in charge of the college, we will analyze how the "factory-in-school" model can realize the seamless connection between the curriculum content and the job requirements through the enterprise's real project-driven teaching and provide a practical model for deepening the integration of industry and education.

RESULTS AND DISCUSSION

This study has obtained rich data and materials through the above systematic method. This part will analyze the research results in detail by combining the survey data, interview quotes, and case evidence. Table 2 shows the descriptive statistical results of the questionnaire survey. From these data, the respondents' satisfaction with the curriculum is high, but the degree of enterprise participation is low, and the satisfaction with the quality of practical teaching is at a medium level.

Table 2. Descriptive statistical results of the questionnaire

Title	Mean	Standard Deviation (Std Dev)	Proportion of Options (%)
Satisfaction with the curriculum	3.85	0.72	Theory-based: 60%, combination of theory and practice: 40%
Degree of business involvement	2.67	0.83	No participation: 35%, participation in course design: 30%, other: 35%
Quality of practical teaching	3.45	0.80	Very satisfied: 20%, satisfied: 50%, fair: 30%

The current situation of the vocational education system of clothing design in the inheritance of silk culture

Curriculum and teaching content

The survey data show that the current vocational education in fashion design is significantly deficient in the systematic nature of silk culture courses. An analysis of the official course plans of the eight vocational colleges and universities studied reveals that only two institutions, including Suzhou A Vocational and Technical College, offer an independent mandatory course titled "Chinese Silk Culture and Design". The remaining 75% (6 institutions) of the institutions only arranged the relevant content sporadically in the courses of Textile Materials or Clothing Craftsmanship, with an average credit hour share of less than 5% of the total curriculum. This leads to a more one-sided understanding of silk among students. A student from a higher vocational college wrote in the open question of the questionnaire, "We only know that silk is very expensive and difficult to take care of, but as for its types, craftsmanship, and cultural significance, the teacher brought it over in one or two lessons, leaving no deep impression at all.". The low proportion of practical teaching is another prominent problem. More than 60% of the students interviewed think that the current curriculum is still dominated by theoretical teaching. In the expert interview, a design director from a silk enterprise in City C pointedly pointed out, "Many of the graduates nowadays are 'on paper'. They can retell the history of silk, but they can't tell the difference between Song brocade and Yun brocade, not to mention hands-on tie-dye or batik [32]. What we need are not narrators, but designers who can get their hands dirty." This confirms what is shown in Table 3, that the proportion of silk-related practical teaching in higher vocational colleges and universities is generally low (15% to 30%), except for institutions with specialized characteristics, which makes it difficult to meet the industry's demand for highly skilled personnel. Table 3 below shows the silk culture courses offered by different institutions.

Table 3. Silk Culture Courses Offered in Different Institutions

Type of institution	Whether or not to open an independent Silk Culture Program	Silk Culture Teaching Content and Integration Modalities	Percentage of practical teaching
undergraduate college	Some institutions offer	Mainly covered in textile material science and history of clothing courses	Higher (more than 30%)
professional school	Offered by a few institutions	Taught sporadically, mainly in apparel craft and fabric application courses	Low (15% to 30%)
technical school	Largely unavailable	Predominantly practical training, but very little silk culture content is covered.	Very low (below 15%)

Type of institution	Whether or not to open an independent Silk Culture Program	Silk Culture Teaching Content and Integration Modalities	Percentage of practical teaching
Independent Silk Colleges	Offer a full range of services.	There is a specialized course on silk culture and craftsmanship, which systematically teaches.	Maximum (40% or more)

Survey data show that there are obvious differences in the opening of silk culture courses in different types of institutions. Colleges and universities, only some colleges and universities open independent silk culture courses; most of the relevant content is still scattered in the textile materials or clothing history courses, and the proportion of practical teaching is relatively high. In higher vocational colleges and universities, only a few schools set up special silk culture courses, most of which are taught sporadically in courses such as clothing technology and fabric application, and the proportion of practical teaching is relatively low [33]. Technical schools almost did not open silk culture courses, although their courses are based on practical training, the content involving silk culture is very limited, and the proportion of practical teaching is the lowest [34]. In contrast, independent silk colleges and universities in this field of teaching are more complete, generally have systematic silk culture and craft courses, and have the highest proportion of practical teaching. Overall, at present, in addition to independent silk colleges and universities, most vocational colleges and universities in the silk culture course curriculum still have a big deficiency, mainly manifested in fragmented course content, the proportion of practical teaching is low, it is difficult to systematically cultivate the students' understanding of the silk craft and the application of the ability.

More than 60% of the teachers and students interviewed believe that the current curriculum system is still based on theoretical teaching, with limited time for practical teaching, especially in traditional silk weaving, dyeing, and garment making, where there is a lack of opportunities for hands-on practice.

Models of Integration of industry and education, and cooperation with enterprises

The survey found that although most vocational colleges and universities have established cooperative relationships with silk and garment enterprises, the mode of cooperation is relatively single and the degree of in-depth integration is low, which is mainly reflected in the fact that the mode of cooperation is mainly based on short-term training, as well as the low degree of enterprise participation in curriculum design [35]. Survey data show that more than 65% of the institutions and enterprises still cooperate with short-term lectures, internships, or joint school-enterprise projects, the lack of long-term skills training, or a curriculum co-construction mode, as shown in Figure 4.

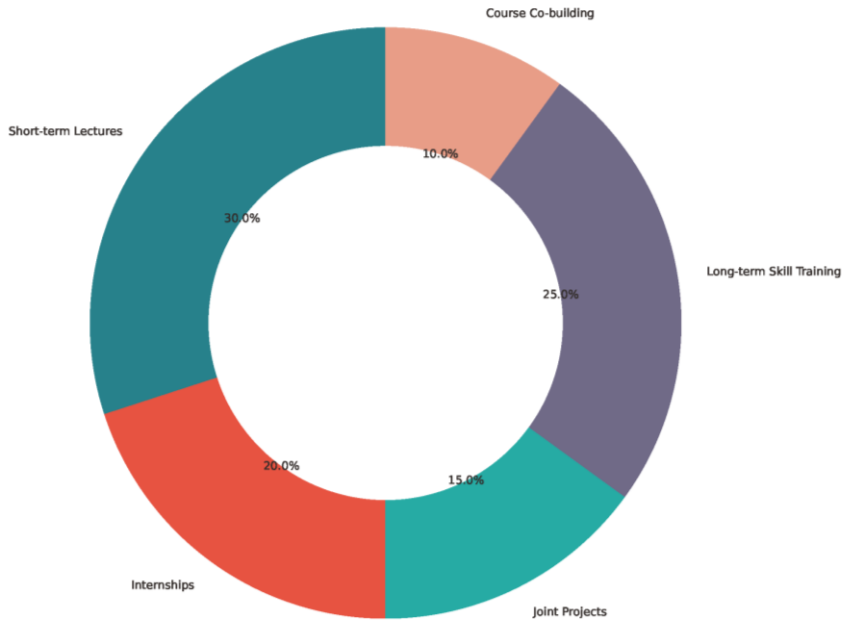

Figure 4. Circle diagram of the proportion of different modes of integration between industry and education

Interview results show that insufficient participation of enterprises in curriculum design is the core problem. The average score of the questionnaire item "the degree of enterprise participation" is only 2.67 (out of 5 points), which is at a low level. A person in charge of an institution who participated in the interview said frankly: "We very much hope that enterprises can participate in-depth, but enterprises also have their business pressures, and it is difficult to send senior designers to systematically participate in the development of the curriculum and lectures, and most of the cooperation stops at organizing a few lectures or accepting a few interns, which is a kind of 'formal' cooperation. ' cooperation." This viewpoint is corroborated by the feedback from the enterprise side. The HR of an enterprise said, "The school's curriculum is updated too slowly, and there is a disconnect between the technology we use and the market we look at. Graduates have to retrain for most of the year when they come."

Application of modern technology in silk clothing design education

With the development of digital technology, there is a growing demand for intelligent design, 3D pattern making, virtual fitting, and other technologies in the apparel industry. However, survey data show that the current vocational education system is lagging in the teaching content of these aspects, the teaching coverage of digital design software is low, and the combination of intelligent manufacturing technology and silk clothing design is insufficient. Only 40% of the institutions have introduced digital apparel design software such as CLO 3D and Optitex into their curriculum, and less than 20% of them have students who are truly proficient in this technology. The results of the

interviews show that although some institutions have introduced intelligent manufacturing-related courses, the teaching content is mostly oriented to theory, with fewer opportunities for practical operation, resulting in students' weak adaptability in the intelligent production chain. Figure 5 is a hierarchical stacked bar chart showing the proportion of traditional craft courses and digital technology courses. 60% of the traditional craft courses and 40% of the digital technology courses. This shows that while traditional craft courses still dominate, the proportion of digital technology courses is also increasing, reflecting the fact that the education sector is actively introducing modern technology while preserving traditional skills.

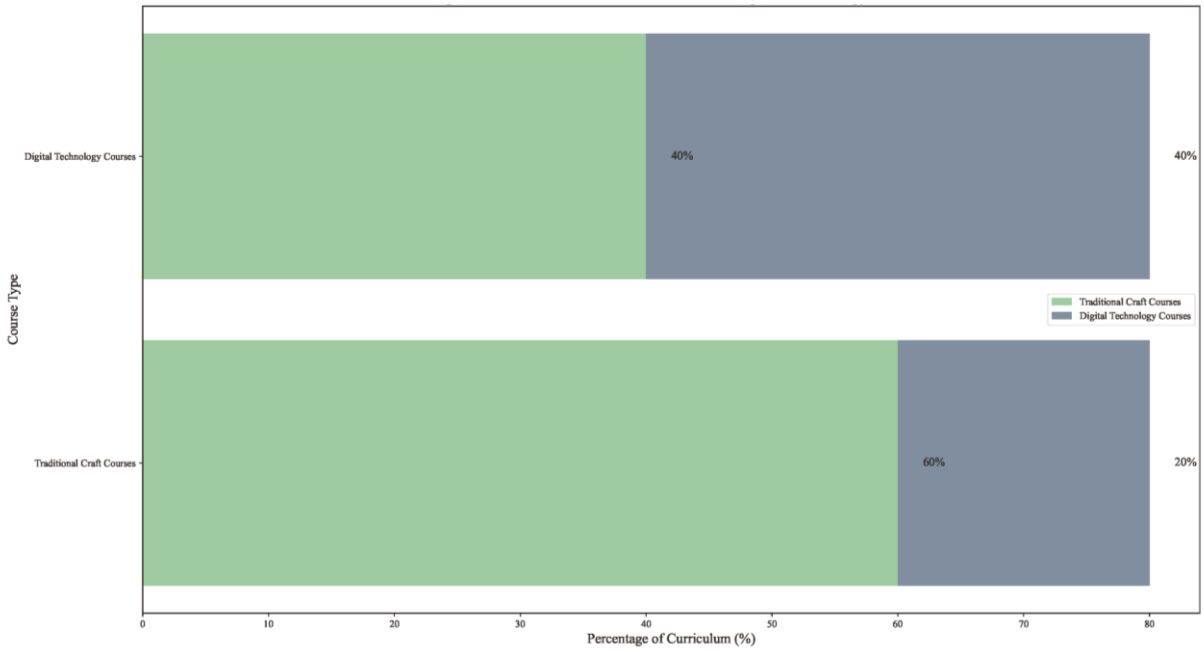

Figure 5. Comparison of traditional craft courses and digital technology courses

Discussion: Optimising pathways in vocational education

Based on the above findings, this study proposes the following optimization paths to enhance the effectiveness of the vocational education system in the cultivation of silk cultural heritage and clothing design skills.

Building a systematic Silk Culture Curriculum system

Given the problem of fragmented content of the current curriculum, it is suggested to set up systematic silk culture course modules in vocational colleges and universities, including theoretical courses covering the history of silk, craftsmanship techniques, material properties, and market applications, so that students can form a complete knowledge of silk culture. Strengthen the practical training of traditional silk crafts, such as Suzhou embroidery, batik, tie-dye, and other techniques, and combine

them with modern clothing design to enhance students' practical skills in crafts[36]. Combine silk culture with cutting-edge concepts such as digital technology and sustainable design to broaden students' design thinking and support interdisciplinary integration.

Deepening the integration of industry and education, and promoting collaborative education between schools and enterprises

To narrow the gap between vocational education and industry needs, it is recommended that a more in-depth mode of industry-teaching integration be adopted, including the following: joint development of curricula, joint formulation of curriculum content by institutions and silk and garment enterprises to ensure that the teaching content follows the development trend of the industry and incorporates real cases in teaching [37]. Establish a long-term cooperation mechanism to guide enterprises to deeply participate in the teaching process, such as sending industry experts to teach, providing real projects as practice course content, etc., to improve students' practical ability. Expand the scale of practical training bases and encourage institutions and enterprises to jointly build silk clothing design training centres so that students can learn in a real production environment and improve their vocational skills. Figure 6 demonstrates the optimization model of industry-education integration, which is divided into four main parts. In terms of establishing a long-term cooperation mechanism, enterprises are encouraged to participate deeply in the teaching process, for example, by sending industry experts to give lectures and providing actual projects as course content. This ensures that students are exposed to cutting-edge industry knowledge and practical experience and are better adapted to the future working environment[38]. In terms of joint course development, we work with silk and garment companies to develop course content in line with industry trends and incorporate real-life case studies into the teaching process. This makes the course content closer to actual needs and improves students' competitiveness in employment. In terms of expanding the scale of training bases, institutions, and enterprises are encouraged to jointly establish silk clothing design training centres, so that students can learn in real production environments and improve their vocational skills. The combination of theoretical knowledge and practical operation enables students to master skills more comprehensively and lay a solid foundation for their future careers[39]. Enhancement of students' practical skills. In terms of enhancing students' practical skills through in-depth integration of industry and education, students get more opportunities to practice and enhance their practical skills. Practice is the only criterion to test the truth, through practical operation, students better understand and master the knowledge they have learned.

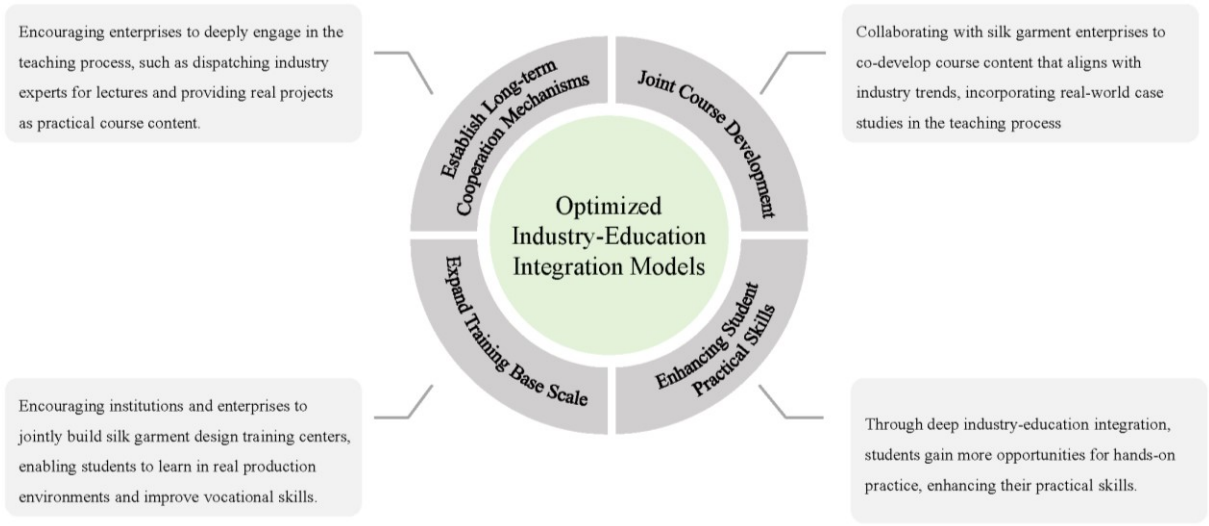

Figure 6. Optimization model of the integration of industry and education

Promoting the integration of digital technologies into vocational education

The following measures are recommended to address the current inadequacy of teaching with digital technology:

Introducing cutting-edge design software: adding CLO 3D, AI clothing design, and virtual reality fitting to the curriculum system so that students can master the application of modern design tools.

Construction of Intelligent Manufacturing Laboratory: Equipped with intelligent textile equipment, so that students can master the basic process of intelligent manufacturing in the process of practical training.

Developing a digital learning platform: building an online learning system to provide learning resources for silk craftsmanship, clothing design, and digital tools, to facilitate students' independent learning and practice [40]. The following Figure 7 shows the flow chart of the optimization path of digital teaching, which starts from "establishing an online learning platform" and gradually advances to "supporting the practical operation and real-life application". The flowchart shows six key steps, each with a specific implementation component, such as integrating learning resources, introducing interactive learning modules, providing real-time feedback and assessment, facilitating student-teacher interaction, and combining virtual training and hands-on practice. The core of this flowchart lies in providing rich learning resources through digital means, emphasizing interactivity and practicability, and enhancing students' learning experience and practical operation. In this way, the teaching and learning process is more flexible and efficient, and better adapted to the needs of modern education.

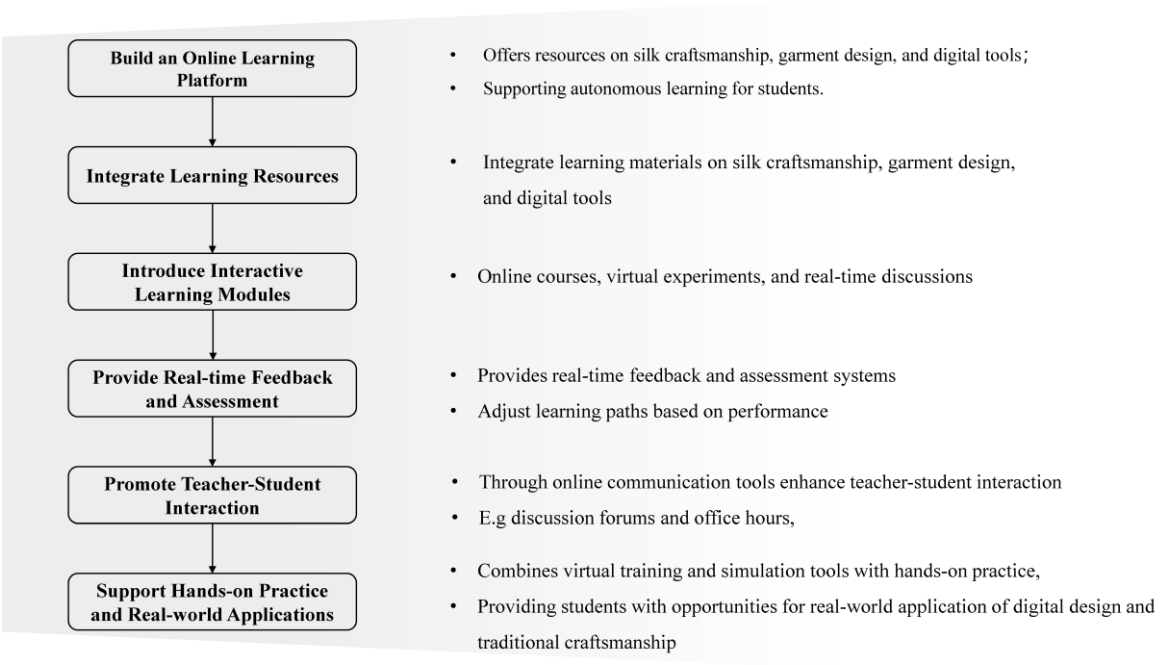

Figure 7. Digital teaching Optimization path

CONCLUSION

Focusing on the integration of Chinese silk culture and garment design vocational education, this study adopts research methods such as literature analysis, questionnaire survey, expert interviews, and case study to systematically explore the status quo, problems, and optimization paths of the current vocational education system in the inheritance of silk culture and the cultivation of garment design skills. The research results show that although China's vocational education system has achieved certain results in the cultivation of clothing design talents, there is still much room for improvement in the curriculum system, practical teaching, integration of industry and education, and application of digital technology. First of all, the existing vocational colleges and universities in the silk culture-related courses are set up due to the lack of systematic, most of the institutions did not open independent silk culture courses, but the relevant content is scattered in other course modules, resulting in students are difficult to form a complete knowledge system. In addition, the practical teaching link is relatively weak, students lack silk weaving, printing and dyeing, and traditional craft practical training, affecting the quality of skills training. Secondly, the mode of integration of industry and education has not yet given full play to its role. Most of the cooperation between vocational colleges and enterprises remains at the level of short-term training or internships, the enterprise's participation in the course content is relatively low, and it is difficult to ensure that the teaching content is highly compatible with the industry's needs. The silk clothing industry is increasingly demanding the skills of talent, especially in the field of digital design and intelligent manufacturing, but the current vocational education system

is relatively lagging in the teaching of related technologies and fails to effectively integrate modern technological means to improve the comprehensive competitiveness of students.

Given the above problems, this study proposes three major optimization paths: first, to build a systematic silk culture curriculum system, strengthen the combination of theory and practice, and improve students' understanding and application of silk crafts and culture; second, to deepen the integration of industry and education, guide enterprises to participate in the training of talents in-depth and promote the construction of curriculum co-construction, the construction of practice bases and the mechanism of long-term cooperation; third, to promote the application of digital technology in vocational education, introduce cutting-edge technologies such as intelligent manufacturing, virtual simulation, and 3D clothing design, and enhance students' modernized design ability.

Although this study analyses the application of silk culture in clothing design vocational education more comprehensively, there are still some limitations. First, the research sample is mainly concentrated in some vocational colleges and garment enterprises, and the scope of investigation needs to be further expanded to improve the universality of the research findings. Second, the study mainly adopts qualitative analysis methods, which can be combined with larger-scale quantitative data analysis in the future to enhance the objectivity and verifiability of the study. In addition, this study focuses on the internal factors of the optimization of the vocational education system, while there is less discussion on the external factors such as policy support and industrial upgrading, and the future study can further expand these aspects to construct a more complete research framework and provide more comprehensive theoretical support for the reform and development of vocational education.

Conflicts of Interest

The author declare no conflict of interest.

REFERENCES

[1] Cao H, Champadaeng S. The Art of Chinese Calligraphy: Educational Protection and Literacy Study of Cultural Heritage. International Journal of Education and Literacy Studies. 2024; 12(3):160–171. https://doi.org/10.7575/aiac.ijels.v.12n.3p.160

[2] Junsawat C, Sangsawang T. Application of eri silk to create awareness of undergraduate students. Turkish Online Journal of Educational Technology. 2023; 22(4):18–27.

[3] Haleem A, Javaid M, Qadri MA, Suman R. Understanding the role of digital technologies in education: a review. Sustainable Oper Comput. 2022; 3:275–285.

[4] Tian X, Wang T. From a word to a world: an innovative teaching at a higher educational institution in China. Journal of Higher Education Theory & Practice. 2024; 24(7). https://doi.org/10.33423/jhetp.v24i7.7128

[5] Qiu J. Research on the construction of a curriculum system of clothing major under the perspective of integrating cultural confidence into the cultivation of innovation ability. Contemp Educ Teach Res. 2023; 4(5):244–249. https://doi.org/10.47852/bonviewCETR232010130510

[6] Hidayat H, Primandari SRP, Ferdian F, Fitria R, Others. The empirical study of factors affecting students' competence in fashion design education in the Industrial Revolution 4.0 era. Int J Instr. 2022; 15(4):259–276.

[7] Kawlra A, Sarkar S. Hybrid creature motifs as cross-cultural transmission along the Silk Roads. Textiles and Clothing Along the Silk Roads: Thematic Collection of the Cultural Exchanges along the Silk Roads. 2022; 1:209.

[8] Hu W, Cao Y. The value of collaborative education in industry-specific colleges and universities of China: tracing the origin, travails and iterations. Adv Appl Sociol. 2023; 13(9):623–635.

[9] Qiu J, Tan S. Cultural inheritance under the concept of sustainable development: Shaping the Xiang Yun yarn green industrial chain. Academic Journal of Humanities & Social Sciences. 2024; 7(2):260–266.

[10] Tomasic Z. Traditional Chinese art and culture in contemporary Chinese fashion. Chinese Fashion Designer. 2023; 3(3):12–44.

[11] Hauser H, Beisswenger C, Partarakis N, Zabulis X, Adami I, Zidianakis E, Patakos A, Patsiouras N, Karuzaki E, Foukarakis M, Others. Multimodal narratives for the presentation of silk heritage in the museum. Heritage. 2022; 5(1):461–487.

[12] Huynh PH. Enabling circular business models in the fashion industry: the role of digital innovation. Int J Product Perform Manag. 2022; 71(3):870–895.

[13] Liang J. Let the excellent Chinese traditional culture pass on from generation to generation in colleges and universities. The Educational Review USA. 2022; 6(12):832–836.

[14] Iliani AI, Nurhadi D, Zahro S, Ching SJ. Entrepreneurship development based on teaching factory in fashion design skill program at vocational high school. Teknologi Dan Kejuruan: Jurnal Teknologi, Kejuruan, Dan Pengajarannya. 2022; 45:168–73.

[15] Wang G. 'A cultured man is not a tool': the impact of Confucian legacies on the standing of vocational education in China. Journal of Vocational Education & Training. 2024; 76(1):179–196. https://doi.org/10.1080/13636820.2021.2024590

[16] Kassah JK, Jnr EB-A, Acquaye R, Bruce-Amartey E, Jnr R. Fashion design training in technical universities and performance of graduates in computer-aided apparel development in Ghana. Am J Art Des. 2022; 7(3):78–82.

[17] Pan S. The Belt and Road initiative will focus on the cultivation of creative and design talents. International Journal of Education and Teaching Research. 2022; 22(12):149.

[18] Wang L. Revitalizing traditions: music, dance, puppetry, art education, and cultural exchange along the maritime silk road between Quanzhou and Bangkok. Arts Educa. 2023; 37(4):27–66.

[19] Chang Y. China beyond China, establishing a digital order with Chinese characteristics: China's growing discursive power and the Digital Silk Road. Polit Policy. 2023; 51(2):283–321. https://doi.org/10.1111/polp.12524

[20] Li Q. Overcoming barriers to industry collaboration in innovation and entrepreneurship education: an analysis of the Chinese context. J Interdiscip Insights. 2024; 2(2):9–19.

[21] Li X. Education for International Understanding and Design Literacy: Design Literacy in the Context of the Belt and Road Initiative. FormAkademisk. 2023; 16(5).

[22] Liu K. Promoting the Revitalisation of China's Countryside through Modern Development: The Example of Talent Training. Journal of Humanities and Social Sciences Studies. 2023; 5(4):56–60.

[23] Yang M. Analysis of the four treasures of Xuan Cheng Wenfang and the road to Chinese painting. Highlights in Art and Design. 2023; 3(2):88–93.

[24] Chen J, Luo S, Wu N, Chen Z, Yang H, Zhang Y. A cite space-based comparative analysis of China and international embroidery research hotspots and frontiers (2010-2022). Reviews Of Adhesion And Adhesives. 2023; 11(2).

[25] Yang S. Design and aesthetics of national brand clothing. Arts Stud Crit. 2021; 2(2). https://doi.org/10.32629/asc.v2i2.325

[26] Li Z, Xie L. A Probe into the Mutual Enhancement between Tertiary Education of Art and Intangible Cultural Heritage in China: A Case Study of Xiamen Bead Embroidery Course by Xiamen Academy of Arts and Design, Fuzhou University. Sustainability. 2023; 15(8):6469.

[27] Yan W-J, Chiou S-C. The safeguarding of intangible cultural heritage from the perspective of civic participation: the informal education of Chinese embroidery handicrafts. Sustainability. 2021; 13(9):4958.

[28] Zhang W, Walker S, Evans M, Bennett J. Inheritors of the Yellow River: The relationship of heritage-making practices to cultural self-confidence in China. Int j anthropol ethnol. 2021; 5(1):4. https://doi.org/10.1186/s41257-021-00045-6

[29] Ge (Rochelle) Y, Ho KC. Belt and Road Initiatives: implications for China's internationalization of tertiary-level education. Educational Research and Evaluation. 2022; 27(3–4):260–279. https://doi.org/10.1080/13803611.2022.2041858

[30] Papahristou E, Tatsi NZ. A review of 3D design knowledge and its impact on creativity in fashion design education. Commun Dev Assem Text Prod. 2024; 5(2):266–277.

[31] Zong C. The internationalization of China's vocational education: value implications, practices, and planning. Vocat Technol Educ. 2024; 1(3):33–56.

[32] He M, Mei M, Zhang H. Evolutionary stages and paths of innovation networks in industrial clusters: A case study of Nanchong silk-spinning garment industry cluster (SSGIC). J Knowl Econ. 2024; 15(1):1703–1735. https://doi.org/10.1007/s13132-023-01219-7

[33] Lin X. Internationalizing the fashion design curriculum: an evolving perspective. The International Journal of Design Education. 2021; 16(1):127.

[34] Liu Y. Application of digital technology in intangible cultural heritage protection. Mobile Information Systems. 2022; 2022(1):7471121.

[35] Liu H, Fu C, Li W. Silk Road heritage: the artistic representation of port trading culture in the images of characters in Qing dynasty Guangzhou export paintings. PLoS One. 2024; 19(10):e0308309.

[36] Huan X, Yu P, Zhang Z, Jia X. The silk road: Boosting the textile industry in the Tang dynasty. Psychology. 2022; 12(9):744–747.

[37] Li Q. Strategies for integrating industry collaboration into innovation and entrepreneurship education curricula in China. J Interdiscip Insights. 2024; 2(2):19–32.

[38] Liu Q, Sirisuk M. Dong brocade in Hunan, China: Literacy and re-invention of tradition in the perspective of intangible cultural heritage protection. International Journal of Education and Literacy Studies. 2024; 12(3):65–73. https://doi.org/10.7575/aiac.ijels.v.12n.3p.65

[39] Szadziewski H, Mostafanezhad M, Murton G. Territorialization on tour: The tourist gaze along the Silk Road economic belt in Kashgar, China. Geoforum. 2022; 128:135–147.

[40] Alenezi M, Wardat S, Akour M. The need of integrating digital education in higher education: challenges and opportunities. Sustainability. 2023; 15(6):4782.