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# An Exploration of the Role of AIGC Based on Jiangsu Cultural IP in the Development of Vocational Education Models

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**Abstract**

With the explosive growth of Artificial Intelligence Generated Content (AIGC) technology, vocational education stands at a pivotal juncture for digital transformation. As a province rich in cultural heritage, Jiangsu possesses abundant tangible and intangible cultural assets (cultural IP). This paper explores pathways and impacts for deeply integrating Jiangsu's cultural IP with AIGC technology within vocational education models. By analysing AIGC's applications in restructuring teaching resources, supporting personalised learning, and fostering innovation in industry-education integration, this paper demonstrates that AIGC not only enhances the efficiency of cultural transmission but also propels vocational education towards a paradigm shift from ‘skills impartation’ to ‘intelligent co-creation’. The research concludes that establishing a synergistic ecosystem integrating ‘culture, technology, and education’ represents a vital pathway for achieving high-quality development in Jiangsu's vocational education sector.

**Keywords:** AIGC, Jiangsu cultural IP, vocational education, teaching model, industry-education integration, digital transformation

## 1. Introduction

### *1.1 Introduce the Problem*

The national strategy for educational digitalisation is currently being implemented in depth.

As an innovative approach to content production, AIGC (Artificial Intelligence Generated Content) is reshaping the educational ecosystem through its efficient generation capabilities and cross-modal comprehension. Concurrently, Jiangsu Province is dedicated to building a 'strong socialist cultural province'. Its distinctive regional cultural IPs—including canal culture, Wu-style elegance and Han dynasty traditions, Suzhou embroidery, and Kunqu opera—urgently require revitalisation and preservation through new technological means.

Vocational education, being the educational model most closely integrated with industry, bears the dual mission of cultivating high-calibre technical and skilled personnel while perpetuating the spirit of craftsmanship. However, traditional vocational education often encounters challenges in cultural curricula, including static teaching resources, high creative barriers, and low market conversion rates. How to leverage AIGC technology to empower Jiangsu's cultural IP and integrate it into vocational education has become an urgent issue requiring resolution.

When discussing the necessity of AIGC intervention, relevant data should be cited to substantiate the scale of Jiangsu's cultural industry and its talent gap.

*Scale of Jiangsu's Cultural Industry*:

According to data from the Jiangsu Provincial Bureau of Statistics, the added value of Jiangsu's cultural industry accounted for over 5% of GDP in 2023, establishing it as a pillar industry of the national economy. However, traditional craft sectors face severe ageing among practitioners. Research indicates that the average age of workers in industries such as Suzhou embroidery and purple clay pottery exceeds 45 years, urgently requiring infusion of younger, digitally proficient talent.

*AIGC Market Potential*:

The iResearch Consulting Group's 2023 China AIGC Industry Panorama Report projects that China's core AIGC market will exceed RMB 270 billion by 2028.

Within vocational education, over 80 higher vocational institutions in Jiangsu offer programmes in 'Digital Media' and 'Art Design', catering to a substantial student population.

*Employment Market Feedback*:

China's Zhilian Zhaopin released the 'Report on the Impact of AI Large Models on the Employment Market,' revealing that design professionals proficient in AIGC tools (such as Midjourney and Stable Diffusion) command average salaries 20%-30% higher than their non-proficient counterparts. This directly demonstrates the practical significance of integrating AIGC instruction into vocational education for enhancing students' employability..

*1.2 Research Significance*

*Theoretical Significance*: This research enriches the theoretical framework of 'AI-enhanced vocational education,' particularly by introducing regional cultural IP as a specific variable within educational technology studies. It expands the applicability of constructivist and situated learning theories in the era of artificial intelligence.

*Practical Significance*: It provides vocational colleges in Jiangsu and other regions with actionable digital teaching reform solutions. This approach helps address the generational gap in intangible cultural heritage (ICH) practitioners and enhances vocational institutions' capacity to support regional cultural industry development.

## 2. Method

This study employs literature review, case analysis and interdisciplinary research methodologies, integrating theories from educational technology, cultural industry management and vocational technical education to conduct an in-depth analysis of the application logic of AIGC within vocational education.

### *2.1 The Essence and Characteristics of Jiangsu Cultural IP*

Jiangsu cultural IP refers to cultural symbols within the Jiangsu region that possess high recognisability, profound historical significance, and commercial development potential. For example, as shown in Table 1.

Table 1. The essence and characteristics of Jiangsu Cultural IP

| No. | Tangible Cultural Heritage | Intangible Cultural Heritage | Characteristics |
|---|---|---|---|
| 1 | Suzhou Gardens | Suzhou embroidery | Aesthetic distinctiveness |
| 2 | Ming Xiaoling Mausoleum | Nanjing Cloud Brocade | Technical complexity |
| 3 | Grand Canal | Huaiyang Cuisine Cooking Techniques | Narrative richness |
| 4 | Confucius Temple | Kunqu opera | |

Aesthetic distinctiveness, technical complexity, narrative richness. Within vocational education, these intellectual properties serve both as teaching content and practical training vehicles.

### *2.2 The Application Logic of AIGC Technology in the Education Sector*

AIGC refers to the use of artificial intelligence technology to automatically generate content, encompassing text (ChatGPT), images (Midjourney, Stable Diffusion), audio, and video (Sora). Within the educational sphere, its core logic lies in human-machine collaboration.

*Knowledge mapping*: Transforming implicit cultural knowledge into explicit data.

*Creative Scaling*: Lowering the technical barriers to design and creation, enabling students to focus on conceptualising ideas.

*2.3 Theoretical Foundation*

*Situated Learning Theory* (SLT): Emphasises that knowledge is constructed within specific contexts. AIGC can rapidly generate authentic cultural and historical settings (such as reconstructing Suzhou's streetscapes during the Ming and Qing dynasties), providing students with immersive learning environments.

*Cognitive Apprenticeship*: AI functions as a scaffolding and virtual tutor, offering immediate feedback and demonstrations as students master complex skills (such as embroidery colour coordination or garden layout design).

*2.4 The Technical Logic of AIGC Empowering Cultural IP*

The prevailing architecture for AIGC in visual content generation currently relies on latent diffusion models (LDMs), with Stable Diffusion being the most representative example. Compared to traditional generative adversarial networks (GANs), LDMs demonstrate greater diversity and high fidelity when processing objects embodying Jiangsu cultural IP—featuring highly intricate textures (such as cloud brocade and Suzhou embroidery) and specific aesthetic concepts (such as garden landscapes).

$$x_{t-1} = \frac{1}{\sqrt{\alpha_t}}\left(x_t - \frac{1-\alpha_t}{\sqrt{1-\bar{\alpha}_t}}\epsilon_\theta(x_t, t)\right) + x_{t-1} = \frac{1}{\sqrt{\alpha_t}}\left(x_t - \frac{1-\alpha_t}{\sqrt{1-\bar{\alpha}_t}}\epsilon_\theta(x_t, t)\right) + \sigma_t z$$

Its core mathematical principles encompass a forward diffusion process and a reverse denoising process. During the forward process, the system introduces Gaussian noise onto authentic cultural imagery; in the reverse process, the neural network learns to reconstruct images bearing specific semantic content from this noise.

Here, \epsilon_\theta represents the noise predicted by the neural network. In vocational education contexts, students need not master complex mathematical derivations, but must comprehend how prompts are mapped to latent spaces via the CLIP model, thereby guiding the denoising process to generate images consistent with the styles of ‘Jiangnan water towns’ or the ‘Jinling School of Painting’.

Foundation models, whilst possessing strong generalisation capabilities, often lack precise understanding of Jiangsu's specific regional culture. For instance, gardens generated by such models frequently exhibit characteristics of Japanese gardens or northern imperial gardens, struggling to reproduce the intricate structure of Suzhou gardens, renowned for their ‘shifting vistas and miniature worlds within reach’.

LoRA (Low-Rank Adaptation) technology provides a low-cost solution for this purpose. LoRA fine-tunes the model by adding two low-rank matrices alongside the weight matrix of the pre-trained model. Its weight update formula is:

$$W' = W + \Delta W = W + BA$$

Here, W denotes the pre-trained weights, while B and A represent low-rank matrices.

For vocational institutions, this signifies that retraining large models requires no costly computational resources. Instructors may organise students to gather 50–100 high-quality images of 'Yixing purple clay teapots' or 'Taohuawu woodblock New Year prints' to train a LoRA fine-tuning package of several dozen megabytes. Upon loading this LoRA, the AI acquires domain-specific cultural aesthetic sensibilities, enabling stable generation of images bearing Jiangsu intangible cultural heritage characteristics. This resolves the critical challenge in cultural transmission where 'form resembles but spirit does not'.

In digital design for intangible cultural heritage, straightforward text-to-image generation often struggles to control specific compositions and forms. For instance, when designing a cultural product based on 'Ming-style furniture,' AI might produce bizarre shapes violating mortise-and-tenon principles or ergonomic principles.

ControlNet technology resolves this issue by introducing additional conditional control pathways. In teaching practice, students can apply the following control modes:

*Canny Edge Detection*: Students sketch a simple line drawing of a purple clay teapot. The Canny processor locks the contours, ensuring the AI renders materials and lighting only within these boundaries, thus guaranteeing the vessel's form adheres to traditional teapot-making standards.

*OpenPose Pose Control*: In Kunqu opera instruction, skeletal keypoints extracted from master performers' videos guide AI-generated virtual characters to execute standardised 'orchid fingers' or 'postures,' enabling precise replication and stylised reinterpretation of theatrical movements.

*Depth Map*: Employed in Suzhou garden landscape design, this controls spatial depth relationships within generated scenes, ensuring the perspective logic of rockeries, pavilions, and water surfaces adheres to physical realism.

## 3. Analysis of Pain Points and Results in Cultural IP Instruction within Traditional Vocational Education

Current teaching materials predominantly rely on text and images, falling short in presenting dynamic and intricate content such as the evolution of Kunqu opera vocal styles or the needlework techniques of Suzhou embroidery. Students struggle to truly grasp the essence of Jiangsu culture through such static media.

### *3.1 High Barriers to Entry in Creation and Design Coupled with Insufficient Innovation Drive*

Within art design, cultural creativity and related disciplines, students are often constrained by their hand-drawing skills or proficiency in software, making it difficult to translate their creative ideas into high-quality finished products. For instance, designing a cultural and creative product incorporating Nanjing Cloud Brocade patterns involves a traditional process

that is extremely time-consuming and carries high trial-and-error costs.

*3.2 Disconnect between Industry and Education Coupled with Low Conversion Rate of Cultural Achievements*

Student projects at vocational colleges often remain confined within campus boundaries, struggling to align with market demands. The lack of rapid prototyping and market testing capabilities has resulted in numerous student creative concepts based on Jiangsu cultural IPs being stillborn.

## 4. The Mechanism of AIGC in Jiangsu's Cultural IP Vocational Education

*4.1 Content Restructuring*

AIGC technology can significantly reduce the production costs of high-quality teaching resources.

*Multimodal conversion*: Utilising AI to transform textual descriptions of scenes from Dream of the Red Chamber into high-definition concept art; generating 3D texture maps from flat Suzhou embroidery patterns via AI.

*Case Study*: In a Digital Media Arts course at a vocational college in Nanjing, lecturers employed Midjourney to generate hundreds of distinct stylistic designs for the Qinhuai Lantern Festival. This created an extensive visual resource library for students to deconstruct and analyse.

*4.2 Model Innovation*

AIGC has transformed the pedagogical paradigm in vocational education.

*Assisted Design and Inspiration*: Students input prompts such as ‘Suzhou gardens, cyberpunk style’, and AI instantly generates multiple sketches. Students are no longer mere draughtsmen, but have become ‘prompt engineers’ and ‘aesthetic gatekeepers’.

*Personalised Learning Pathways*: AI tutors (Agents) can adapt to students' progress, using large language models to explain historical anecdotes about purple clay teapots or provide aesthetically grounded revision suggestions for design projects.

*4.3 Skill Transmission*

For intangible cultural heritage skills, AIGC can assist teaching by integrating motion capture and computer vision technologies.

*Virtual simulation*: Whilst AIGC primarily focuses on generation, when combined with virtual reality (VR), it can produce dynamic “virtual masters”. For instance, by learning from extensive performance videos of renowned Kunqu masters, AI can generate standardised demonstration videos of movements. It can even recreate performances by deceased masters, enabling opera students to emulate their artistry.

*4.4 Industry-Education Integration*

AIGC has significantly shortened the journey from "concept" to "product".

*Rapid prototyping*: Fashion design students utilise AI to swiftly incorporate "blue-printed cloth" elements into contemporary garment patterns, generating e-commerce-grade mannequin visuals.

*Market validation*: Students employ AIGC-generated visualisations of cultural and creative products to swiftly gauge market response on social media or crowdfunding platforms, enabling pre-production sales. Data feedback then refines teaching priorities.

## 5. Establishing an AIGC Vocational Education Ecosystem Based on Jiangsu Cultural IP

*5.1 Establish a Dedicated AIGC Model Repository for Jiangsu Cultural IPs*

Vocational institutions should collaborate with technology enterprises to train specialised LoRA (Low-Rank Adaptation) models for vertical domains.

*Specific measures*: Collect publicly available digital resources from the Jiangsu Provincial Museum and Nanjing Brocade Museum to train AI models specifically designed to generate 'brocade patterns,' 'Han dynasty painted brick styles,' and 'Jinling School painting styles.' This approach not only avoids the homogenisation inherent in general-purpose models but also safeguards the authenticity of cultural heritage.

*5.2 Developing the 'Prompt Engineering' Initiative and Integrating Cultural Literacy Courses*

Within the vocational education curriculum framework, interdisciplinary courses have been introduced. As shown in Table 2.

Table 2. Interdisciplinary timetable

| No. | Course Offerings | Objective |
|---|---|---|
| 1 | The Cultural History and Aesthetics of Jiangsu | Familiar with the cultural essence of Jiangsu |
| 2 | Fundamentals of AIGC Tool Applications | Familiar with AI conversational language |
| 3 | Prompt Logic Training | Familiar with the logic of AI prompts |
| 4 | Creative Writing | Cultivate versatile technical and skilled personnel |

*Overall Objective*: To cultivate versatile technical professionals who possess both a deep understanding of Jiangsu's cultural heritage and proficiency in AI interaction languages.

*5.3 Establishing a Collaborative Innovation Platform Linking Universities, Enterprises and Artificial Intelligence*

*Operating Model*: Enterprises publish genuine Jiangsu cultural IP development requirements (e.g., IP character design for a tourist attraction). The university introduces AIGC tools, with students forming project teams to undertake assignments. AI handles bulk draft generation, students undertake selection, refinement and final production, while enterprises manage commercialisation.

*5.4 From "Needlework Simulation" to "Pattern Generation": A Revolution in Graphic Design*

Jiangsu Suzhou embroidery is renowned for its 'precision, delicacy, elegance and purity'. However, within traditional vocational education programmes for clothing and textiles, students often struggle with intricate pattern drafting, hindering rapid design output.

*Data context*: According to the Jiangsu Provincial Arts and Crafts Industry Association, traditional Suzhou embroidery designs take an average of 3-5 days from conception to finalisation, with extremely high revision costs.

*Pattern Innovation*: Utilising Midjourney's --tile (seamless tiling) parameter, students can rapidly generate extensive pattern materials blending modern aesthetics (e.g., abstract geometry, cyberpunk colour palettes) with traditional Suzhou embroidery techniques (e.g., flat embroidery, random-stitch texture).

*Simulation Preview*:Combining Stable Diffusion's Img2Img functionality, generated patterns are instantly overlaid onto product models like cheongsams or handkerchiefs for rapid visual validation.

*Educational Outcomes*:This approach reduces design cycles to hours, enabling students to undergo dozens of iterations during practical sessions. This prioritises cultivating their mastery of colour, composition, and cultural symbolism over mere drafting skills.

*5.5 Multimodal AI-generated Content Creates Immersive Stage Design and Virtual Performances*

Kunqu opera, revered as the progenitor of all theatrical arts, faces the challenge of its aesthetic language being inaccessible to younger students, rendering its legacy difficult to perpetuate.

*AIGC Application Strategy*:

*Reconstructing Stage Artistry Ambience*: Traditional stage design training proves costly and time-consuming to construct. Utilising AIGC, students can input prompts based on lyrics from The Peony Pavilion: The Dream in the Garden to generate dynamic stage backdrops in ink-wash or meticulous brushwork styles (employing Runway or Sora to create looping

short-video backgrounds), fostering an immersive atmosphere.

*Digital Human Performance*: Employ audio-driven facial animation technologies (e.g., SadTalker) to animate static Kunqu character portraits, enabling them to 'sing'. In opera performance programmes, AI analyses discrepancies between student movements and master standards (via pose estimation), generating visualised comparison reports to assist physical training instruction.

*Script Adaptation and Popularisation*: Employ large language models like ChatGPT or Wenxin Yiyan to translate obscure classical Kunqu lyrics into accessible modern narrative scripts for short videos. Students then produce these as educational content on Douyin/Bilibili, advancing the digital dissemination of Kunqu culture.

*5.6 Exploring Vessel Form in Zisha Teapots through 3D Modelling and Parametric Design*

Yixing purple clay pottery stands as Jiangsu's distinctive artisanal calling card, its essence lying in the beauty of its vessel forms. Traditional pottery instruction relies on hand-building techniques, with lengthy trial-and-error cycles (success or failure only revealed after firing).

*AIGC Application Strategy*:

*Sketch-to-3D Conversion Assistance*: Whilst AI technologies capable of directly generating high-quality 3D models (such as Shap-E) remain under development, the '2D-to-3D' workflow has matured. Students can rapidly generate multi-view diagrams (three-view drawings) of purple clay teapots using AI, then import these as reference templates into 3D modelling software, significantly boosting modelling efficiency.

*Material and Texture Exploration*: Purple clay encompasses diverse types (Zini, Zhuni, Duan ni). Students can train material models for different clays within AI systems, digitally simulating colouration effects at various kiln temperatures prior to firing for virtual trial-and-error testing.

*Industry-Education Integration Data*: According to the Yixing Ceramics Industry Association report, ceramic enterprises adopting digital design reduce new product development cycles by an average of 40%. Vocational colleges directly address corporate industrial upgrading needs by teaching this 'AI + 3D' workflow.

**6. Discussion**

*Ambiguous copyright ownership*:

(1) Do AI-generated Suzhou embroidery patterns infringe upon the original creator's copyright?

(2) How should copyright for student works be defined?

*Risk of cultural misinterpretation*: General-purpose large models may harbour stereotypes or misconceptions about Jiangsu's regional culture (such as confusing Suzhou-style gardens with northern Chinese gardens), resulting in culturally incongruous outputs.

*Technical ethics and dependency*: Students may become overly reliant on AI generation, leading to a decline in fundamental design abilities and craftsmanship skills.

*Establishing compliance mechanisms*: Vocational institutions should formulate ethical guidelines for AIGC usage, clarify the legitimacy of source materials, and include AI-generated identifiers in works.

*Human-Centred Core Principle*: Emphasise 'human-machine collaboration' rather than 'machine substitution'. In assessments, increase the weighting for evaluating creative concepts and cultural research processes, rather than solely judging final output.

*Cultural Data Governance*: Led by education authorities, establish a high-quality Jiangsu cultural annotation dataset to correct AI cultural biases through fine-tuning models.

## 7. Conclusion

The integration of AIGC technology presents unprecedented opportunities for the preservation and advancement of Jiangsu's cultural IP within vocational education. It serves not merely as an efficiency tool, but as a cognitive enabler. Through AIGC, vocational education can transcend the constraints of traditional resources to deliver personalised, immersive teaching. By fostering human-machine co-creation, ancient Jiangsu culture can enter the marketplace in a more youthful, contemporary form.

However, technology remains a means rather than an end. In advancing AIGC applications, we must steadfastly uphold the educational essence of vocational training and maintain cultural confidence. Moving forward, Jiangsu's vocational education should strive to cultivate 'digital artisans' who master AI tools while deeply understanding the essence of Jiangsu's cultural heritage, thereby breathing new life into Jiangsu's cultural IP in the digital age.

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## Appendix A

Table A1. The Essence and Characteristics of Jiangsu Cultural IP

| No. | Tangible Cultural Heritage | Intangible Cultural Heritage | Characteristics |
|---|---|---|---|
| 1 | Suzhou Gardens | Suzhou embroidery | Aesthetic distinctiveness |
| 2 | Ming Xiaoling Mausoleum | Nanjing Cloud Brocade | Technical complexity |
| 3 | Grand Canal | Huaiyang Cuisine Cooking Techniques | Narrative richness |
| 4 | Confucius Temple | Kunqu opera | |

Table A2. Interdisciplinary Timetable

| No. | Course Offerings | Objective |
|---|---|---|
| 1 | The Cultural History and Aesthetics of Jiangsu | Familiar with the cultural essence of Jiangsu |
| 2 | Fundamentals of AIGC Tool | Familiar with AI conversational |

| | | |
|---|---|---|
| | Applications | language |
| 3 | Prompt Logic Training | Familiar with the logic of AI prompts |
| 4 | Creative Writing | Cultivate versatile technical and skilled personnel |

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Data sharing statement

No additional data are available.

## Open access



## Copyrights