Occupation and Professional Education Vol. 3 No. 7, 2026

From "Manual Experience" to "Design Thinking": A Practical Study on AI-Assisted Intangible Cultural Heritage Creative Projects in Vocational Aesthetic and Labor Education

Jie Yang*
Guangzhou Urban Construction Vocational School, Guangzhou, Guangdong, China
**Corresponding Author*

Abstract: Vocational aesthetic and labor education courses tend to be lower order "manual experience", and students do not develop higher order "design thinking". In this paper, we explored how generative AI assisted technologies can propel project-based teaching of intangible cultural heritage (ICH) creative products from mechanical manual operations to creative design thinking. Based on perceptual assessment and data mining techniques from art heritage conservation, we used mixed methods design to conduct a mixed-methods study on 125 vocational students engaged in project-based learning. We collected students emotional perception data via semantic differential scales and used co-occurrence network analysis to extract core themes from their design reflection logs. We show that AI assistance helped to lower technical barriers, allowing students to focus on creative ideation and cultural expression. Students' perceptions of "thinking shift" (M=3.51), "cultural identity" (M=3.91) and "labor value" (M=3.74) were above the median. Text mining revealed core clustering themes of "human-machine collaboration", "design thinking" and "cultural reconstruction" In this paper, we construct a new model of vocational aesthetic and labor education based on "AI empowerment and design thinking orientation" supporting the creative transformation of ICH and digital transformation of vocational education.

Keywords: Design Thinking; AI-Assisted Design; Vocational Education; Aesthetic and Labor Education Courses; Intangible Cultural Heritage Creative Products; Perceptual Assessment; Text Mining

1. Introduction

In modern vocational education systems, technical and skilled talents with innovative abilities and comprehensive literacy are the goal [1]. The integration of aesthetic education and labor education is considered to be the key step to achieve this goal. But when teaching aesthetic and labor courses for intangible cultural heritage (ICH), current vocational schools often have to "value skills over principles", since they teach mostly passive imitation and mechanical experience of traditional handicrafts. Students know "how", but not "why", but lack proactive "design thinking" (Design Thinking) and cultural creation capabilities [2]. This low order "manual experience" is not stimulating students deep learning motivation and cannot meet modern creative industry's demand for innovative talents.

With the rapid development of AIGC technologies, art and design education has a chance for paradigm shift [3]. AI painting tools (Doubao, Dreamina, etc.) can rapidly produce high quality visual images based on natural language prompts and can significantly lower skill level for artistic expression. This technology can make vocational aesthetic and labor courses possibility: AI aid will help students bridge the gap in hand-drawing skills, focus their cognitive resources on problem discovery, creative ideation, cultural reconstruction, and leap from "manual experience" to higher-order "design thinking" [4].

The "ICH creative project" is used as a carrier. The application path of AI assisted technology in vocational aesthetic and labor courses and the impact of AI assisted technology on design thinking of students. Combining quantitative perception and qualitative text in cultural heritage studies [5], we aim to answer the following questions: How does AI assisted technology change learning experience and thinking patterns of vocational students in ICH creative projects? What impact does this teaching model have on students' cultural

identity and labor values?

Combining aesthetic education, labor education and digital technology presents a new frontier in vocational pedagogy which is warranted systematic study. We contribute to this growing body of information by combining mixed methods research, combining perceptual assessment and text mining to capture both quantifiable results and the cognitive processes of students involved in AI assisted ICH creative projects.

2. Theoretical Foundation and Literature Review

2.1 Connotation and Value of Design Thinking in Vocational Education

Design thinking is a human-centered, goal-oriented innovative problem solving approach consisting of five steps: empathy, definition, ideation, prototyping, and test [6]. Design thinking can lead students to transform from mere tasks executors to problem solvers. Unlike step-by-step manual labor, design thinking labor involves deep integration of mental and physical labor, helping to develop critical thinking and innovative creation abilities [7].

Design thinking also represents a fundamental change of philosophy in vocational education. When students work in ICH creative projects guided by design thinking, they are no longer passive recipients of traditional craft techniques but active participants in cultural innovation. This shift aligns with the mission of vocational education to develop compound talents who possess both technical and creative intelligence. Recent studies have shown that design thinking in vocational settings can significantly improve students' creative self-efficiency and motivation. Combining digital technologies such as AIGC tools, design thinking provides a structured yet flexible framework for learning styles and skill levels.

2.2 Application of AI Assistance in Art Design Education and ICH Revitalization

The use of artificial intelligence in art education is moving from a tool in the background to a “cognitive scaffold" [8]. Studies show that generative AI can stimulate divergent thinking of design novices and provide visual inspiration to accelerate creativity. In the protection and revitalization of ICH, digital and AI technologies are used to extract and reconstruct traditional patterns, colors and shapes. Human-machine collaboration allows ICH elements to break the limitations of old material carriers and be presented in ways that better meet modern aesthetic and practical needs [9]. However, there is no systematic empirical study of how AI technology can organically integrate design thinking and labour values of students in real vocational classrooms.

2.3 Mixed Research Methods of Perceptual Assessment and Data Mining

To scientifically assess teaching effectiveness, single quantitative tests or qualitative interviews often fail. In art and heritage science research, the Semantic Differential Method quantifies the audience's implicit perception of complex cultural symbols or experiences [5]. Text mining techniques based on natural language processing (topic modelling, co-occurrence network analysis) can objectively and intuitively extract the core cognitive schemas and emotional tendency from learners' unstructured reflection texts [10]. We will combine these two methods in a multidimensional educational evaluation framework.

This mixed method approach was chosen because perceptual assessment provides quantified information on the change of students' thinking for a given domain, while text mining provides the emergent, unstructured stories that reveal deeper cognitive processes. By triangulating these two data sources, the evaluation is more valid and complete than any other method used alone.

3. Methodology and Teaching Design

This paper combines quantitative perceptual assessment with qualitative text mining to study practical effects of AI-aided teaching.

3.1 Research Subjects and Sample

The subjects of this study are 125 current vocational high school students (mainly in their second and third years) and vocational high school graduates from a certain vocational college, covering two major fields: art design and non-art (such as e-commerce and computer application). 89 females (71.2%) and 36 males (28.8%), 112 females (81.6%), 13 males (10.4%), 112 males (89.6%) are Art design majors and 13 males (10.4%). AI tool use experience, 45 students (36.0%) use them frequently, 78 students (62.4%) understand them occasionally

and 2 students (1.6%) have no knowledge of AI tool usage experience (see student demographic summary). These students had acquired basic computer operation skills in previous courses but generally did not have systematic design thinking training and background knowledge of ICH culture.

3.2 Construction and Implementation of Teaching Model

We constructed a project-based teaching model for ICH creative products with AI empowerment and design thinking orientation. The teaching cycle was 8 weeks, with design thinking theme: Modern creative transformation of local ICH (Tongcao painting, Guangcai porcelain, cloisonné enamel, etc). The teaching process follows the five stages of design thinking and deeply integrated AI-aided tools: Empathize and define (weeks 1-2): Students understood cultural meanings of ICH and creative needs of modern consumers through field research or virtual museums, defined design problems, Idea and AI Aid (weeks 3): Students extracted the core ICH elements, transformed them into text prompts, and input them into AIGC tools to generate large number of initial design sketches of ICH-based creative product prototypes. Prototype (weeks 5-6): Students produced creative product prototypes, Test and Reflect (weeks 7-8): creative roadshow was held and students wrote reflection logs.

3.3 Data Collection and Analysis

Perceptual Assessment Questionnaire: SD method [11] (15 items) based on 5-point scoring scale. Re-disputed after the course, 125 valid questions were collected. Data were statistically analysed using SPSS. Text Data Mining: Reflections sent by students at end of term were collected. Text analysis tools were used for word segmentation, word frequency statistics and Co-occurrence Network analysis to extract core themes.

Table 1. Statistical Table of Core Indicators for Perceptual Assessment of Teaching Effectiveness (n=125)

Evaluation Dimension	Opposing Adjectives (1-5 points)	Mean	SD	Interpretation of Results
Thinking Shift	Blind imitation (1)– Active design (5)	3.51	1.05	Above median; students leaned towards "active design," indicating initial stimulation of design thinking.
Creative Experience	Skill-constrained (1)– Creative freedom (5)	3.65	0.99	AI tools effectively broke skill barriers, releasing creative freedom.
Human-Machine Collaboration	AI replacement (1)– AI assistance (5)	3.70	1.03	Most students viewed AI as an auxiliary tool, maintaining themselves as the dominant designers.
Cultural Identity	Superficial form (1) – Deep connotation (5)	3.91	0.89	Highest score; students believed the project touched upon the deep cultural connotations of ICH.
Labor Value	Mechanical repetition (1) – Creative practice (5)	3.74	1.01	Recognized the creative nature of the labor process, achieving the integration of mental and physical effort.

Note: Data derived from the questionnaire survey of this study (n=125).

The text mining process involved three steps: first Chinese text segmentation using Jieba word segmentation library with custom dictionary for ICH terminology; second word frequency analysis to find important vocabulary; and third co-occurrence networks constructed using sliding window (window size = 5 words) to uncover thematic relationships between high frequency terms. Network visualization was performed using Gephi software to produce force-directed graph layout.

4. Results Analysis

4.1 Perceptual Assessment Results

Through the statistical analysis of 125 valid questionnaires, students showed positive perceptual tendencies higher than the median (3 points) in all core dimensions (Table 1, Figure 1, Figure 2, and Figure 3).

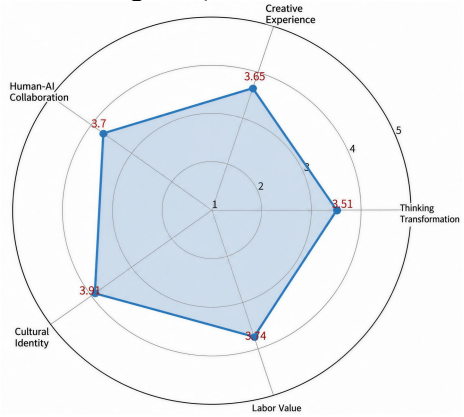

Figure 1. Radar Chart of Mean Perceptual Assessment across Dimensions (n=125)

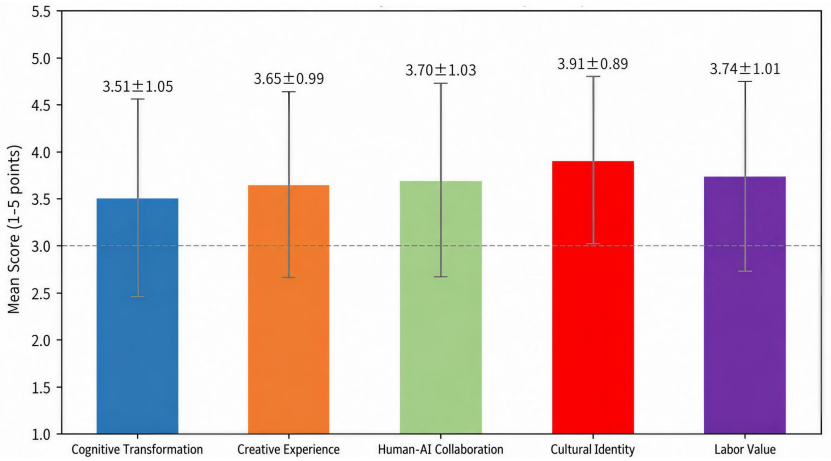

Figure 2. Bar Chart of Means and Standard Deviations across Five Major Dimensions (n=125)

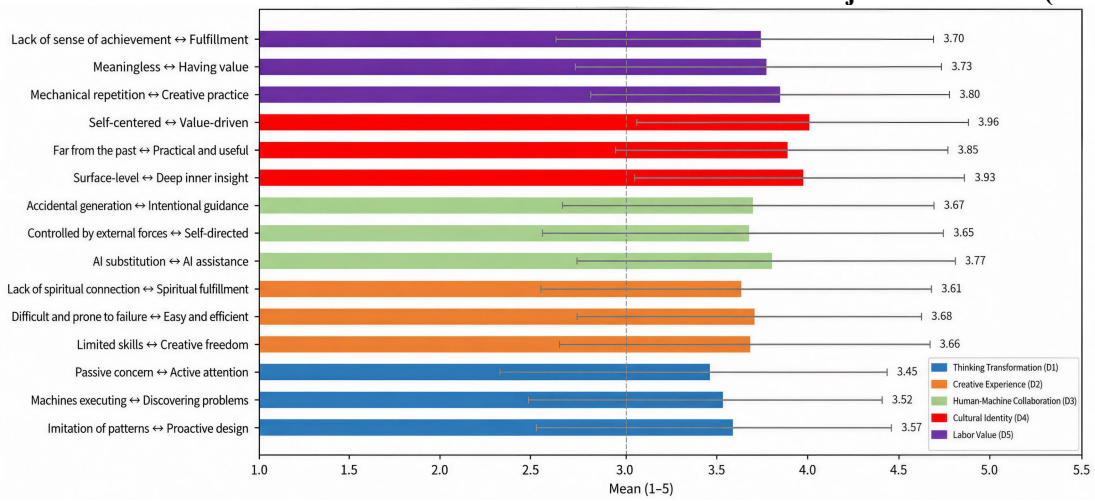

Figure 3. Bar Chart of Means and Standard Deviations for All 15 Scale Items (n=125)

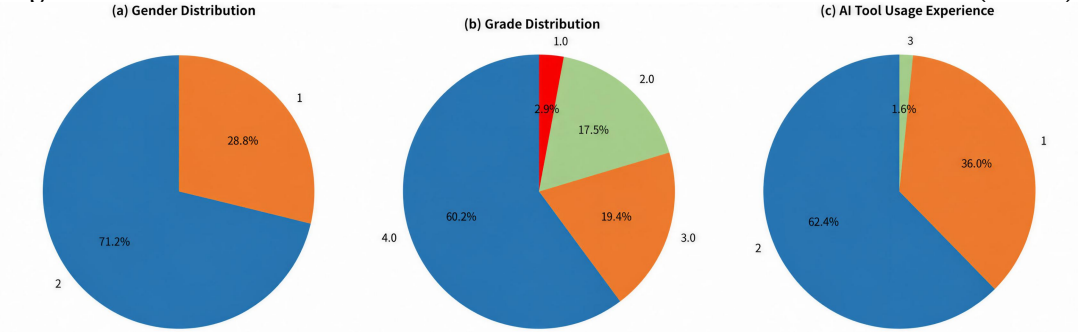

Figure 4. Distribution of Basic Information of Respondent Students (n=125)

The most important characteristic of the category "Culture Identity" was M=3.91SD=0.89, showing that the ICH creative project was the most influential to deepen students' cultural identity. Thinking Shift was the lowest (M=3.51SD=1.05) with the highest standard deviation, suggesting significant differences among students on the initiative of design thinking based on their professional background and AI usage experience.

The distribution of the student demographics, including gender, grade level and AI usage experience, is shown in Figure 4 (which confirms that the sample was a diverse sample and generalizability of results is generalizability of results for different student background.

4.2 Text Mining and Thematic Co-occurrence Network

Reflection logs were retrieved using text mining methods. High frequency vocabulary include AI (103 times), design (66 times), ICH (51 times), prompt (47 times), manual (31 times), modify (22 times), traditional (20 times), difficulties (19 times) and iteration (18 times).

Co-occurrence network analysis revealed three

clusters of thematic clusters: Human-Machine Collaboration and Creative Iteration Cluster: Clustered on AI, prompt, modify, and iteration cluster: clustered on design, ICH and difficulty, students often discussed how to make traditional ICH meet modern design needs; Cultural reconstruction and Labor Value Cluster: Clustered on traditional and manual reflecting students' identification with local culture during labor.

The co-occurrence analysis showed that students often connect traditional ICH concepts to modern design terms, suggesting that ancient knowledge is reinterpreted through modern design lenses. This works in line with the notion of creative transformation of cultural heritage studies, where traditional elements are preserved, but also reimagined for new contexts and audiences.

5. Discussion

5.1 AI as a "Cognitive Scaffold" to Release Design Potential

The results show that AI has a crucial role as a "cognitive scaffold" in aesthetic and labor courses [12]. In vocational classes, students often find it hard to be successful in traditional art classes due to weak handdrawing skills. AIGC takes over the art expression work (such as perspective, lighting, color rendering) and allows students to concentrate their limited cognitive power on higher order design thinking activities such as solving problems, extracting cultural symbols, and ideas for creative solutions. This "technological empowerment" translates into a shift in teaching focus from "valuing skills" to "valuing principles".

This finding is consistent with recent research showing that AI tools in design education do not replace human creativity but support design intentionality, allowing novice designers to concentrate on conceptual thinking rather than technical execution. The data from the Human-Machine Collaboration dimension (M=3.70, SD=1.03) further confirm this view, as most students view AI as an addition tool rather than a replacement for their own creative agency.

5.2 Sublimation of Labor Connotation: The Integration of Mind and Body

Traditional ICH manual experience classes are often modeled as mechanical labor of assembling materials step by step. In our model, labor has been significantly reduced. Perceptual assessments show that mean value of "Labor Value" is M=3.74 (SD=1.01). Students had a complete closed loop from "inputting prompts for mental creation" to "using tools to polish physical prototypes". This creative work gives the works personal marks and enhances students' sense of labor dignity and achievement [13].

The perceptual data also show that students who had a prior experience with AI had higher scores on Labor Value than students who had a limited experience. This suggests that technology familiarity positively influences the ability to work creatively and get personal satisfaction from designing.

5.3 Dialogue between Tradition and Modernity: "Living Transmission" of ICH

Design thinking emphasizes empathy and user needs. AI help students not view ICH as "dead objects" displayed in museums but as "living water" to solve modern design problems. The highest score in Cultural Identity (M=3.91, SD=0.89) confirms this view. With a creative reconstruction of human-machine collaboration, old patterns are painted and shaped in ways that meet modern aesthetics, promoting the "living transmission" of ICH and internalization of cultural identity [14].

5.4 Practical Challenges and Coping Strategies

However, the practice also exposed the problem of lack of "Prompt Engineering" knowledge. Text mining showed the word "difficulty" appeared 19 times; some students found it hard to use precise language to describe abstract cultural images and design needs and AI-generated results were expected to be different. Moreover, the "Thinking Shift" dimension had the largest standard deviation (SD=1.05) and was very individualistic. Future courses should develop students' text expression and logic deconstruction skills, in order to maintain human subjectivity and critical scrutiny in "human-machine co-creation".

Further, the digital gap in AI tool accessibility is another practical problem. While most students had some knowledge of AI tools, quality and consistency of output differed greatly depending on the degree of familiarity with platforms such as Doubao and Dreamina. Future implementations should incorporate structured AI literacy training modules that gradually build

students' skills in prompt crafting, image evaluation and iterative refinement. Additionally, peer learning communities that students learn from can help speed up skill acquisition.

5.5 Implications for Vocational Education Practice

The results of this paper have practical implications for vocational education practitioners and policy makers. First, the successful integration of AI tools in ICH creative projects suggests that vocational schools should invest in building digital infrastructure and training faculty on AIGC technology; second, strong performance of students in Cultural Identity aspects suggests that ICH-themed projects can be used as a medium for cultural education, and vocational curricula should include more locally relevant cultural content; third, the persistent challenge of Prompt Engineering literacy suggests that human-AI communication skills should be explicitly taught in vocational design education.

6. Conclusion

We have used the ICH creative project as an example and tested the impact of AI assisted technology applied to vocational aesthetics and labor courses using mixed methods. We found that the introduction of AI technology made the teaching model jump from lower-order "manual experience" to higher-order "design thinking" using the perceptual assessment data. Based on the perceptual evaluation data of 125 valid questions, the mean of 5 major dimensions ranged from 3.51 to 3.91 (over the median of scale 3 points), with Culture (M=3.91) and Labor Value (M=3.74) scoring especially prominently. Text mining also found three main themes: Human-machine collaboration, Design Thinking and Cultural reconstruction. The theoretical significance of the paper is that we can prove the value of AI as a "cognitive scaffold" for the development of innovative talents in vocational education and to extend applications of perceptual assessment and data mining in educational empirical research. Future research might further expand the sample size or track and evaluate how this model contributes to students' long-term career development and innovation potential.

This paradigm shift can have a profound impact on vocational education policy and curriculum design. Educational institutions should consider integrating AI assisted design thinking modules into their aesthetic and labor education programs, particularly those that involve cultural heritage elements. Our results show that AI assisted design thinking modules increase students' creativity quality and enrich their cultural engagement and labor value orientation. Future studies should investigate longitudinal effects of this teaching model, such as impact on students' career paths in creative industries and their engagement with preservation and innovation of ICH. Cross-institutional studies with different vocational education contexts and ICH domains would further validate and refine the proposed approach.

References

[1] Zhang, H., & Li, M. Research on the integration path of labor education and aesthetic education in vocational education. Vocational and Technical Education, 2023, 44(10): 25-30. (In Chinese)

[2] Wang, Q. Analysis of the current situation and countermeasures of aesthetic education in secondary vocational schools in the new era. Education Exploration, 2022, (5): 45-49. (In Chinese)

[3] Jiang, Y., et al. Generative AI in Art Education: A Systematic Review of Research Trends and Implications. Education Sciences, 2025, 16(1): 47. https://doi.org/10.3390/educsci16010047

[4] Guo, X. Ethical challenges and reshaping of vocational education in the era of artificial intelligence. Modern Distance Education Research, 2023, 35(4): 33-41. (In Chinese)

[5] Li, W., Ma, S., Shi, W., Lin, H., Liu, Y., Cui, Y., & Ao, J. Artistic heritage conservation: the relevance and cultural value of Guangzhou clan building paintings to traditional rituals from a kinship perspective through perceptual assessment and data mining. npj Heritage Science, 2024, 12: 216. https://doi.org/10.1186/s40494-024-01328-9

[6] Brown, T. Design thinking. Harvard Business Review, 2008, 86(6): 84-92.

[7] Yang, L. Integration of labor education and creative practice in vocational college curriculum reform. Vocational and Technical Education Forum, 2023, (15): 28-34. (In Chinese)

[8] Tao, W., et al. Cognitive outsourcing based on generative artificial intelligence. Acta Psychologica Sinica, 2025.

https://doi.org/10.3724/SP.J.1041.2025.0967
[9] Zheng, Y. Design transformation mechanism of intangible cultural heritage creative products in the digital context. Packaging Engineering, 2023, 44(6): 280-286. (In Chinese)
[10] Blei, D. M. Probabilistic topic models. Communications of the ACM, 2012, 55(4): 77-84.
[11] Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. The Measurement of Meaning. University of Illinois Press, Urbana, Illinois, 1957. 342 pp.
[12] Pea, R. D. Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), Distributed Cognitions: Psychological and Educational Considerations (pp. 47-87). Cambridge University Press, 1993.
[13] Liu, W. Inheritance and innovation of intangible cultural heritage in modern vocational education. National Arts Research, 2021, 34(2): 112-118. (In Chinese)
[14] Chen, J. Educational mechanism of traditional cultural identity from the perspective of embodied cognition. Educational Research, 2022, 43(3): 78-85. (In Chinese)