

# ***Innovation and Practical Pathways of Public Art Teaching Mode Driven by Knowledge Graph: A Case Study of Liyang Old Street Project***

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**Abstract:** Under the dual background of New Liberal Arts construction and the Rural Revitalization Strategy, public art education in universities faces the era requirement of reconstructing teaching models to cultivate interdisciplinary practical talents. Addressing the pain point of the theory-practice disconnection in traditional public art courses, this paper introduces the knowledge graph as a core methodology and constructs a closed-loop teaching model driven by a three-stage process: "Theory Construction - Field Empowerment - Outcome Transformation." The research takes the "Children's Poetry Path" project in Ningbo's Liyang Old Street as a practical field, elaborating in detail on the collaborative construction of a knowledge graph by teachers and students, inquiry-based learning and creative generation guided by the graph, and a multi-stakeholder ("Government-University-Village") collaborative evaluation and outcome transformation mechanism. Practice shows that this model effectively enhances students' knowledge integration and application abilities, cultural understanding and innovation capabilities, while providing concrete solutions and intellectual support for local cultural revitalization. Finally, the paper prospects the construction of a digital platform for the knowledge graph, and the policy and mechanism guarantees for model promotion, aiming to provide a referable paradigm for interdisciplinary teaching reform in art and design disciplines.

## **1 Introduction**

Currently, the state is vigorously promoting the Rural Revitalization Strategy, implementing the Aesthetic Education Infiltration Action, and accelerating the

construction of New Liberal Arts, thereby endowing higher art education with a new historical mission and social responsibility [1]. On one hand, there is an urgent social demand for art and design majors to cultivate innovative, interdisciplinary talents who possess solid theoretical literacy and can flexibly apply knowledge to solve complex real-world problems and serve social development. Particularly in the field of rural cultural revitalization, the need for professionals well-versed in local culture and capable of artistic creation and practice based on it is especially pressing [2]. On the other hand, traditional public art teaching in universities has significant shortcomings: the teaching content often focuses on urban space cases and Western classical theories, disconnecting from China's rich and diverse rural cultural context, leading to students' vague cognition of and weak emotional identification with local cultural traditions; the teaching methods are predominantly teacher-led theoretical lectures, making it difficult for students to translate abstract theoretical concepts such as "publicness" and "localness" into embodied spatial design schemes and practical abilities, ultimately resulting in a structural misalignment between talent cultivation and social needs [3].

The knowledge graph, as an emerging structured, semantic knowledge organization, and visualization technology, provides new possibilities for addressing the aforementioned teaching pain points with its powerful capabilities in knowledge integration, relational reasoning, and personalized recommendation [4]. Its structured expression method, centered on "Entity-Relation-Entity" triples, can systematically integrate discrete theoretical knowledge points, local cultural elements, and practical skill requirements in the field of public art, clearly presenting the complex logical network between knowledge fragments. This offers solutions to problems such as knowledge fragmentation and the theory-practice dichotomy in traditional teaching, injecting new technological vitality and theoretical support into the reform of public art course teaching [5].

## 2 Conceptual Definition and Theoretical Basis

### 2.1 The Core of Public Art Courses and Teaching Challenges

#### (1) The Core of Public Art Courses

The "public art" discussed in this paper transcends the material form category of traditional urban sculptures or landscape pieces, emphasizing more its functions of "relational aesthetics," social intervention, and cultural empowerment within specific contexts (especially rural settings) [6]. Correspondingly, the core of public art course teaching lies in cultivating students' ability to, from a public perspective, keenly insight the socio-cultural context and spatial characteristics of a specific site, and to use comprehensive art and design methods to address public space issues, convey local cultural values, and promote community interaction. In other words, the course aims to make students deeply understand that public art is not only formal artistic creation but also a key medium for reconstructing positive interactive relationships among people, space, society, and culture [7].

#### (2) Teaching Challenges of Public Art Courses

One of the core challenges in public art course teaching is how to guide students to accurately grasp the essential differences between "rural public art" and "urban public art." These differences are reflected in multiple dimensions: in functional positioning, rural public art focuses more on cultural inheritance, emotional cohesion, and community identity cultivation, while urban public art often emphasizes commercial

vitality, city image shaping, and aesthetic embellishment [8]; in audience composition, rural public art needs to face diverse groups such as villagers and tourists, paying special attention to the needs of specific groups like children and the elderly, whereas the audience for urban public art is more generalized and fluid [9]; in material selection, rural public art advocates for the use of local materials to reduce costs and enhance cultural relevance, while urban public art has higher requirements for the technicality, modernity, and diversity of materials [10]; in cultural expression, rural public art needs to deeply excavate and translate unique local historical and cultural resources, while urban public art more embodies the integrated expression of global, modern, and diverse cultures [11]. Guiding students to dialectically recognize and flexibly respond to these differences is a key difficulty in course teaching.

## 2.2 Concept, Composition, and Educational Application of Knowledge Graph

### (1) Concept and Composition of Knowledge Graph

A knowledge graph is essentially a large-scale knowledge base based on a semantic network, whose core data structure is the "Entity-Relation-Entity" triple [12]. In this structure, an "Entity" refers to an identifiable objective thing or abstract concept (e.g., "Public Art," "Liyang Old Street," "Children's Poetry"); a "Relation" describes various semantic associations between entities (e.g., "located in," "has," "applied to"); through the organic connection of massive triples, a structured, semantic huge knowledge network is ultimately formed, capable of clearly revealing and visually presenting the internal connections between knowledge fragments [13].

### (2) Educational Application of Knowledge Graph

In an educational context, the application value of knowledge graphs is mainly reflected in three aspects:

**Knowledge Structuring:** Integrating scattered, isolated knowledge points in a course into a hierarchical and closely connected knowledge network according to their internal logic helps students build a systematic disciplinary knowledge framework and avoid the trap of fragmented learning [14]. For example, in a public art course, knowledge points such as form of expression, material techniques, cultural background, and policies and regulations can be association integrated.

**Teaching Visualization:** Presenting abstract knowledge structures in a graphical, topological manner greatly assists teachers in instructional design and decision-making processes, enabling them to accurately grasp teaching priorities and difficulties, while also helping students intuitively understand complex knowledge relationships and improve cognitive efficiency [15].

**Personalized Learning:** Based on students' mastery of different knowledge nodes and the specific needs of their project practice, the knowledge graph can intelligently associate and recommend relevant theoretical literature, classic cases, or technical knowledge, achieving truly personalized learning support [16]. For example, when a student is engaged in designing a "Children's Interactive Installation," the system can automatically push knowledge on child behavior psychology, interactive technology principles, and related excellent cases.

### (3) The Compatibility Between Knowledge Graph and Public Art Courses

Public art itself is an interdisciplinary field that integrates knowledge from art, sociology, anthropology, architecture, local history and culture, etc., requiring students to possess excellent interdisciplinary knowledge integration and transfer application abilities. This disciplinary characteristic naturally aligns with the powerful

cross-domain knowledge association and organization capabilities of the knowledge graph.

In the specific teaching process, the knowledge graph can effectively help students clarify the intricate interconstructive relationships between "Liyang Old Street - Children's Poetry Culture - Public Art - Rural Space." For instance, through graph reasoning, students can clearly insight how local children's poetry culture is translated into public art language through specific visual symbols and material media, and how public art works integrate with specific spatial nodes and crowd behaviors. This systematic cognitive framework ensures that students' design outputs not only follow the rules of artistic creation but also deeply respond to the cultural characteristics and spatial context of the countryside, thereby providing solid methodological support for public art course teaching.

### **3 Construction of a Public Art Teaching Model Based on Knowledge Graph**

#### **3.1 Overall Model Design: "Theory-Practice-Outcome" Three-Stage Driven Model**

To systematically resolve the drawbacks of traditional teaching, this study constructs a "Theory-Practice-Outcome" three-stage driven, closed-loop feedback teaching model (Figure 1). This model uses the knowledge graph as the core thread and enabling tool throughout, organically connecting theoretical cognition, practical exploration, and outcome transformation to form a spiraling teaching cycle.

Stage 1 (Theory Construction): Collaborative construction of the knowledge graph by teachers and students. The focus is on systematically sort out public art and related field knowledge through entity extraction, relationship definition, and visual presentation, building a structured knowledge foundation for students.

Stage 2 (Field Empowerment): Project practice guided by the knowledge graph. Students conduct inquiry-based learning and creative design in real-world settings based on the guidance of the graph, transforming theoretical knowledge into solutions for practical problems.

Stage 3 (Outcome Transformation): Multi-stakeholder evaluation and outcome implementation/promotion. By introducing multi-subject evaluation to promote scheme optimization, and striving to achieve the social transformation of excellent outcomes, completing the value leap from course assignment to social proposal.

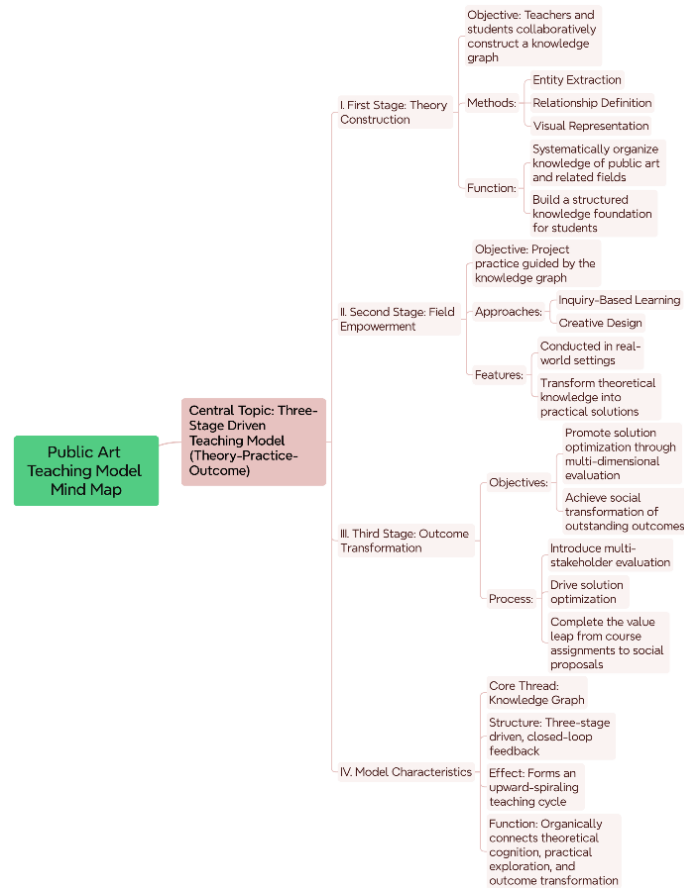


Figure 1: Third-order driving model

### 3.2 Stage One: Collaborative Construction of the Knowledge Graph

#### (1) Entity Extraction

Teachers and students formed collaborative groups. Centering on the two core themes of "Rural Public Art" and "Liyang Old Street Children's Poetry Culture," they extensively extracted key entities through brainstorming, literature review, and field research (Figure 2). The finalized entities included: Core Concepts (Public Art, Rural Aesthetic Education), Regional Culture (Liyang Old Street, Children's Poetry, Chinese Children's Poetry Festival), Spatial Elements (Street Entrance, Central Square, Alley, Around Shops), Audience Characteristics (Children, Villagers, Tourists), Material Technology (Wood, Stone, Bamboo, Local Materials), Cultural Symbols (Book, Wutong Tree, Poetry Slip, Writing Brush), Form and Function (Sculpture, Installation, Mural, Interactivity, Cultural Symbol), etc. This process was closely integrated with course objectives and local needs, ensuring the comprehensiveness and relevance of the entities.

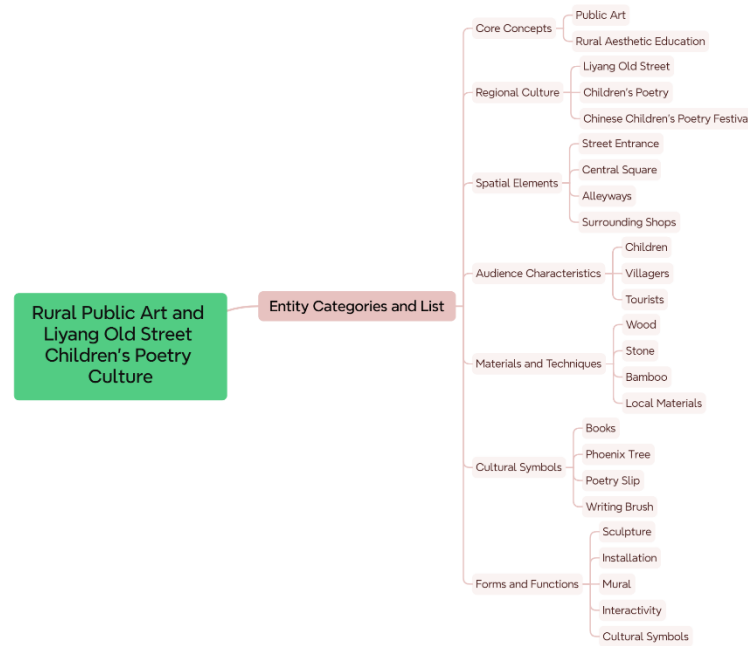


Figure 2: Public Art Map of Liyang Old Street

## (2) Relationship Definition

Based on the entity set, teachers and students jointly defined semantic relationships between entities, constructing knowledge logic chains (Figure 3). The core defined relationships included: ① Applied to: Public Art applied to Rural Aesthetic Education; Public Art applied to Liyang Old Street Space. ② Has: Liyang Old Street has Children's Poetry Culture; Liyang Old Street has Wutong Trees; Children's Poetry has Interactivity. ③ Embodied as: Children's Poetry Culture embodied as Chinese Children's Poetry Festival; Cultural Symbol embodied as Book Shape. ④ Can choose: Public Art Design can choose Local Materials (Bamboo, Stone); Public Art Design can choose Cultural Symbols (Poetry Slip, Writing Brush). ⑤ Can be transformed into: Poetic Text can be transformed into Visual Symbols; Children's Poetry Imagery can be transformed into Installation Forms. ⑥ Located in: Central Square located in Liyang Old Street; Wutong Tree located in Old Street Alley. These relationships precisely depicted the internal connections between entities, forming a semantically rich knowledge network.

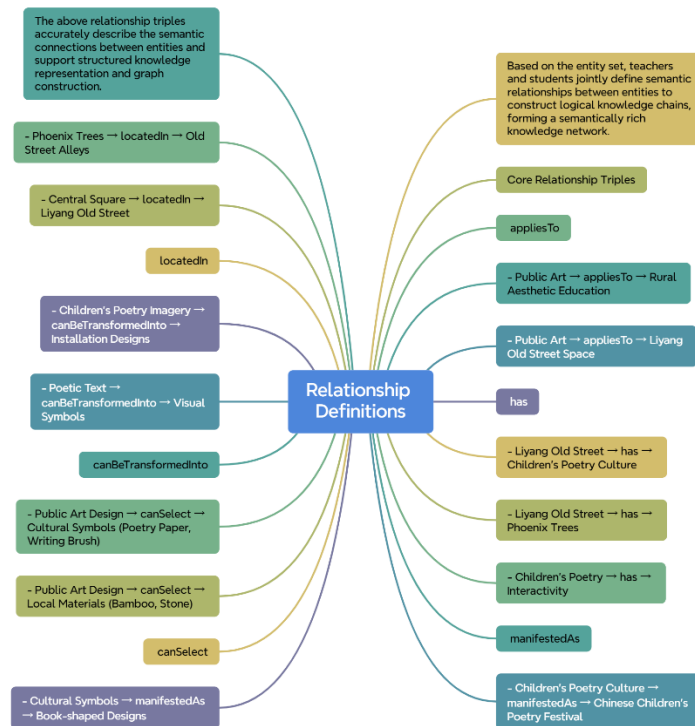


Figure 3: A Review of the relationship between public art Installations in Liyang Old Street

### (3) Visual Presentation

User-friendly drawing tools like XMind were selected to present the aforementioned entities and relationships graphically. The graph adopted a radial layout, with "Rural Public Art Empowering Liyang Old Street Children's Poetry Culture" as the core theme. Various entities were distributed around it according to their categories and relational proximity, connected by labeled vector lines. The final knowledge graph served as a teaching "Cognitive Map" and "Navigator," displayed throughout the course, helping students intuitively understand the knowledge architecture and project context, providing clear guidance for subsequent practice.

## 3.3 Stage Two: Project-Based Teaching Practice Guided by the Knowledge Graph

### (1) Task Distribution

Based on the natural knowledge clusters (Clusters) formed by the knowledge graph, such as "Cultural Imagery Cluster" (Children's Poetry, Cultural Symbols, Poetry Slips, etc.), "Material Technology Cluster" (Local Materials, Craft Techniques, etc.), and "Spatial Node Cluster" (Square, Entrance, Alley, etc.), students were divided into several project groups (2-3 persons per group). Each group claimed a specific spatial node (e.g., "Old Street Entrance Area," "Children's Poetry Square," "Wutong Poetry Alley," etc.). The task goal was: Based on the associative guidance of the knowledge graph, design a set of public art schemes for this node that deeply integrates children's poetry culture, possesses interactive functions, and prioritizes the use of local materials.

### (2) Inquiry-Based Learning



Each group conducted directed literature review and field research based on the research paths suggested by the knowledge graph. Research topics included: "Classic Cases of Rural Public Art," "Child-Friendly Space Design," "Methods of Visual Translation of Poetry," "Construction Techniques of Local Materials," etc. Through group discussions, mid-term reports, and teacher Q&A, theoretical knowledge was deeply digested, forming a design pre-research report. This process ensured that the design practice was based on solid theoretical and research foundations.

### (3) Creative Generation

Guided by the semantic associations of the knowledge graph, each group conducted design divergence. Taking the "Cultural Imagery Cluster" as an example: From the entity "Wutong Tree," attributes like "fallen leaves," "tree shade," and "nature" could be associated; these attributes could then be associated with verses describing nature in the "Children's Poetry" entity (e.g., "Falling leaves are autumn's letters"); subsequently, combined with the "Interactivity" entity, they considered how to transform "poetic fallen leaves" into a tangible, playable interactive installation. Following this logic, groups generated multiple creative schemes, for instance:

"Poetry Leaf Ground Carving" Scheme: Selected children's poetry verses were carved on stone ground carvings shaped like leaves, scattered under the Wutong trees, forming a "poetic carpet" that could be sought, read, and stepped on.

"Under-Tree Audio Reading Pavilion" Scheme: A micro-structure shaped like a tree was designed, with built-in audio equipment; scanning a QR code allowed listening to children's poetry recitations, providing children with an immersive poetry experience space.

Each group refined the preliminary scheme, outputting a complete proposal including design description, renderings, material techniques, and budget evaluation.

## 3.4 Stage Three: Evaluation and Transformation of Outcomes

### (1) Multi-stakeholder Evaluation System

A comprehensive evaluation system with reasonable weights and multiple subjects was established:

Teacher Evaluation (40%): Focused on assessing the academic depth (theoretical application, cultural interpretation, logic) and implementation feasibility (technical rationality, cost controllability) of the scheme.

Local Government/Villager Representative Evaluation (30%): Focused on assessing the cultural fit (whether it highlights local characteristics) and practical value (whether it meets residents' needs, whether it is conducive to tourism promotion) of the scheme.

Peer Evaluation (30%): Focused on assessing the creativity and innovativeness (novelty of conception, originality of form) of the scheme.

The comprehensive score from the three parties formed the final evaluation result (Excellent, Good, Pass, Fail).

### (2) Outcome Implementation and Exhibition

For schemes evaluated as excellent, active coordination with local governments was pursued to promote their physical exhibition. For example: The "Poetry Cube" interactive seating scheme, with the support of the town government, underwent 1:1 physical prototyping and temporary installation in the old street square; the "Light and Shadow Poetry Corridor" was exhibited through detailed models, renderings, and video animations in the village cultural hall. This not only greatly stimulated students'



sense of achievement but also directly empowered local cultural construction with course outcomes, achieving effective transformation of social value.

## **4 In-depth Analysis of Implementation Path: A Case Study of the "Children's Poetry Path" in Liyang Old Street**

### **4.1 Project Background and Teaching Objective Establishment**

#### **(1) Project Background**

This paper selects Liyang Old Street in Ninghai County, Ningbo City, Zhejiang Province, as the physical project carrier. As the cultural core of Liyang Town, Ninghai County, Liyang Old Street possesses a large number of ancient buildings from the Ming and Qing dynasties, boasting profound historical heritage. With its unique identity as the "Chinese Children's Poetry Village" and the cultural IP of the "Chinese Children's Poetry Festival," developing study-tourism is an important path for its rural revitalization. However, issues such as the low quality of public space, the lack of children's poetry cultural experience, and insufficient attractiveness to children groups constrain its development. Therefore, intervening through public art to create an immersive "Children's Poetry Path" became an urgent need of the local government.

#### **(2) Teaching Objective Establishment**

Based on the project background, three layers of teaching objectives were set:

**Knowledge Objectives:** Master the core theories of rural public art, design methods for translating children's poetry culture, and application knowledge of local materials.

**Ability Objectives:** Strengthen practical abilities in research and analysis, creative divergence, design expression, teamwork, and cross-domain communication.

**Quality Objectives:** Cultivate cultural confidence, local sentiment, social responsibility, and innovative spirit.

Students were ultimately required to produce design schemes possessing the "Four Properties": Cultural, Public, Local, and Child-friendly.

### **4.2 Application Cases of Knowledge Graph in Specific Design Links**

#### **(1) Case 1: "Poetry Station" Design**

**Graph Guidance:** Path: Public Art→Form of Expression→Interactive Installation; Children's Poetry→Carrier→Book; Child→Behavior→Reading/Playing. Derived design direction: Use the "book" as the formal carrier to create an interactive installation with "reading" and "playing" functions.

**Scheme Output:** Designed a set of "Poetry Cube" interactive seats. Cubic wooden seats, with different verses and illustrations carved on each face. Children can combine new poems by flipping the cubes, or sit down to read and rest, perfectly integrating interactivity, functionality, and culturality.

#### **(2) Case 2: "Wutong Poetry Language" Node Design**

**Graph Guidance:** Path: Liyang Old Street→Has→Wutong Tree; Wutong Tree→Symbolizes→Time/Poetry; Poetry→Form of Expression→Sound/Light and Shadow. Derived design direction: Use light, shadow, and sound media to create a poetic atmosphere around the Wutong tree.

**Scheme Output:** Proposed the concept of "Light and Shadow Poetry Corridor."

Build a corridor frame with 镂空 steel plates in the Wutong alley. Sunlight passes through the steel plates carved with poems, projecting dynamic poetic light and shadows on the ground, supplemented by hidden audio playing children's poetry recitations, creating an audiovisual blended poetic walking experience.

#### **4.3 "Government-University-Village" Collaborative Implementation Path and Mechanism Guarantee**

##### **(1) Communication and Collaboration with Liyang Town Government**

A university-local cooperation agreement was signed early in the project, clarifying rights and responsibilities. The university provided intellectual and design support, while the government provided basic information, coordinated resources, and supported outcome implementation. Regular joint meetings were held to ensure the project design resonated with local development plans.

##### **(2) Student Village residency Research and Villager Participation**

Students were organized for a 3-day Village residency research stay, conducting forums and in-depth interviews with villagers, poets, and children's parents to collect firsthand needs and cultural stories. After the schemes were formed, villager review meetings were held to integrate non-professional but valuable local wisdom into design optimization, ensuring the "localness" of the schemes.

##### **(3) Organization and Impact Amplification of Course Outcome Exhibition**

A "Children's Poetry Path" public art design outcome exhibition was held in the central square of the old street for one week. All schemes were publicly displayed through models, panels, videos, etc., with interactive sessions set up to attract the attention of residents, tourists, media, and academia. The exhibition not only enhanced the project's influence but also laid the foundation for further in-depth cooperation.

### **5 Reflection on Teaching Effectiveness and Challenges**

#### **5.1 Teaching Effectiveness**

##### **(1) Student Level**

Significant improvement in knowledge integration and application abilities: Over 85% of the final schemes could systematically integrate multidisciplinary knowledge, with accurate cultural expression and reasonable material application; the design depth and completion far exceeded previous years.

Enhanced social responsibility and cultural confidence: Through Village residency research and local collaboration, students deeply experienced the value of art and design serving society, establishing a strong cultural identity and local care.

##### **(2) Course Level**

Greatly enriched course content: The real project introduced a large amount of interdisciplinary knowledge and practical skills, Extreme expanding the course's connotation and extension.

Innovative breakthrough in teaching mode: The "Three-Stage Drive" model effectively connected theory and practice; the knowledge graph, as a core tool, significantly improved the systematicness and effectiveness of teaching.

### (3) Social Level

Provided high-quality schemes for the locality: Among the 23 output schemes, 10 were rated "Excellent," providing a design think tank for the local government that can be directly referenced or further implemented.

Stimulated local attention and social impact: The exhibition and media reports triggered widespread social attention, attracting more educational resources and tourism investment intentions, forming a positive social ripple effect.

## 5.2 Challenges and Countermeasures

### (1) Challenge 1: Requirements for Teachers' and Students' Information Technology Ability in Knowledge Graph Construction

Some teachers and students had difficulties with tool usage and logic construction.

Countermeasures: Select low-threshold tools (e.g., XMind) and provide detailed tutorials; focus teaching on logic construction rather than technology itself; form student technical mutual aid groups.

### (2) Challenge 2: Mismatch Between Rural Project Cycle and Semester System

The schemes were often still in the design stage when the course ended, causing implementation delays.

Countermeasures: Clarify that the core output of the course is the "conceptual scheme"; establish connection mechanisms with graduation projects and disciplinary competitions; sign long-term agreements with localities, set up practice bases, and promote continuous incubation of outcomes.

### (3) Challenge 3: Difficulty in Collecting and Quantifying Non-Professional Evaluation in the Multi-Stakeholder Evaluation System

Evaluations from non-professional subjects like villagers were mostly subjective feelings, difficult to quantify.

Countermeasures: Use structured interviews and questionnaires to guide specific feedback; formulate easy-to-understand evaluation reference indicators (e.g., cultural fit, practicality); emphasize the "corrective value" rather than the "score value" of evaluation opinions, using them as an important basis for scheme optimization.

## 6 Conclusion and Prospect

### 6.1 Research Conclusion

This study successfully constructed and practiced a knowledge graph-driven "Theory-Practice-Outcome" three-stage teaching model. Practice has proven that this model can effectively address the core pain points in public art teaching. The knowledge graph, as a "cultural translator" and "creative catalyst," significantly enhanced students' depth of understanding of local culture and their creative transformation ability. The success of the Liyang Old Street project not only verified the teaching effectiveness of the model but also demonstrated the great potential of university art education's deep participation in rural revitalization through the "Government-University-Village" collaboration mechanism, providing a new referable paradigm for teaching reform in art and design disciplines.

### 6.2 Future Prospects

(1) Digitization and Platformization of Knowledge Graph

Future work will focus on developing a specialized digital platform for public art knowledge graphs, integrating functions such as knowledge query, associative recommendation, collaborative editing, and learning management, to achieve dynamic knowledge updating and intelligent recommendation, further enhancing the intelligence level of teaching.

(2) Promotion of Teaching Mode and Case Database Construction

Plan to promote this model to other design majors (e.g., Visual Communication, Product Design) within the university, and accordingly build an interdisciplinary "Knowledge Graph-Driven Teaching Case Database," forming a broader demonstration effect.

(3) Strengthening Policy and Funding Support, Improving University-Local Cooperation Mechanism

Appeal for policies and assessment mechanisms supporting practical teaching at the university level, and establish special funds. Meanwhile, strive to build a more complete benefit-sharing and risk-sharing mechanism with local governments to ensure sustainable and high-quality development of university-local collaboration, jointly contributing to cultural revitalization.

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