

Research on the Pathways of Industry-Education Integration in Cultivating Talents for Rural Environmental Art Design in the Hainan Free Trade Port

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Abstract: Grounded in the contemporary context of advancing both the Hainan Free Trade Port and the rural revitalization strategy, this study addresses the structural mismatch between talent supply and industrial demands in rural environmental art design. It explores innovative approaches to industry-education integration in talent cultivation. By analyzing the expanded scope of rural environmental art design and evolving competency requirements within the Free Trade Port framework, the research clarifies the theoretical rationale and practical value of industry-education collaboration while identifying challenges in current training systems, including curriculum relevance, practical depth, stakeholder coordination, and evaluation mechanisms. Key strategies proposed include establishing a multi-stakeholder collaboration mechanism (government–university–industry–enterprise–village), developing a regionally culturally oriented modular curriculum, enhancing project-driven practical training, and refining a multidimensional dynamic evaluation system. Implementation safeguards are designed across three dimensions: policy guidance, resource integration, and cultural immersion. The findings aim to align talent development precisely with the high-quality growth needs of Free Trade Port villages, provide theoretical foundations and practical models for regional art design education reform, and facilitate the optimization of rural living environments alongside sustainable cultural revitalization.

Keywords: Industry-education integration; Hainan free trade port; Rural environmental art design; Talent cultivation; Collaborative education

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1. Introduction

As a pivotal initiative in China's deepened reform and opening-up, the "Overall Plan for the Construction of the Hainan Free Trade Port" explicitly emphasizes "promoting coordinated urban-rural and regional development and comprehensively advancing rural revitalization", positioning rural areas as the core vehicle for showcasing the port's ecological essence, cultural appeal, and sustainable development capabilities. In this process, rural environmental art design has expanded beyond traditional landscape beautification to encompass multidimensional domains such as settlement space restructuring, cultural heritage revitalization, ecological wisdom creation, and innovative cultural-tourism

scenarios, serving as a vital link between natural foundations, regional cultural heritage, and modern quality of life. The policy benefits of the free trade port have driven the clustering of new industries like rural cultural tourism, wellness tourism, and creative agriculture, demanding design professionals to possess interdisciplinary competencies encompassing cultural literacy, design expertise, operational proficiency, and deep-rooted rural understanding. Currently, talent cultivation in rural environmental art design in Hainan faces challenges including rigid disciplinary barriers, disconnection between educational content and rural realities, and inadequate practical platforms, making it difficult to meet the high-quality and localized demands of rural development. Industry-education integration is recognized as an effective solution to the disconnect between academia and industry, fundamentally involving deep collaboration among governments, universities, industries, enterprises, and rural communities to organically integrate real industrial needs, technical standards, and cultural contexts throughout the educational process. Although ministries such as the Ministry of Education have established policy frameworks for industry-education integration, systematically exploring new models for cultivating rural environmental art design talents that reflect Hainan's tropical island ecology, Li and Miao cultural heritage, and the free trade port's openness remains imperative. This study, grounded in both theoretical and practical perspectives, conducts an in-depth analysis of the core issues and proposes an industry-education integration approach tailored to Hainan's specific context. It aims to provide theoretical foundations and practical references for reforming regional art and design education and revitalizing rural talent development ^[1].

2. New characteristics of talent demand for rural environmental art design in the free trade port context

The institutional innovations and open framework of the Hainan Free Trade Port are systematically reshaping the logic of rural development. Rural environmental art design has evolved beyond mere physical space beautification to become a critical component in supporting the development of an "International Tourism and Consumption Center", realizing the value of ecological products, and enhancing cultural soft power. Design projects span diverse scenarios, including the preservation and revitalization of traditional villages, restoration of coastal wetland landscapes, creation of intangible cultural heritage workshop spaces, and planning of rural homestay clusters—which demand designers to possess ecological ethics awareness, cultural translation capabilities, and cross-disciplinary collaboration skills. The free trade port policy attracts international design resources and cultural-tourism capital, driving rural design projects toward greater refinement, branding, and experiential development. Professionals must possess in-depth understanding of local knowledge, including material adaptability under Hainan's tropical monsoon climate, contemporary interpretations of Li and Miao totem symbols, and disaster-resilient design for coastal villages, while maintaining an international perspective on aesthetic expression and sustainable design principles. As the ultimate bearers of design outcomes, rural communities demand practitioners with field research capabilities, community communication skills, and participatory design thinking to bridge the gap between "elite design" and local needs. This integrated, localized, and human-centered competency framework fundamentally challenges traditional training models centered on technical skill development, necessitating a restructuring of educational approaches through deep industry-education integration ^[2].

3. Theoretical logic of integrating industry and education to enhance rural environmental art design education

The value of industry-academia integration stems from adherence to the principles governing knowledge production and application. The collaborative education theory reveals that talent cultivation is a value-creating endeavor involving multiple stakeholders working toward a shared objective. In the field of rural environmental art design, universities provide theoretical frameworks and innovative thinking; enterprises introduce market standards and cutting-edge technologies; rural communities contribute cultural contexts and genuine needs; while governments establish institutional platforms and

resource networks, all collectively forming an integrated educational community^[3].

The constructivist perspective on learning further underscores the pivotal role of practical contexts in capability development. Environmental art design knowledge exhibits pronounced contextual dependence and tacit nature, making effective internalization challenging through classroom instruction alone. Industry-education integration facilitates knowledge synthesis and skill advancement by embedding teaching into real-world projects such as rural micro-renewal initiatives and cultural station designs, guiding students to address concrete challenges like “how to preserve the cultural heritage of boat houses while meeting modern functional requirements” and “how to create low-cost landscapes using local volcanic rocks”. Meanwhile, stakeholder theory provides a framework for defining responsibilities: universities lead curriculum development and teaching implementation; enterprises participate in standard-setting and faculty deployment; rural communities provide practical implementation sites and feedback mechanisms; while governments strengthen policy incentives and quality oversight. This theoretical framework transcends superficial “university-industry collaboration”, promoting organic integration of educational, talent, industrial, and innovation chains, thereby establishing a theoretical foundation for rural environmental art design education to return to its core mission of “serving local communities and creating value”.

4. An examination of the practical challenges in cultivating talent for rural environmental art design in Hainan

The current talent cultivation system for rural environmental art design in Hainan faces a significant disconnect from the high-quality development needs of the free trade port’s countryside. The curriculum framework remains largely rooted in urban environmental design paradigms, failing to systematically address distinctive rural challenges such as the spatial texture of tropical settlements, design constraints in ecologically sensitive zones, and the narrative logic of intangible cultural heritage expression. Textbook case studies are severely disconnected from local practices, making it difficult to meet the localized requirements of rural design implementation. Practical training exhibits a persistent structural imbalance known as the “three emphases and three neglects”: excessive focus on campus model simulations at the expense of field research, prioritization of individual space design over regional system integration, and emphasis on visual presentation over community engagement processes. This imbalance results in students mastering professional software skills yet lacking deep understanding of local material characteristics, traditional construction techniques, and villagers’ actual needs, rendering them ill-equipped to address the complexity and cultural sensitivity of rural environments^[4].

The structural deficiencies in the teaching faculty are particularly pronounced, with a low proportion of “dual-qualified” instructors. Most educators lack experience in leading rural implementation projects, making it challenging to effectively integrate cutting-edge industry trends and practical case studies into teaching content. The collaborative mechanism involving multiple stakeholders remains under-institutionalized: university-industry partnerships often remain superficial, limited to signing ceremonies and short-term lectures, with enterprises demonstrating insufficient intrinsic motivation for talent development; rural communities are frequently reduced to mere “research subjects” in teaching, with their agency and voice inadequately recognized, failing to fulfill their core roles as cultural carriers and sources of local needs; industry associations have failed to effectively lead in establishing competency standards and quality evaluation systems, resulting in a lack of professional support for collaborative education. The evaluation framework overly emphasizes visual aesthetics and technical compliance while neglecting the social acceptance, cultural appropriateness, and ecological sustainability of design outcomes, creating a significant “temperature gap” between talent cultivation and actual rural demands. This constrains the practical effectiveness and cultural value creation capabilities of rural environmental art design professionals.

5. Construction of a talent development path system driven by industry-education integration

5.1. Building an integrated collaborative education community with five components

At the provincial level, an institutionalized coordination mechanism has been established, led by the education, agriculture and rural affairs, and culture and tourism departments in collaboration with universities, the Hainan Provincial Environmental Art Design Association, local design institutions, and distinctive villages (such as Baoting Shijin Village and Qionghai Beirong Village) to form the “Hainan Free Trade Port Rural Environmental Art Design Industry-Education Alliance”. The alliance has formulated the “Collaborative Talent Development Guidelines”, clarifying respective responsibilities: the government provides policy guidance and project resource support; universities spearhead the optimization of talent training programs and teaching organization; enterprises contribute authentic project databases, assign technical mentors, and offer internship opportunities; rural communities share practical scenarios and actively participate in needs assessment and outcome evaluation; industry associations establish competency standards, organize skill certifications, and conduct quality assessments. Through mechanisms such as regular joint meetings, project roadshows, and exhibition exchanges, the alliance facilitates the transition of university-local-enterprise-village cooperation from superficial collaboration to institutional integration, ensuring clear accountability and efficient operation among all stakeholders ^[5].

5.2. Reconstructing a curriculum module integrating “culture–ecology–technology”

Guided by the objective of cultivating comprehensive capabilities throughout the rural design process, this approach breaks down traditional disciplinary barriers and systematically establishes an integrated curriculum system encompassing “culture–ecology–technology”:

Regional Cultural Awareness Module: Courses such as “Morphology of Hainan Rural Settlements”, “Analysis of Li and Miao Architectural Symbols” and “Cultural Memory of Nanhai Fishing Villages” are offered. Intangible cultural heritage inheritors and rural elders are invited to actively participate in teaching, guiding students to develop a sense of reverence for local culture and the ability to creatively reinterpret it.

The Ecological Smart Design Module integrates core elements such as tropical plant applications, local material techniques, and low-impact development technologies. By incorporating localized case studies, including mangrove ecosystem restoration and rain garden design, it cultivates students’ systematic approach to integrating ecological ethics into design practices.

Project Implementation Module: Adopting a “real-world case-based” teaching approach, this module breaks down practical projects such as rural micro-renovation and cultural station design into specific course components, thematic workshops, and graduation project topics. It establishes a tripartite guidance mechanism involving university mentors, industry experts, and villager representatives to ensure the design process aligns closely with actual rural needs ^[6].

5.3. Deepening the three-dimensional practice system of “residing in villages—residing in enterprises—residing in schools”

Establish a three-dimensional practical platform featuring “village-based, enterprise-based, and campus-based” engagement: Set up a “Rural Design Simulation Laboratory” on campus to simulate the application of local materials and techniques in community consultation scenarios; collaborate with renowned design firms to establish an “Off-campus Industry College”, offering quarterly rotational internships that enhance students’ immersion in corporate technical standards and market dynamics; establish “Teaching Practice Bases” in representative rural areas, where students undertake weeks-long design practices involving field research, concept development, villager evaluations, and implementation feedback. Simultaneously, implement a “Design Service Week” program, under which faculty and student teams regularly visit paired villages to conduct environmental diagnostics and micro-updates, ensuring dynamic alignment between teaching practices and rural development needs and preventing a disconnect between design outcomes and actual

rural realities.

5.4. Establish a multi-dimensional dynamic quality evaluation mechanism

To overcome the limitations of traditional single-assessment methods, a three-dimensional dynamic evaluation system encompassing “process, outcome, and impact” has been established: Process evaluation focuses on the depth of field research, the logical progression of project iterations, and cross-domain collaboration capabilities; Outcome evaluation is conducted through joint review by the university, enterprise, and village stakeholders, with emphasis on assessing the cultural appropriateness, technical feasibility, and villagers’ acceptance of the solutions; Impact evaluation tracks the practical application outcomes, social acceptance, and ecological sustainability of the designed solutions in rural settings. The introduction of a “learning portfolio” system systematically documents students’ role contributions, reflective journals, and competency development trajectories within projects, enhancing the diagnostic and developmental functions of evaluation to ensure precise alignment between talent cultivation quality and rural development needs.

5.5. Support and guarantee system for path implementation

At the policy support level, rural environmental art design industry-education integration projects should be systematically incorporated into the expanded scope of Hainan Province’s “Active Work, Active Study” tourism talent development program. Enterprises that participate extensively should receive targeted incentives such as tax reductions and priority project support. Concurrently, special funds should be established to prioritize the development of teaching practice bases, the creation of locally distinctive textbooks, and the establishment of localized case databases, ensuring precise alignment between policy resources and rural development needs.

At the resource integration level, efforts should focus on establishing a three-dimensional collaborative mechanism involving “universities, enterprises, and rural communities”: universities leverage their theoretical expertise, enterprises contribute technical standards and market insights, while rural communities provide cultural contexts and practical implementation environments. Together, these three parties jointly develop the “Hainan Rural Environmental Design Digital Resource Library”. This platform systematically compiles survey data of representative villages, samples of local materials and crafts, case studies of intangible cultural heritage spatial narratives, and exemplary practical achievements, enabling dynamic resource updates and open sharing to provide robust data support and cultural references for teaching and practical applications.

In terms of cultural cultivation, efforts are focused on fostering an educational ecosystem that emphasizes “design rooted in local contexts”. Through initiatives such as hosting the “Hainan Rural Design Biennale”, conducting the “Most Beautiful Rural Design Practice Case” selection, and organizing the “Rural Cultural Dialogue Workshop”, faculty and students are encouraged to actively engage in preserving and innovating rural culture, thereby strengthening their commitment to serving rural communities and enhancing cultural awareness. Concurrently, emphasis is placed on adapting international best practices locally: systematically examining community participation mechanisms from Japan’s “regional design” approach and multi-stakeholder collaboration models in Singapore’s community development, while distilling transferable industry-education integration experiences to improve the foresight and adaptability of implementation strategies.

In terms of implementation strategy, the principle of “pilot-first, dynamic optimization, and phased promotion” is adhered to: priority is given to selecting villages with mature foundational conditions, such as Baoting Shijin Village and Qionghai Beirong Village, to collaborate with universities renowned for their design disciplines, like Hainan University and Sanya University, to carry out demonstration projects. A dynamic feedback mechanism encompassing demand diagnosis, process monitoring, and outcome evaluation is established. Through quarterly joint meetings, mid-term performance assessments, and annual optimization adjustments, the implementation pathway is continuously refined to ensure a gradual, point-to-surface promotion process that is both scientific and effective, ultimately establishing a replicable and scalable regional paradigm for talent cultivation.

6. Conclusion

The industry-education integration mechanism serves as the core pathway to address the structural contradictions in cultivating rural environmental art design talents in the Hainan Free Trade Port. This study establishes a systematic framework grounded in a multi-stakeholder collaboration mechanism, centered on curriculum restructuring, linked through localized practices, and supported by multidimensional dynamic evaluation. It positions rural areas as dynamic teaching environments and sources of cultural innovation, driving a profound transformation of talent cultivation models from mere technical transmission to value co-creation. This framework not only precisely addresses the urgent demand for interdisciplinary design talents for high-quality rural development in the Free Trade Port but also provides a regional practical paradigm for art and design education to take root in China's rural context and serve rural revitalization. Future research should focus on deeper issues such as the sustainable operational mechanisms of industry-education integration projects and the underlying logic for fostering students' attachment to their local communities, continuously enhancing the systematicness and adaptability of educational models. Only by grounding education in the fertile soil of rural areas can we cultivate design talents with both global vision and cultural awareness, infusing enduring humanistic momentum and practical vitality into the Hainan Free Trade Port's rural development goal of "seeing mountains, viewing waters, and cherishing nostalgia".

Disclosure statement

The author declares no conflict of interest.

References

- [1] Xiao J, Wang X, Xie K, et al., 2024, New Requirements for Industry-Education Integration and Innovation in Talent Cultivation Models for Economics and Management in the Digital and Intelligent Era: A Study Based on "Living" Case-Based Teaching. *Journal of Beijing Jiaotong University (Social Sciences Edition)*, 23(4): 138–145.
- [2] Liu X, Deng J, 2024, Some Reflections on Transitioning from an Education-Strong Nation to Industry-Education Integration. *Journal of Education, Renmin University of China*, 2024(1): 11–16 + 181.
- [3] Wang T, 2024, Exploration of High-Quality Development of Vocational Education in the Digital Ecosystem: Integrated Curriculum Design and Innovation in Teaching Models. *Vocational and Technical Education*, 45(2): 45–50.
- [4] Liu R, Chen J, 2023, The Current Status, Connotation, and Pathways of Digital Transformation in Higher Vocational Colleges—An Analysis Based on the "Guidelines for Building Model Schools of Vocational Education Informatization". *China Vocational and Technical Education*, 2023(28): 13–20.
- [5] Tang J, 2023, Research on the Modular Customized Practical Training Teaching Model in Vocational Colleges Under the Background of Digital Transformation. *Education and Vocational*, 2023(8): 90–94.
- [6] Wang H, 2018, From Competency-Oriented Approach to Core Literacies: A Rational Choice for Vocational Education Curriculum Reform. *Shaanxi Education (Higher Education)*, 2018(4): 55–56.

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