

Research on the Practical Path of Environmental Design Major in Supporting Rural Revitalization under the Background of “AI + Education”

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Received: 3 September 2025; **Accepted:** 14 October 2025; **Published:** 31 October 2025

Abstract:

China's comprehensive implementation of the rural revitalization strategy has spanned eight years. University environmental design urgently require deep integration with modern artificial intelligence technologies. “AI + Education” can not only cultivate technical talent for rural spatial planning at the local level but also offer fresh insights into regional economic growth models such as the preservation of rural cultural heritage and the development of rural cultural tourism. This paper explores how environmental design at local universities can effectively empower rural revitalization and achieve digital transformation within practical teaching. The article first analyses the current state of environmental design serving rural development, subsequently identifying key issues within traditional teaching practices. Finally, adopting an “AI + Education” perspective, it proposes forward-looking and actionable innovative pathways across three dimensions: establishing intelligent rural design workshops, reshaping the “design-empowered, data-driven” teaching system, and creating digital practice platforms for rural development. This offers valuable reference for local university environmental design major to serve rural revitalization precisely and efficiently while achieving digital transformation.

Keywords:

AI + Education, Rural Revitalization, Environmental Design, Digital Transformation Practice

1. Introduction

As a pivotal province in China's rural revitalization initiative, Hubei's local universities serve as vital bridges connecting higher education with rural development. Integrating modern AI technology with environmental design curricula can effectively address core challenges in traditional case-based teaching models, including disconnects with practical rural construction needs, insufficient regional cultural research, and implementation difficulties. [1] Consequently, this paper examines how

environmental design at local universities in Hubei Province can leverage digital transformation to address outdated rural infrastructure, cultural discontinuities, and the need for cultural tourism industry upgrading and spatial revitalization within the context of AI-empowered education. This exploration holds significant practical value and social significance for unlocking the innovative potential of environmental design in rural revitalization.

2. Outcomes and Challenges of Environmental Design in Local Universities Supporting Rural Revitalization

2.1. Case-Based Teaching Emerges as the Mainstream Approach

Local universities in Hubei have widely integrated authentic rural environment renovation projects into their curricula, achieving notable successes in leveraging artistic empowerment for rural cultural revitalization. For instance, the rural renovation practice in Hongmiao Village, Mahe Town, jointly undertaken by faculty and students from Wuhan Donghu College's Environmental Design, employs a "real-world problem, real-world solution" teaching approach. Here, teachers assume the role of project mentors, extending the classroom into the rural landscape. Students stepped out of the classroom to experience authentic rural environments firsthand, with their exploratory drive and thirst for knowledge notably heightened compared to conventional classroom settings. However, due to limited research time, students' design proposals often lack deep engagement with villagers' actual living needs, production habits, and local culture. Consequently, while possessing artistic merit, these designs frequently prove difficult to implement in complex spatial planning scenarios or fail to align with rural lifestyles. Traditional design methodologies struggle to comprehensively and rapidly capture and analyse intricate rural ecological data, leading to mismatches between supply and demand and rendering design outcomes challenging to execute.

2.2. Initial Application of Digital Technologies in Professional Curricula

Some pioneering environmental design teaching teams at universities in Hubei Province have begun guiding students in employing drones for site surveying and AI modelling. For instance, in the course "Traditional Village Conservation and Renewal" at Wuhan Institute of Design and Engineering, staff and students utilised drone oblique photography to digitally reconstruct 56 Ming and Qing dynasty dwellings in Yadoushan Village, Macheng. The integration of AI technology into environmental design education and practice has, to some extent, enhanced the efficiency of preliminary research and the expressiveness of design proposals. However, this has led to students becoming overly reliant on digital tools. Some students exhibit a tendency to rely directly on AI for generating visual outputs, remaining predominantly at the level of auxiliary drafting and artistic expression. This approach risks bypassing the essential design thinking process and fails to fully explore AI's potential applications in rural data analysis, collaborative design, and industrial implementation, particularly within the context of respecting local landscapes and cultural heritage.

2.3. Monolithic Technology and Functionality of Digital Practice Platforms

For digital practice platforms targeting rural development, the Environmental Design discipline must establish an integrated smart platform encompassing teaching,

research, and social services. [2] For instance, Wuhan Light Industry University's course "Rural Spatial Revitalization and Development" leveraged university-enterprise collaboration to build a digital practice platform integrating "design-governance-service" for Fairy Village, thereby supporting its emergence as a model case for rural revitalization. Currently, most universities focus on employing singular technological tools within their digital practice platforms—such as text-to-image generation for conceptual design drawings—resulting in homogenised outcomes across villages. There remains a lack of integration with functionalities like GIS geographic information systems and AI big data analytics. This singularity constrains the comprehensive efficacy of digital technologies in rural revitalization, necessitating breakthroughs through digital technology integration and the dismantling of disciplinary barriers.

3. Pathways for Environmental Design to Support Rural Revitalization under "AI + Education"

3.1. Establishing an "AI + Local" Intelligent Design Workshop for Precision Design Intervention

Establish a rural environment database, continuously collecting diverse data on geography, ecology, architecture, industries, and culture through IoT sensors, drone aerial photography, satellite remote sensing, and social surveys. Subsequently, introduce AI data analysis tools and provide foundational training for students, enabling them to utilise computational learning algorithms to analyse rural spatial usage patterns, identify key areas for regional landscape conservation, and predict rural industrial development trends. During the scheme generation phase, guide students in employing parametric design and generative AI tools. After inputting site conditions, functional requirements, cultural elements, building codes, and relevant constraints, AI-assisted generation produces multiple preliminary schemes for refinement and selection, thereby enhancing design scientific rigour, adaptability, and innovation efficiency.

3.2. Reshaping the Integrated Teaching System: "Design Empowerment – Data Driven"

Design empowerment traditionally manifests in case-based teaching within conventional curricula, emphasising student creativity and final design outcomes. [3] The new teaching system incorporates an AI application module, enabling students to master the full text-to-image workflow. Through repeated practice in generating conceptual visuals based on rural research, the module prioritises big data analysis to enhance design efficiency and creative expression. Practical implementation integrates AI-driven visualization tools such as MidJourney and Stable Diffusion. These technologies analyse local cultural elements, integrate GIS and BIM for holistic rural spatial planning, and employ digital twin and virtual simulation techniques. Strengthened industry-academia-research collaboration serves regional economies, achieving integrated design empowerment and data-driven outcomes.

3.3. Establishing a Cross-Disciplinary Digital Practice Platform for Rural Development

The Hubei Provincial Department of Education launched the "Hundred Universities Supporting Hundred Counties" rural revitalization initiative in 2024, designating the

Environmental Design AI Rural Construction Project as a provincial-level special programme with dedicated university funding. [4] Leveraging “AI + Education”, this initiative centres on environmental design disciplines while integrating agriculture, tourism management, computer science to jointly undertake intelligent planning and business model design for rural industrial spaces. AI design analysis tools tailored for rural contexts will be developed. Through a hybrid approach combining online collaboration platforms and offline rural intelligent design workshops, interdisciplinary rural construction teams comprising both faculty and students will be formed. Priority will be given to collaborative research on rural revitalization projects designated for targeted poverty alleviation by the university. This will establish the Hubei Provincial University Rural Revitalization Design Alliance, creating a multidisciplinary digital practice platform for rural construction that spans AI data collection, AI tool algorithms, and AI-driven rural scenario construction.

4. Conclusions

Addressing core challenges faced by environmental design at regional universities in rural service practices, this paper systematically analyses the current state and constraints of digital transformation within environmental design disciplines. It explicitly identifies challenges in traditional practice-based teaching concerning technological application, pedagogical systems, and disciplinary collaboration. “AI + Education” entails more than merely introducing AI tools as technical skills in the classroom; it involves transitioning rural projects from experience-driven to data-driven precision design. This approach emphasises integrating data analysis into students’ design thinking, cultivating multi-skilled professionals with digital literacy and a connection to rural communities. It enhances the breadth and depth of intellectual resources universities can offer to rural areas, providing valuable reference for the digital transformation of environmental design at local institutions.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the Key Project of Wuhan Donghu College’s Teaching Research Programme: Optimisation and Implementation of Talent Development Schemes Embodied in the Environmental Design Programme to Foster the ‘Artisan Spirit’.

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