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GDHI Intrinsic Transformation and Development of Landscape Architecture Discipline Oriented by Green Development and Digital Intelligence-driven

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Abstract In order to effectively serve the modernization of China, the Landscape Architecture discipline of the College of Science and Technology of China Three Gorges University, building on its distinctive disciplinary strengths and proactively adapting to the demands of the times, has proposed an innovative transformation and development model centered on the principle of "Green, Digital-intelligence, Humanity, and Integration (GDHI)" and conducted comprehensive practical research through multiple dimensions, including restructuring talent training programs, innovating teaching content and methods, and fostering in-depth interdisciplinary integration. This has resulted in the formation of a distinctive, innovative teaching methods, providing valuable experience for further transformation and reshaping of the Landscape Architecture discipline and related disciplines.

Keywords Green, Digital, Connotation, Transformation

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In today's world, where the Fourth Industrial Revolution centered on artificial intelligence, big data, the Internet of Things (IoT), cloud computing, is sweeping across the globe and the iteration of emerging technologies is accelerating at an unprecedented pace, Chinese modernization guided by the new development philosophy of "innovation, coordination, green, openness, and sharing" has become the foremost mission in the new ear. With the constant emergence of new technologies and industries, traditional sectors are also facing unprecedented pressure to transform, upgrade and undergo the replacement of old with new, while often lacking the capacity for technological innovation and business model reinvention.

On the other hand, emerging industries are experiencing a growing demand for interdisciplinary, cross-disciplinary, and innovative talents, while the demand for talents in traditional sectors is contracting. This has created a significant mismatch between the competencies of university graduates and market requirements, leading to the paradoxical situation where "college graduates struggle to find employment while businesses face talent shortages." The root of cultivating student competences lies in the intrinsic characteristics and knowledge systems of academic disciplines with the ultimate implementation resting in classroom teaching and extracurricular practices. Therefore, it has become a key priority for universities to ensure that the disciplines adapt to the times, embrace transformation, undergo intrinsic evolution, and lead industry development, thereby serving and supporting the construction of Chinese-style modernization.

On February 21, 2023, the Ministry of Education and four other government departments jointly issued the *Plan for Optimizing and Reforming the Adjustment of Academic Disciplines in Regular Higher Education* (Jiao Gao [2023] No.1). The document stipulates that: higher education institutions must scientifically formulate medium- to long-term plans for the development of their disciplines. They should proactively adapt to the needs of national and regional economic and social development, knowledge innovation, scientific and technological progress, and industrial upgrading, and effectively carry out the optimization, adjustment, upgrading, renewal, and creation of the disciplines[1].

Building a tripartite linkage mechanism involving enrollment, cultivation, and employment can effectively enhance the quality of higher education, promote the sustainable development of disciplines, enhance students' employment competitiveness, and balance the supply and demand of talents in the new era. Within this framework, high-quality employment serves as the goal-oriented target, which should drive the adjustment of enrollment professional structure and self-renewal of talent cultivation based on the development trend of the industry and the demand for social talents; Dynamic enrollment acts as the regulatory tool that enables institutions to rationally suspend, add, restructure, or replace disciplines based on big data analysis of enrollment, employment and market shifts, thereby ensuring that higher education remains synchronized with market and industry needs; Cultivation process constitutes the implementation pathway, the main battlefield for talent cultivation, and the essential core of higher education. Through concrete measures such as restructuring disciplinary focus and connotation, optimizing talent training program, updating teaching content, and innovating teaching methods, higher education institutions can achieve the intrinsic transformation, upgrading, and sustainable development of disciplines. This, in turn, enables them to effectively serve and support the Chinese modernization development.

1 Connotation of GDHI grounded in a global perspective and a modernized national industrial system

The current complex and ever-changing international situation, characterized by environmental degradation, intense technological competition and escalating geopolitical conflicts, has elevated the focus on critical areas such as ecological protection, energy development, artificial intelligence, social governance, and humanistic care. Within the landscape architecture industry, academic research hotspots and construction practice cases are now primarily concentrated on themes like ecological restoration, green development, digital-driven approaches,

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health and humanistic considerations, and interdisciplinary integration. Meanwhile, the national modern industrial system, defined by its intrinsic characteristics of innovation, regenerative capacity, ecological sustainability, and systematic integration, advocates for a development path centered on multi-industry convergence. This path is steered by the smart economy, grounded in modern agriculture, and places the big health industry at its core.

Integrating into global economic development and globalization trends to serve and support China's modernization constitute the fundamental mission of reshaping the intrinsic transformation for academic disciplines. Therefore, "Green development, Digital intelligence, Humanistic health, and Integrated innovation" have become the key words for the intrinsic transformation and development of landscape architecture discipline. Specifically speaking, the green development domain encompasses knowledge systems of ecological restoration, energy conservation and consumption reduction, sponge cities, efficient water use, brownfield remediation, and stormwater management. The digital intelligence-driven domain encompasses knowledge systems of smart landscaping, intelligent construction, digital twin cities, virtual reality, digital landscape modeling, and landscape big data. The humanistic health domain encompasses knowledge systems of health-supportive agriculture, therapeutic landscapes, nature education, community gardens, edible landscapes, and humanized design. The interdisciplinary integration domain encompasses the integrated and innovative development of disciplines of ecology, horticulture, architecture, arts, anthropology, sociology, data science, and tourism management (Table 1).

2 Aligning service-oriented regional economy with sustainable development

The Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting High quality Development in the Central Region in the New Era, issued on April 23, 2021, point out that by 2025, green development in the central region will be deeply promoted, with the reduction rate of energy consumption per unit of regional GDP reaching the national average, carbon dioxide emissions per unit of GDP further reduced, and a resource-saving and environmentally friendly development model widely established. By 2035, the central region will have largely established a modernized economic system; the overall industry will have advanced towards the medium-high end of the value chain; the coordinated development of urban and rural areas will have reached a high level; the green and low-carbon production and lifestyle will have taken shape fundamentally; the open economic system and mechanism will be further improved; people's lives will be happier and healthier; socialist modernization will be basically achieved; and common prosperity will witness more substantial and tangible progress[2].

Simultaneously, aligning with the regional development layout requirement of "One core leading, two wings driving, and coordinated regional development" in Hubei, Yichang is building itself into an exemplary city in Yangtze River conservation. It is deeply implementing the three major development strategies of "Dual carbon initiative leadership, hub empowerment, and robust industry for urban revitalization", with ecological protection, cultural tourism, health, energy, and digital transformation positioned as the pillar industries driving innovation.

The cultivation of students' professional competence and comprehensive abilities should also align with regional economic development goals. Higher education institutions should restructure their disciplinary knowledge systems to correspond with local innovation-driven industrial frameworks. By leveraging their disciplinary strengths and unique characteristics, particularly in ecological governance and restoration expertise, planning and design capabilities, and core commitments to humanistic care, they should facilitate knowledge transfer

Table 1 Knowledge and competency for GDHI intrinsic reshaping in landscape architecture

Key words	Transformation connotation	Main knowledge system	Description of knowledge and skill objectives
Green development	① Ecological balance ② Recycling economy ③ Energy conservation and consumption reduction ④ Resilient landscape	① Ecological restoration and biodiversity ② Efficient water use and water quality restoration ③ Brownfield remediation and regeneration ④ Climate adaptation and stormwater management ⑤ Clean energy and green travel ⑥ Resource conservation and recycling	Focusing on ecosystem structure and function, it aims to achieve coordinated development between the environment and economy through biodiversity conservation and resource recycling. By utilizing ecological engineering techniques such as optimizing the "patch-corridor-matrix" landscape system, constructing ecological corridors, and building sponge cities, it enhances landscape value while preserving the original ecological foundation.
Digital intelligence	① Landscape big data ② Virtual reality ③ Intelligent construction ④ Intelligent management and maintenance	① LIM landscape information model ② Virtual reality scene construction ③ Digital twin city technology ④ New building materials and construction ⑤ Digital landscape maintenance management ⑥ Smart park management	The deep integration of digital technology and landscape architecture knowledge utilizes 3D modeling to achieve visual design, enhances interactivity through VR/AR technology, and predicts ecological impacts through environmental simulation software. The adoption of information-based model (BIM) improves accuracy, and combines Internet of Things technology to achieve real-time monitoring and dynamic maintenance and adjustment.
Humanistic health	① Health care and healing landscape ② Landscape humanistic care ③ Edible garden ④ Community nature education	① Forest wellness and healing ② Age-friendly landscape ③ Urban edible garden ④ Community garden and maintenance ⑤ Nature education and community governance ⑥ Healthy agriculture and local cultural context	Prioritizing harmonious coexistence between humans and nature, it aims to enhance people's physical and mental well-being through landscape design and cultural heritage integration, and synergize edible economies with ornamental economies, while emphasizing inclusive and harmonious urban-rural public spaces. By implementing all-age-friendly design and social interaction-oriented layouts, it aims to foster community stability and interpersonal engagement.
Integrated innovation	① Smart tech-integrated landscape ② Cultural tourism and creative industry incubation ③ Community collaborative governance ④ Regional cultural inheritance	① Landscape + Information technology ② Landscape + Tourism economy ③ Landscape + Social governance ④ Landscape + Cultural narrative	The interdisciplinary integration of landscape architecture is not only a technical process of knowledge combination, but also a philosophical practice of reconstructing the contract between humans and nature. By achieving multidimensional symbiotic integration, it catalyzes emerging industries, ultimately aiming to mediate the fundamental contradiction between civilization development and ecological sustainability through spatial intervention.

and integrated innovation in specific fields such as energy conservation and consumption reduction, smart cities, harmonious and beautiful villages, livable environment, digital twins, virtual reality, cultural tourism planning, landscape-based wellness, nature education, community governance, and intangible cultural heritage protection, so as to supply high-quality innovative talent for the region, further carry out continuous dynamic adjustment and updating, and clarify the sustainable development pathway for the discipline of landscape architecture.

3 Measures for the intrinsic transformation of landscape architecture disciplines

3.1 Reconstructing GDHI intrinsic landscape architecture talent cultivation program

The talent cultivation program serves as the overarching framework for teaching and educating within a discipline, and intrinsic transformation must first be implemented within the program. Grounded in disciplinary frontiers, national strategies, and provincial/municipal development plans, and guided by market dynamics and employment demands, institutions should further deepen university-enterprise collaboration, synergistic talent cultivation, and practical innovation, which necessitates thorough revision and restructuring of the existing talent development plan[3]. The new talent cultivation program focuses on green development concepts (G) (energy conservation and consumption reduction, recycling materials, ecological restoration, and resilient landscapes), digital intelligence technologies (D) (information modeling, virtual reality, digital twin cities, and smart landscaping), humanistic health care (H) (health care and healing landscape, organic agriculture, all-age inclusive design, nature education) and cross-integration industries (I) (interactive experiences, cultural and creative tourism, community governance, intangible cultural heritage preservation). Full consideration will be given to the diverse student profiles (undergraduate, college transfer students), academic foundations, and institutional positioning of the landscape architecture program. Adhering to the principles of overall coordination and differentiated development, the program will achieve a comprehensive overhaul of the teaching system, curriculum content, and teaching methods. In the meantime, the proportion of practical components should be further increased to train students' innovative and practical abilities. This involves deepening the integration of "research commercialization, teaching serving local needs, and university-enterprise collaborative education". The program will implement an integrated "industry-academia-research-application" framework and an "enrollment-education-employment" linkage mechanism. These measures aim to establish institutional safeguards for self-renewal and intrinsic transformation of disciplines (Fig.1).

3.1.1 Undergraduate talent cultivation program integrating green development and digital twin. The undergraduate program in landscape architecture has been established for 8 years, producing 5 batches of graduates for society. Based on comprehensive analysis of historical enrollment sources, employment destinations, industry market development trends, job demand, and disciplinary and professional construction experience, the program will continue to build upon its core competitiveness of "ecological civilization construction", take "carbon

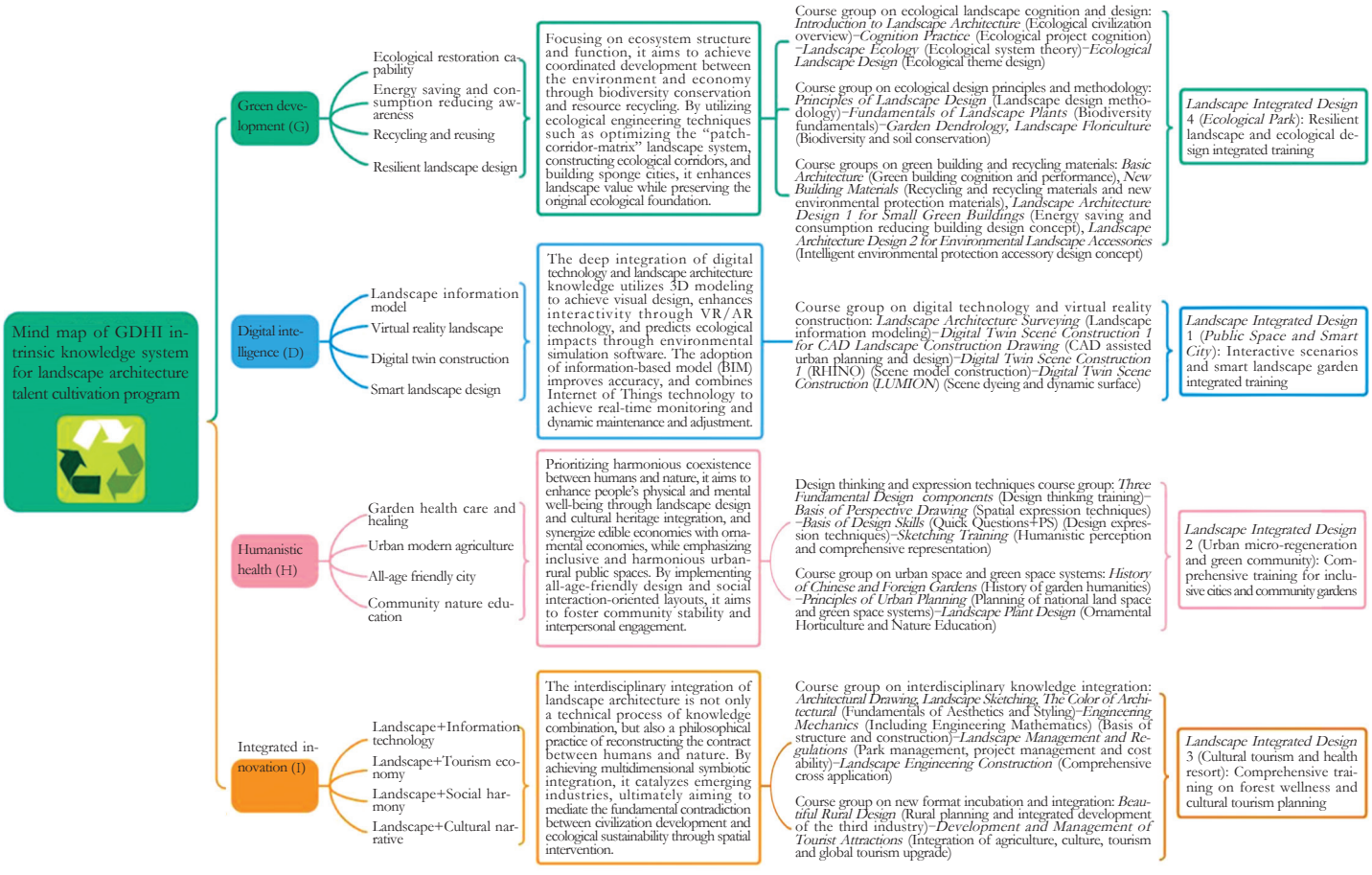

Fig.1 Mind map of GDHI intrinsic knowledge system for landscape architecture talent cultivation program

neutrality" as the disciplinary responsibility, strengthen the expertise in building livable urban-rural environments, integrate the green economy concept of "green production, green circulation, green distribution, green consumption" and cutting-edge digital technologies of "smart cities, smart landscape, digital twin, digital countryside" into the professional teaching and practice system, which will become the transformation connotation of disciplinary and professional adaptation to the changes of the times. Meanwhile, the program will uphold its social responsibility and cultivate comprehensive competencies by emphasizing "community engagement, community governance, cultural and tourism planning, and health care and healing".

Regarding the professional competencies of students, the focus is shifting from traditional industry roles of "urban and rural planning, landscape design, and landscape construction" to modern innovation-driven sectors like "smart urban-rural development, green development, and digital twins." Students will develop core competencies in "ecological restoration and eco-design, energy conservation and circular regeneration, and digital twin scenario development, which enable them to provide comprehensive service aligned with national strategies and regional economic development[4].

3.1.2 Top-up degree curriculum framework integrating ornamental horticulture and nature education. The Landscape Architecture discipline in the junior college to bachelor's degree program at the College of Science and Technology of Three Gorges University is a newly added enrollment tier, and its students mainly come from local vocational colleges. Preliminary research and analysis shows that most of the source students are majored in two categories: agriculture-related majors (horticultural technology, landscape technology, and modern agricultural technology) and landscape engineering-related majors. However, there is a huge difference in the curriculum system and knowledge and skills between these two majors in higher vocational education, and there are also significant barriers to connection with the knowledge and ability foundation of the first two years of undergraduate studies in landscape architecture. Considering the existing capabilities, connection between vocational and undergraduate programs, and employment orientation of students upgrading from vocational to undergraduate programs, the program will implement the talent development strategies of "differentiated program design, specialized career development tracks, integration of internal and external resources and enhanced adaptive capacity building".

The strategies of "differentiated program design, and specialized career development tracks" fully respect the learning foundations and competency strengths acquired by students transitioning from vocational to academic bachelor's programs, and independently develops talent training programs tailored for students upgrading from vocational colleges to universities. The program will intensify training in plant cultivation, planting, maintenance, landscaping abilities, as well as the design, construction, operation and maintenance abilities of small-scale green spaces, enabling the graduates prepared for serving sectors such as garden city development, ornamental horticulture design, floral exhibition and display, and community-based nature education. The program aims to cultivate innovative, application-oriented talents for the local region who are proficient in greening practices, skilled in management and maintenance, and committed to community integration[5].

The strategies of "integration of internal and external resources and enhanced adaptive capacity building" emphasize cultivating the adaptability, extensibility, collaborative competence and resilience of the students upgrading from vocational colleges to universities after their transition into the new undergraduate phase. Analysis of similar programs at peer institutions and other disciplines within the university reveals that the most significant challenge for top-up students entering undergraduate studies is the wide variation in their initial majors and foundational knowledge, stemming from diverse regional and institutional backgrounds. This creates a substantial misalignment with the existing disciplinary framework of the first two undergraduate years, presenting significant learning obstacles. Although the top-up degree curriculum system in landscape architecture cannot fully cater to different students, the program can achieve the following: freshman orientation, foundational coursework and practical training foster complementarity and mutual skill-sharing between students with horticultural (agronomy) and engineering (civil) backgrounds within the class; the combined classes for select courses, synchronized practical sessions, and collaborative competitions enable rapid integration and co-development between existing undergraduates and top-up students within the major; intrinsic transformation, interdisciplinary convergence, and synergistic interaction drive the program's comprehensive integration with disciplines like engineering cost management, intelligent construction, computer science and technology, tourism management, and visual communication design. This propels the evolution of related fields towards the new formats of "green, digital and cultural tourism".

3.2 Content and method innovation of GDHI intrinsic teaching

Teaching practice is the foothold and testing ground for talent cultivation. The transformative development of higher education institutions and intrinsic construction of discipline are measured by the comprehensive quality, employment outcomes and societal evaluation of the cultivated students. Without teaching practice, all innovative ideas, system construction, and institutional construction remain mere empty talk. The institutions can find out a viable transformation pathway suited to the demands of modernization and their own unique context only by embedding GDHI intrinsic transformation within teaching and learning practices, and continuously testing, refining, and adjusting it through practices.

3.2.1 Outcome-oriented teaching reform. The misalignment between higher education disciplines and industry development, along with the skills gap between graduates and job requirements, lies in the fact that the teaching systems, content, and methodologies are detached from sectoral development and market dynamics, which has gradually fostered an insular, "ivory tower" talent cultivation model. Therefore, in the current era, the key to unlocking the transformation of higher education and the development of disciplines lies in proactive integration and self-renewal, and outcome-oriented teaching has consequently emerged as the perennial driving force for teaching content updating and teaching method innovation[6].

The talents cultivated from contemporary higher education institutions are innovative, application-oriented and interdisciplinary ones equipped for China's modernization. Reshaping the teaching objectives in this orientation can further foster the renewal of teaching content and reform of teaching methods. The innovative ability-oriented professional curriculum system is aligned with the national innovation-driven strategies and global disciplinary trends, taking "green development, digital technologies, twin cities, smart landscapes, humanistic wellness" as the foundation of the talent development plan. The system is deeply integrated with core professional skills such as urban-rural planning, tourism planning, vertical design, spatial design,

architectural design, and plant-based landscaping, permeating all specialized courses to achieve comprehensive content renewal. The applied ability-oriented curriculum system significantly increase practical components, shifting some in-class hours and credits to extracurricular activities. The teaching mode evolves from purely campus-based learning to integrated on-campus and field-based experience, emphasizing deep immersion in industry settings for practical learning and application, which ensures parallel development of theoretical knowledge and practical skills during the school time. The interdisciplinary ability objective emphasizes cultivating talents with knowledge transferability, versatile expertise, and adaptability. This necessitates that the teachers, through teaching implementation and teaching research, propel the convergence of the discipline with IoT engineering, computer science and technology, management science and engineering, tourism management, smart community management, intelligent construction and digital media arts with the cultivation of new quality productive forces and innovation-driven industrial development within the landscape architecture sector. They must continuously update their own knowledge base, teaching materials, and methodologies, and empower students to perceive contemporary demands and industry evolution through the lens of their disciplines, equipping them with the capacity for employment and entrepreneurship across multiple avenues, dimensions, and positions.

3.2.2 Multidimensional teaching content updating. The update of teaching content is not only about updating teaching objectives and course names, but also requires multidimensional collaborative updates of knowledge system (framework construction), teaching syllabus (institutional basis), course content (essential connotation), and presentation courseware (teaching implementation), in order to ensure that the quality of discipline-based education meets industry demands and equips students with competencies relevant to contemporary development. In terms of core knowledge of ecological restoration and ecological design, a logically progressive framework (introduction–recognition–principles–methods–application–integration) has been established, integrated with a lifecycle perspective (environment, biology, architecture, materials, processes, operation and maintenance, and hot trends (including energy conservation and consumption reduction, efficient water use, water and soil conservation, brownfield utilization, native species, habitat restoration, landscape resilience, and stormwater management) have been comprehensively expanded to all specialized courses. In terms of digital technology empowerment, courses such as engineering surveying, computer-aided design, and urban open space design have undergone comprehensive updates to both their titles and substantive content. Cross-disciplinary technologies like Low-Attitude Drone Surveying, GIS (Geographic Information Systems), and BIM (Building Information Modeling) are now applied within landscape surveying and landscape information modeling. Traditional drafting and modeling focused solely on buildings, and green spaces are being progressively replaced by "urban planning layouts, comprehensive virtual simulations, and real-time rendering engines". Courses on urban public greenspaces and open space design now lay emphasis on emerging technologies and trends oriented by "smart cities, smart landscapes, and interactive landscapes".

3.2.3 Diversified and integrated teaching methods. Landscape architecture is inherently an interdisciplinary, application-oriented discipline, integrating elements of Arts, Engineering, Agriculture, Economics, Management, and Law. Consequently, its teaching methods should not be confined to rigid, singular models. Capitalizing on the collaborative strengths of in-house faculty and part-time industry instructors, the program actively promotes cross-disciplinary and cross-institutional teaching and research partnerships. Upon reaching consensus on teaching objectives and educational goals, teaching teams are encouraged to leverage their diverse academic backgrounds and industry resources, gradually fostering unique teaching methods that are tailored to the student-centered specific context.

The instructors of the structure and architecture course group align chapter content with current industry trends and forge strong connections with intelligent construction and advanced materials practice bases. They employ a "theory-practice rotation" teaching method, emphasizing both classroom learning and hands-on application, guide students to engage with the critical trend of "whole-life-cycle green building". The instructors of ecological design and new industry incubation course group persistently innovate field teaching within the urban-rural design workshop model, lead students directly into urban communities, rural villages, and scenic areas during the in-class practical sessions to carry out activities of field research, solution design, and project presentations after theoretical instruction in relevant courses, which activate community agency among residents while enabling students to develop practical and low-energy solutions on-site, and integrate ecological design and environmental design with agritourism, brand strategy, forest wellness tourism, and value-added agricultural product processing. The digital technology and virtual reality course group plans to draw on the collaborative teaching model of industry-academy partnership, modeled after successful industry college collaborations. They will engage frontline designers from enterprises specializing in intelligent construction, digital twins, and visual effects to deliver instruction and provide practical guidance. Training will be rigorously oriented towards the latest industry demands, focusing on sharpening students' practical skills[7].

3.3 GDHI intrinsic multidisciplinary deep integration development

As an interdisciplinary field, the landscape architecture major continues to progress towards greener, smarter, more efficient, and human-centered development, necessitates continuous enhancement of interdisciplinary integration at two distinct levels. First is the horizontal integration with innovation-driven industries and regional economies, integrating core professional skills (ecological restoration, planning and design, virtual construction) into industries of big health, cultural tourism and creative industries, social governance, digital media, film and gaming, generating new quality productivity and employment and entrepreneurship opportunities. The second is the trending vertical integration with the development of disciplines empowered with advanced digital technologies, integrating the entire process of planning and design, plant cultivation, construction, management and maintenance of the landscape industries with "terrain mapping, information modeling, ecological deduction, intelligent construction, landscape big data, virtual landscape, scene interaction, twin cities, smart agriculture, and intelligent nursery".

3.3.1 Cross-disciplinary teaching team development. Building upon the existing "cross-enterprise, multi-disciplinary" faculty team, the program further expands the enterprise resources in related fields such as digital twins, intelligent construction, seedling cultivation, cultural tourism, landscape management, and film and games production. Efforts will be made to the advancement of industrial college initiatives and the school-enterprise dual-system teaching mode, continuously recruit top-tier technical professionals from industry to serve as part-time teaching teams to undertake course instruction, graduation project supervision, innovation and

entrepreneurship education, academic seminar participation, internship and employment recruitment activities, and collaborative teaching and research projects. It will establish a "teaching-internship-employment" direct pathway, breaking down barriers between academia and industry, and solidifying joint talent cultivation and co-development of academic disciplines and programs. Concurrently, aligning with the transformation and development progress, it will strategically recruit young talents specializing in frontier research areas like botany and design, which can be a complementary synergy to the existing faculty structure, thus providing the essential talent foundation necessary to support the national strategic emerging industries and facilitate the intrinsic transformation of disciplines.

3.3.2 Integrated curriculum module restructuring. No matter the new round of technological revolution and industrial transformation directed with "green, intelligent, and healthy", or the professional transformation and construction of landscape architecture with "Green development, Digital intelligence driven, Humanistic care, and Physical and mental health" as the connotation, both are characterized by the new formats and technologies of interdisciplinary intersection of "engineering, literature, arts, agriculture, economics, and law". Therefore, the fragmented curriculum system and rigid fixed teaching mode can no longer meet the needs of contemporary innovative and composite talent cultivation. It is therefore imperative to reshape the curriculum system and teaching content towards a integrated and innovative model. Based on the four major thematic focuses of landscape architecture within GDHI, corresponding integrated curriculum modules have been organized and constructed for specialized courses.

The "Green development" curriculum module has restructured three course groups: ecological landscape cognition, ecological design principles, and green building design. It integrates the introduction to the discipline, field recognition, landscape ecology, and ecological landscape design to form a progressive and alternating theory-practice course group of "Theory overview-Wetland cognition-Ecological Principles-Ecological applications", breaking the boundary between basic disciplinary courses and specialized core courses, and promoting the integration of ecology and design. Combining landscape design principles with dendrology and floriculture, it promotes the integrated comprehension of knowledge points on landscape pattern, topography, vertical design, composition design, and the ecological, adaptive, seasonal, and economic aspects of plants, highlighting the core design concept of ecological balance and sustainable development of "working with the natural terrain and using locally suitable plants". The combination of architectural basis, building materials, architectural design, and installation design makes it a comprehensive green building system of green building cognition - green building materials - green building design - eco-intelligent installations, representing a deep integration of architecture, ecology, architectural design, building renovation, smart construction, circular regeneration, and energy efficiency and environmental protection.

The "Digital intelligence driven" course module integrates unmanned aerial vehicle (UAV) surveying and mapping, CAD-aided urban-rural planning, RHINO digital scene construction, LUMION virtual reality rendering, and dynamically updates the specific scene modelling software and real-time rendering software (or engines) according to market and industry shifts. With new perspectives and cross-domain thinking, it transforms the fixed conventional approaches to landscape construction drawing, architecture and green space modeling, and landscape design rendering production, strengthens students' skills in building digital twin cities and virtual reality scenes, and serves the widespread demand for smart city construction and virtual simulation applications nationwide.

The "Humanistic health" curriculum module links specialized courses such as basic aesthetics, painting techniques, humanistic landscapes, garden history, green space planning, plant landscaping, and community renewal, leveraging the immersion and healing power of aesthetic education, humanities, green spaces, and gardens. It addresses the development of eco-friendly, transportation-friendly, all-ages-friendly, and education-friendly environments within modern high-density cities. By fully incorporating ecological integrity, aesthetic quality, cultural significance, interactive potential, and educational value into spatial design and green space creation, the module fosters physical and mental well-being, enhances social interaction, and contributes to societal harmony.

The "Integration innovation" curriculum module integrates the basic knowledge of aesthetics, engineering, management, and economics; On the other hand, it combines comprehensive planning and design courses such as harmonious rural design, tourist scenic area development and management, and wellness resort planning and design, to jointly explore the incubation and cultivation of new business models for the integrated development of primary, secondary, and tertiary industries in cities, suburbs, and rural areas, including "agri-cultural-tourism and nature education, brand planning and visual design, forest wellness and landscape therapy, smart farming and value-added agricultural processing.

3.3.3 Intelligent teaching methods application. According to the transformation and upgrading needs of applied university education and teaching, further strengthening practical application and reducing in class hours have put forward higher requirements for students' autonomous extended learning and teachers' teaching method updates. In terms of teaching means, it is an inevitable way for educational reform to make full use of the advantages of contemporary Internet and artificial intelligence technology. Based on the characteristics and teaching principles of landscape architecture discipline, the teaching team has made reform and innovation attempts in artificial intelligence assisted teaching in the following aspects:

(1) AI-assisted information collection. Most of the core courses in this discipline have a course design oriented in class practice, with a large number of practical projects in planning, architecture, space, and greening as assessment topics, which can effectively cultivate students' problem-solving skills in practical contexts. When field investigation conditions such as distance, funding, and time are not available, AI-assisted data collection and analysis can effectively obtain information such as site conditions, topography, planning scope, literature resources, satellite imagery, and on-site photographs, thereby supporting both instructional delivery and student project execution.

(2) AI-assisted conceptual generation. In both planning and design projects, analyzing existing site, architectural, infrastructural and landscape elements and developing intended solutions are necessary for conducting similar comparisons, drawing on experience, and exploring ideas. It is also an essential content in texts and exhibition boards. The current AI graphics generation software, when properly trained, can produce highly effective conceptual designs and visuals, significantly saving time and effectively mitigating copyright concerns associated with sourcing images from the Internet[9].

(3) AI-assisted learning extension. Artificial intelligence can also play a significant role in diverse learning contexts, including in-class

discussions, flipped classrooms, case study sessions, and extracurricular extension activities. It has irreplaceable advantages in searching, screening, and summarizing exemplary case achievements, cutting-edge academic progress, interconnected knowledge points, policy and regulatory documents, and can serve as an important assisting tool for self-directed learning and extended learning both in and out of class.

4 Summary and prospect

In the new era of technological revolution and industrial transformation, colleges and universities, as the primary institutions for high-quality talent cultivation, must seize the opportunity of the times, optimize the disciplinary structures, and achieve the intrinsic disciplinary transformation so as to cultivate innovative and interdisciplinary talents capable of shouldering the mission of the times for the society, integrate into the national strategic emerging industry layout, and serve the modernization of China. The research and practice on the GDHI intrinsic transformation of the landscape architecture discipline at the College of Science and Technology of Three Gorges University exemplifies how a low application-oriented university, building on its own realities and disciplinary characteristics, undertakes comprehensive and multi-dimensional reform from the aspects of educational positioning, training objectives, curriculum system, teaching content, and teaching methods. Aligned with the national new development concept of "Innovation, Coordination, Green, Openness, and Sharing", it explores new pathways for the sustainable development of the landscape architecture discipline. However, the intrinsic transformation and structural optimization of the landscape architecture discipline are still in the initial stages of exploration and practice. The depth and breath of laboratory development, faculty enhancement, and curriculum construction urgently need to be strengthened, and related undergraduate and vocational majors also need to follow up on application and joint development. Furthermore, the effectiveness of current disciplinary development and teaching reforms also need to be evaluated and validated through ongoing tracking by current students, graduates, teaching teams, teaching supervisors and employers.

In the future, with the accelerated iteration of science and technology, the teaching content, teaching methods, and educational infrastructure of landscape architecture discipline will undergo continuous renewal. Feasible directions for further advancing the "Greening, Intelligence, Humanization" development of the discipline include the following: adding specialized courses in smart landscape technology and landscape interaction technology; adapting and promoting mature AI modeling and rendering software; building virtual reality laboratories for ecological simulation, tourism data simulation, AR virtual simulation internship and training; further promoting curriculum reform and strengthening practical abilities; deepening engagement with urban and rural communities to serve the development of modern "ecological, intelligent and livable" environments, including smart cities, smart landscapes, age-friendly cities, and green communities[10].

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