Reconstruction of Digital Design Teaching and Paths of Ideological and Political Integration in Landscape Architecture Driven by AIGC

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Abstract According to the long-standing teaching dilemmas in the digital design courses of landscape architecture in colleges and universities, such as overemphasis on technology and neglect of creativity, and the superficial integration of ideological and political education, a new teaching model of "creative driving–technology empowerment–comprehensive improvement" and paths of ideological and political integration were constructed based on AIGC technology. The digital design presentation course of the landscape architecture major at Chongqing College of Humanities, Science & Technology was taken as an empirical object, and quantitative and qualitative comparisons were conducted across dimensions such as design efficiency, scheme quality, depth of ideological and political integration, and learning experience. The teaching experiment results show that the AIGC-enabled mode can reduce the total design time by approximately 51%, significantly enhance the innovation and technical expressiveness of the schemes, and increase the explicit rendering of ideological-political connotations by over 25%. The study confirms that AIGC is not only a technical tool for improving teaching efficiency, but also an effective carrier for achieving the integration of value guidance and professional skills, providing a reference path for the cultivation of interdisciplinary landscape architecture talents in the new era.

Keywords AIGC, Landscape architecture, Digital design, Teaching model, Curriculum ideology and politics, Human-machine collaboration

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Currently, global higher education is undergoing an unprecedented profound transformation[1]. With the comprehensive deepening of the national strategy combining "artificial intelligence and education" and the surging wave of digital transformation in higher education, traditional education is being redefined[2]. The series of action plans issued by the Ministry of Education in recent years clearly state that higher education must break through the barriers of traditional single knowledge imparting and shift towards a new paradigm of comprehensive education that emphasizes both ability development and value guidance[3]. Especially after the promulgation of the *Guidelines for the Ideological and Political Construction of Courses in Colleges and Universities*, how to implicitly dissolve moral education into the teaching of professional skills, "like salt in water", has become a difficult problem that colleges and universities urgently need to solve[4]. For colleges and universities, this is not only an innovation in teaching methods, but also a fundamental reconfiguration of the logic of talent cultivation, namely finding the precise matching point between technical logic and value guidance in professional teaching and achieving the deep integration of the two[5].

Meanwhile, the landscape architecture industry is undergoing a dramatic transformation from "incremental expansion" to "stock renewal"[6]. Urban renewal has raised higher requirements for the refined improvement of the living environment, while the rural revitalization strategy calls for in-depth exploration and inheritance of regional cultural heritage[7]. This industry trend urgently requires highly comprehensive and versatile talents who should not only have solid technical implementation capabilities but also possess profound humanistic care and ecological ethics qualities[8]. However, as a high-end talent output base, the landscape architecture major in colleges and universities, which cultivate a wealth of talents, is currently trapped in a severe mismatch between supply and demand[9]. As the key link connecting design thinking and engineering practice, traditional digital design courses have long adhered to the outdated model of "software technology centrism"[10]. Under this model, students often become skilled operators of software rather than designers with creative thinking. Due to the disconnection between teaching content and industry practice, graduates often show problems such as rigid skills, lack of innovation and suspended values when facing complex and multi-dimensional real projects, and the supply of talents lags seriously behind the actual demand of the industry[11].

The explosive rise of Artificial Intelligence Generated content (AIGC) provides a powerful technological lever to break this educational deadlock[12]. AIGC tools such as Doubao, Midjourney, Stable Diffusion, and Hunyuan 3D are reshaping the entire design process[13]. It not only significantly shortens the time span from concept to visualization and allows designers to focus on creativity again, but also opens up a new path for the integration of creativity and ideological and political education. Through cross-modal interaction of natural language processing and image generation, AIGC enables abstract cultural concepts and values to be quickly and intuitively transformed into concrete design languages, providing unprecedented technical support for the visual teaching of curriculum ideology and politics[14].

Although the application of AIGC in the design field has shown some initial results, the reform of course teaching still faces three major problems: energy misallocation, separation between education and industry, and value disconnection[15].

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Current studies mostly focus on the technical application of AIGC, but there are few systematic studies on the reconstruction of teaching models and the integration of ideological and political education. Therefore, this study takes the digital design expression course of the landscape architecture major at Chongqing College of Humanities, Science & Technology as the empirical object, and has established the dual core goals of "reconstructing teaching models" and "integrating ideological and political education deeply". The research moves beyond the single theoretical exposition and adopts a rigorous teaching experimental method. Through a comparative experiment, it deeply analyzes the teaching effects before and after the intervention of AIGC, aiming to construct a replicable and implementable teaching reconstruction plan, fill the theoretical gap of AIGC empowering professional education, and effectively solve the problem of fragmented integration of ideological and political education, ultimately achieving the three-dimensional synergy of knowledge imparting, ability cultivation, and value shaping.

1 Current challenges in the teaching of digital design courses in landscape architecture in colleges and universities

1.1 Course positioning and content structure

Digital design courses are the core compulsory courses of landscape architecture major, playing a crucial role in converting design thinking into engineering language. For instance, the digital design presentation course of Chongqing College of Humanities, Science & Technology has a total of 40 class hours (16 hours of theory and 24 hours of practice), and its core positioning is to cultivate students' practical ability to solve complex landscape planning and design expression problems using digital tools. The course system relies on mainstream software such as SketchUp (modeling), D5 Render (rendering), Photoshop/InDesign (typesetting), etc., covering the complete chain from basic operations, application of advanced functions, modeling logic construction to comprehensive project practice. Its teaching objectives not only require students to master the digital modeling skills of all elements such as landscape architecture, small-scale structures, and terrain, but also require students to be able to independently output high-quality effect diagrams and cultivate design creativity, teamwork, and professional ethics during the process.

1.2 Analysis of core dilemmas

In terms of course teaching, students are required to complete the entire process from modeling and rendering to typesetting within the limited 40 class hours. Under such a high-density and high-intensity situation, beginners often find it difficult to establish their own cognitive framework within a short period of time, and are forced to rush into the next stage of learning. As a result, many students are unable to fully digest the learned knowledge. In the modeling stage, students have weak understanding of spatial geometry and are not proficient in using complex plug-in tools, so when they face complex scenes (such as irregular surfaces and complex terrain), there are often chain reactions such as imbalanced proportions and structural distortion, making it difficult to establish an accurate three-dimensional spatial perception. In the rendering section, students lack a deep understanding of physical optical properties and plant configuration logic, so that they have to rely on mechanical trial and error or directly apply preset templates. The resulting outputs often have mediocre texture, harsh lighting, even seriously violate natural laws, and are unable to truly express the design intention. The existing course system is largely trapped in a linear closed loop of "data input-mechanical reproduction", so that teaching cases are often overly simplified and lack the complexity and variability of real projects. The isolated practical sections cut off the continuity of design thinking, and the heavy technical replication tasks firmly lock students' energy at the dull repetitive command operations, severely squeezing the space for creative generation. In addition, due to the shortage of teachers' energy, it is difficult for them to provide precise and differentiated guidance within the limited time of the classroom, and the teaching effect shows a significant disparity.

In terms of the integration of ideological and political education, courses encounter a structural disconnection between value shaping and skill imparting. Traditional teaching lacks effective carriers for translating abstract value concepts into concrete translations. Grand propositions such as rural revitalization and cultural inheritance often remain at the level of oral preaching, and students are difficult to find specific forms of language to implement these concepts in design practices. Moreover, the existing assessment mechanism heavily leans towards explicit technical indicators, and overly emphasizes the accuracy of model construction, the visual tension of rendering, and the standardization of typesetting. However, there are no clear and quantifiable evaluation standards for implicit ideological and political indicators such as the ecological ethical commitment and cultural self-expression behind design proposals. This assessment system "emphasizing skills but neglecting values" makes students subconsciously view ideological and political requirements as an additional burden rather than the intrinsic soul of design, so that ideological and political education is merely superficial and fails to achieve a profound infusion of values.

2 Mode reconfiguration and paths of ideological and political integration driven by AIGC

2.1 Structural reconfiguration of the teaching mode

According to the drawbacks of the traditional teaching mode, this study relies on AIGC tools (Doubao, Midjourney, Stable Diffusion, Hunyuan 3D, etc.) to construct a new teaching mode of "creative driving-technology empowerment-comprehensive improvement". This mode will completely break the linear process of traditional teaching and establish an iterative closed loop centered on creativity, supported by technology and assisted by AI throughout the process (Table 1).

2.2 Paths for the organic integration of Curriculum Ideology and Politics

Relying on AIGC technology, a new path for integrating ideological and political education with visualized carriers, embedded processes, and closed-loop evaluations is constructed to solve the core problems of traditional ideological and political education, such as lack of car-riers, difficulty in integration, and absence of evaluation.

Firstly, ideological and political connotations are difficult to be concretized, so the powerful image generation capability of AIGC is utilized to build a ideological and political resource library. Midjourney is used to generate a case library of regional landscapes under the background of rural revitalization, thereby converting cultural confidence into a specific design prototype. Stable Diffusion is employed to create comparison images of the effects before and after ecological restoration, so as to visually demonstrate the ecological benefits of technologies such as sponge cities and biodiversity protection and make the concept of ecological civilization tangible and touchable.

Large language models like Doubao are used to generate a case library of professional ethics for industry designers, simulate ethical dilemmas in real workplaces, and strengthen students' sense of professional responsibility.

Secondly, ideological and political requirements are broken down and integrated into each key node throughout the design process. Modeling stage: with regional culture adaptation as the core, students are required to carefully examine whether the AI-generated plans respect the original topography and cultural texture of the site, and to reject large-scale demolition and reconstruction. Rendering stage: focusing on ecological rationality, D5 and AI are used to adjust plant configuration, and native tree species must be used to simulate real seasonal changes and reflect the concept of low-carbon design. Comprehensive application stage: social value should be emphasized, and an independent ideological and political design explanation column is added; students should clearly explain how the design responds to urban renewal, improves the living environment, or contributes to rural revitalization, and closely link design techniques with social responsibility.

Thirdly, the evaluation system is restructured, and the ideological and political dimension is incorporated into the whole-process assessment. Formative assessment (accounting for 40%) focuses on the practicality of scheme selection and the ecological sensitivity of parameter adjustment; in the final assessment (accounting for 20%), a deep scoring item for ideological and political elements is added. Through the dual-dimensional evaluation mechanism of "technology plus ideology and politics", students are urged to transform the passive cognition of ideological and political concepts into active design, forming a complete closed loop of "teaching-learning-assessment".

3 Teaching practice: taking "the renewal design of rural public spaces in western Chongqing" as an example

In order to comprehensively, deeply and objectively verify the actual effectiveness of the teaching reconfiguration model of "AIGC empowerment plus ideological and political integration", a rigorous comparative teaching experiment lasting for one semester was conducted based on the 2023 intake undergraduate teaching of the landscape architecture major of Chongqing College of Humanities, Science & Technology. The overall design, implementation process, and data collection of the experiment as well as in-depth analysis results based on statistics will be elaborated, and the focus is on the specific manifestations of the new model in terms of design efficiency, skill acquisition, innovative thinking and ideological and political internalization.

3.1 Overall design and objectives of the experiment

3.1.1 Objectives and grouping.Two parallel classes of junior students in the landscape architecture major were selected as the experimental samples, totaling 60 students. To ensure the scientific nature of the experimental results, the grades of the three core prerequisite courses (Introduction to Landscape Architecture Design, AutoCAD, and Basic Sketching) of the two classes in their first and second years were retrieved before the experiment began, and an independent samples T-test was conducted using SPSS to verify the homogeneity of the two groups of samples (Table 2).

In the control group (N=29), the traditional teaching model was adopted. The technical approach was "CAD base map import → manual SketchUp modeling → Lumion conventional rendering → Photoshop post-processing". The teaching focus was on the proficiency and

Table 1 Comparison between the traditional teaching mode and AIGC-reconstructed mode

Teaching stage	Core task	Traditional teaching mode	AIGC-reconstructed mode	Core optimization and empowerment logic
Modeling teaching	Space construction and logical generation	Path: software foundation tools teaching→simple replication based on data provided by teachers Drawbacks: it is time-consuming, and students get stuck in basic software operations, but neglect spatial scale and structural logic	Path: Prompt-based generation of multiple schemes → selecting preferred scheme → AI-assisted/manual detailed modeling Practical operation: utilizing Doubao/Midjourney/SD to generate multiple sets of landscape mini-works and site concepts, and proceeding with the modeling process after determining the size data Gain: changing from "passive reproduction" to "active selection and optimization", and taking AI as an inspiration enhancer to stimulate divergent thinking	Creative preparation: Before modeling, various form possibilities are exhausted through AI, and modeling is no longer a trial-and-error process but now precise realization Technical focus: The integration of plugin teaching with the specific implementation difficulties of AI-generated solutions enhances the targeted nature of technical learning
Rendering teaching	Atmosphere creation and material expression	Path: basic teaching with render→ adjusting parameters Drawbacks: materials are rigid, and light and shadow logic is chaotic; plant configuration lacks ecological basis	Path: real-time rendering with D5 Render plus AI material enhancement plus AI environmental atmosphere simulation Practical operation: integrating D5 with AI to quickly match the physical environments varying with different climates (rain/snow/mist) and times (morning/dusk) Gain: establishing a rapid feedback loop of "modeling-rendering", and allowing students to immediately see the impact of model modification on the final effect	Aesthetic enhancement: AI assists in adjusting lighting and color tones, and enables students to break through their personal aesthetic limitations and quickly reach industry-level performance standards Ecological logic: utilizing AI to generate reference plant communities that conform to regional characteristics, and avoiding the issue of "random tree planting"
Comprehensive application	Outcome presentation and narrative construction	Path: PS/ID typesetting → assembling drawings Drawbacks: confused visual hierarchy, empty design explanations, and rigidly inserted ideological and political content	Path: AIGC-assisted drawing refinement → intelligent typesetting → generation of narrative texts Practical operation: utilizing AI to convert the selected design scheme into an editable model, making detailed adjustments, and finally generating the final drawing; writing the design description with the aid of AI Gain: complete integration throughout the process, with a significant improvement in the consistency from initial creative conception to final presentation	Value explicitation: utilizing AI to generate comparison charts and analysis diagrams, visualizing abstract design concepts, and enhancing the persuasiveness of the plan Efficiency release: saving a significant amount of repetitive typesetting time, and focusing on the organization of design logic

standardization of software commands.

In the experimental group (N=31), the reconfiguration model of "AIGC empowerment plus ideological and political integration" was used. The technical approach was "AIGC creative generation (Midjourney/SD) → SketchUp assisted modeling → D5 Render plus AI enhanced rendering → AIGC assisted typesetting and image output". The teaching focused on creative logic, AI-assisted decision-making, and the translation of ideological and political values.

3.1.2 Experimental project: renewal design of rural public spaces in western Chongqing. Project background and design requirements: a real rural node in western Chongqing was selected, with an area of approximately 2,500 m^2. The project needs to complete elderly-friendly renovations, incorporate functions such as villagers' deliberation, rest, and children's activities, continue the traditional style of western Chongqing, and reflect rural revitalization and cultural heritage inheritance. A set of models and no less than 4 high-precision renderings should be completed, and layout presentation should be conducted.

3.2 Comparison of the implementation process

Details of the implementation process are shown in Table 3.

3.3 Data analysis

3.3.1 Quantitative comparison of the design efficiency dimension. Based on the log records of the background software and the time sheets filled out by the students, the average time spent by the two groups of students in each stage was calculated. The data indicate that the AIGC model has completely changed the time allocation structure of the design (Fig.1).

3.3.2 Evaluation of scheme quality and innovation. The final assignment was scored by third-party experts (comprising 3 senior landscape architects and 2 professional teachers) who were not involved in the teaching process. The scoring was on a 100-point scale, and covered 3 dimensions: innovation (30%), technicality (30%), and logic (40%).

A significant leap in innovation (T=−8.125, P<0.001): the control group's work was mainly confined to the conventional modern minimalist style, with a monotonous formal language and severe homogeneity. In contrast, the experimental group utilized AIGC to explore diverse styles, and achieved the visualization of complex landscape structures, breaking through the self-imposed design limitations caused by students' insufficient manual modeling skills. Enhanced technical expressiveness (T=−8.450, P<0.001): the traditional view holds that relying on AI would weaken students' manual skills, but the experimental data show that due to the reduction of technical barriers by AIGC, students can instead focus more on the creation of light and shadow atmosphere and the delicacy of materials. The various environmental elements in the drawings of the experimental group demonstrated far greater expressiveness than those of the control group. Stability of functional logic (P=0.141>0.05): there was no statistical difference in the rationality of functional layout between the two groups. This indicates that AIGC currently mainly empowers in terms of form and expression, while the core site

Table 2 Homogeneity test of the grades of core prerequisite courses of the two groups of students before the experiment

Group	Number of samples (N)	Gender distribution (male/female)	Introduction to landscape architecture design (mean±SD)	AutoCAD (mean±SD)	Basic sketching (mean±SD)	Composite weighted score (mean±SD)
Control group	29	7/22	78.45±5.23	81.12±4.89	76.55±6.10	78.89±4.55
Experimental group	31	8/23	79.10±5.41	80.88±5.12	77.02±5.88	79.05±4.72
T value	–	–	−0.472	0.186	−0.301	−0.134
P value (Sig.)	–	–	0.639	0.853	0.764	0.894

Note: P>0.05 indicates no significant difference between the two groups of students in terms of professional foundation, software logic, and aesthetic literacy, which meets the requirements of the parallel control experiment.

Table 3 Detailed implementation process and variable control of the teaching experiment

Phase (week)	Teaching module	Implementation path of the control group (traditional model)	Implementation path of the experimental group (AIGC model)	Core variable of difference (IV)
Phase 1: preliminary analysis and conceptualization (Week 1–2)	Site cognition and concept generation	Teaching plus sketching method: teachers explain the project features; students consult the atlas and draw sketches by hand. The sketches are subjectively graded by teachers, and the revision process is lengthy. Integration of ideological and political education: only verbal emphasis is given.	AIGC-assisted divergence: students use Doubao/Midjourney to generate a large number of concept maps. Integration of ideological and political education: through the images generated by AI, elements that conform to the "nostalgia" theme can be intuitively screened.	The experimental group utilizes AI to exhaust all possibilities, thereby transcending the limitations of personal experience; the control group relies on existing atlases and is prone to homogeneity.
Phase 2: model construction (Week 3–5)	Space layout and detailed refinement	Manual modeling: starting from the CAD base drawing, each model is constructed one by one using the SU push-pull tool. A significant amount of time is spent on the modeling of irregular landscape structures. Drawbacks: The modeling of complex curved surfaces is difficult, and the design often has to be simplified.	AI plus plug-in collaboration: tools such as Hunyuan 3D are used to convert AI design sketches into reference rough models; SU plugins are used for parametric construction. Advantages: it significantly lowers the construction threshold for complex forms, and focuses on the refinement of spatial relationships and scales.	The experimental group focuses on "selection and optimization", while the control group focuses on "production and reproduction".
Phase 3: rendering and presentation (Week 6–7)	Scene rendering and atmosphere creation	Parameter debugging: Manual lighting and tree planting are conducted by Lumion. Material adjustment relies on preset parameters, and it is difficult to convey the sense of aging of old materials. Ideological and political expression: cultural content needs to be hard-pasted in PS, resulting in a low degree of integration.	AI scene enhancement: D5 Render is used for the initial rendering, and then Stable Diffusion is used to enhance the scene effect.	The experimental group uses algorithms to simulate the physical environment and the sense of cultural accumulation.
Phase 4: comprehensive presentation (Week 8)	Typesetting and reporting	Standard typesetting: focusing on the standardization of graphic typesetting. The design descriptions are mostly composed of text, and the ideological and political content is often added as an afterthought. Result: the connection between text and graphics is weak.	Narrative expression: AI is used to refine the design description and assist in generating analysis charts. Ideological and political expression: a special analysis section of "cultural gene extraction" is specially arranged in the layout.	The experimental group emphasizes the value visualization of the entire process and the establishment of a logical loop.

engineering logic (such as vertical design, flow organization, etc.) still heavily relies on traditional professional theoretical teaching. This suggests that AI cannot completely replace the basic education of design principles, and the two need to complement each other (Fig.2).

3.3.3 In-depth assessment of ideological and political integration. The final assignments were scored based on the specially developed Evaluation Scale for Ideological and Political Integration in Landscape Architecture Courses, and whether students have transformed abstract value concepts into specific design languages was studied (Table 4).

3.3.4 Survey on learning experience and self-efficacy. After the course was completed, an anonymous questionnaire survey was conducted on both groups of students, as shown in Table 5.

4 Conclusion

Through empirical evidence, this study demonstrates that the role of AIGC in the digital design teaching of landscape architecture has transcended its tool attributes, and has actually facilitated a profound transformation of the course education from the previous technical training to the construction of design thinking. It also reveals that when AIGC takes on a large number of mechanical modeling and rendering tasks, students can devote more energy to the creative transformation of ideological and political propositions such as rural revitalization and ecological restoration, thereby

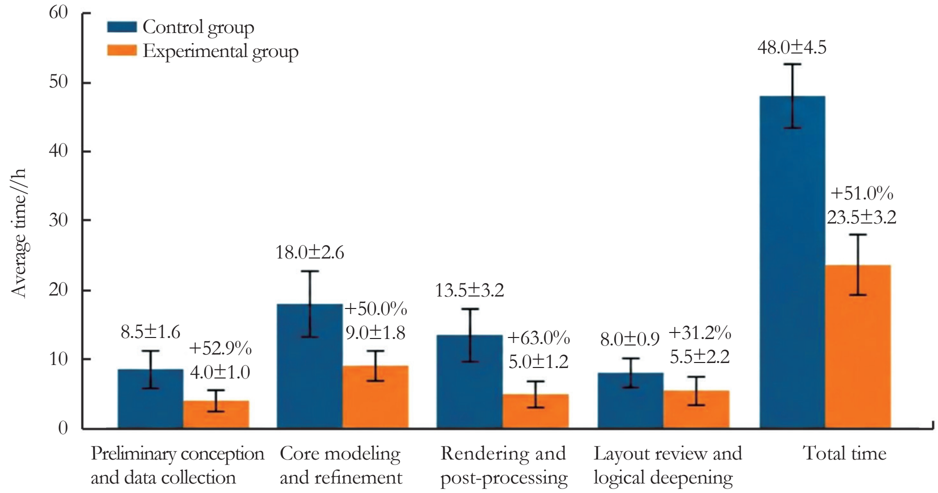

Fig.1 Average time spent by each group of students in each stage of the design

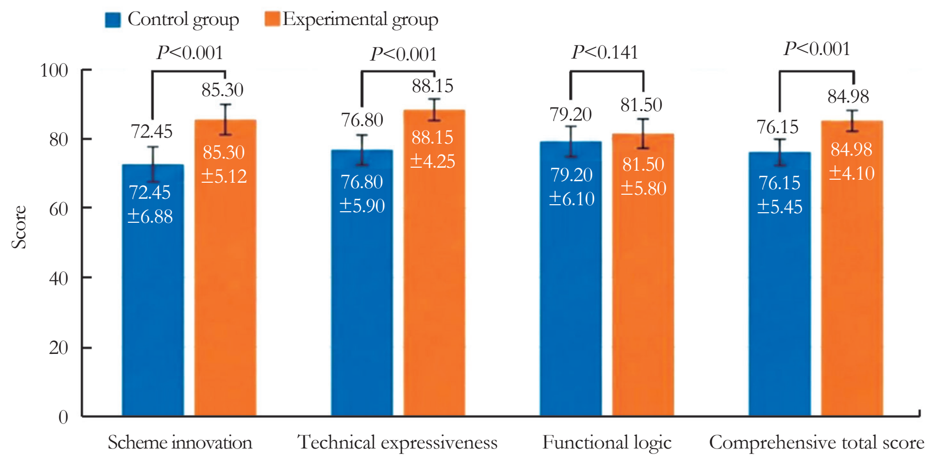

Fig.2 T–test results of independent samples for expert ratings of final assignment outcomes

Table 4 Comparison of the special score of ideological and political integration di–mensions

Evaluation indicator	Description of scoring criteria	Score of the control group	Score of the experi-mental group	Range of relative advantage
Explicitation of regional context	Accuracy and aesthetic appeal of the application of Bayu traditional symbols	7.2/10	9.1/10	+26.4%
Visualization of ecological concepts	Whether clearly and intuitively presenting the ecological technology and its benefits	6.8/10	8.8/10	+29.4%
Expression of humanistic care	Detailed depiction for the elderly and children	7.5/10	8.9/10	+18.7%
Coherence of ideological and political narrative	Whether the layout of exhibition boards form a coherent narrative logic of values rather than rough collage	14.5/20	18.2/20	+25.5%
Total score of ideological and political integration	–	36.0	45.0	+25.0%

Note: Full score is 50 points.

Table 5 Survey results on learning experience feedback

Survey item	Control group	Experimental group	Analysis of difference significance
Q1: How interested are you in this course?	3.82	4.65	That of the experimental group was significantly higher. The real-time feedback mechanism of AI greatly enhanced the interest in learning and strengthened the desire for exploration.
Q2: Can you express the essence of "rural revitalization" through design?	3.55	4.42	The experimental group generally believed that the AI tool is an effective bridge connecting abstract concepts with concrete designs, and reduced the frustration in expression.
Q3: Are you confident about pursuing a career in landscape architecture design in the future?	3.60	4.25	Technology empowerment alleviated the software anxiety of students with weak foundations and enhanced their career confidence.
Q4: Is the time taken up by the course during after-school hours acceptable?	3.20	4.10	Although the experimental group invested more in thinking, the psychological fatigue decreased instead because the repetitive and boring tasks (such as plant configuration and material adjustment) were reduced.

effectively resolving the long-standing problem of superficiality in ideological and political education. However, the experimental data show that there was no significant difference between the two groups in the functional logic dimension, and it also clearly points out the current technological boundaries of AIGC. Its image generation advantage cannot automatically transform into the rigor of spatial engineering logic. The core of design education still lies in the systematic analysis of site issues and the solid adherence to engineering norms. Therefore, future courses in the digital design of landscape architecture should not stop at technical application, but should further strengthen traditional professional core competencies while leveraging AIGC to expand visual expression and cultural narrative capabilities. Only by adhering to the dialectical relationship of "taking humans as the decision-making subject and AI as an empowering", can we hold onto the fundamental of professional education in the technological wave and cultivate outstanding landscape architecture talents who not only possess innovative capabilities in the digital era but are also deeply rooted in patriotism and engineering rationality.

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referential solution and an innovative practical model for exploring "regional holistic development driven by brand strategy" in China's vast border ethnic regions. It will chart a new chapter in the distinctive development of border cities under the opening-up conditions.

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