The Theoretical Construction and Practical Path of AIGC Technology Empowering Environmental Design Paradigm Transformation

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Abstract

With the rapid development of generative artificial intelligence technology, AIGC is gradually evolving from an auxiliary application at the level of a single tool to an important force that affects the production of environmental design knowledge, program generation, expression dissemination and implementation coordination. For environmental design, the significance of AIGC is not only to improve the speed of drawing or enrich the visual expression, but also to reorganise the information flow, decision-making chain and collaboration in design activities, promote the traditional experience accumulation, linear advancement and result-oriented work mode, and support data, intelligent participation and The new paradigm shift of Cheng Lianlian. Based on the practice of environmental design discipline, this article analyses the basic logic of AIGC to promote the transformation of environmental design paradigms, discusses its theoretical construction in terms of methodology, cognitive structure and design organisation, further summarises its main performance from the three aspects of creative generation, process reorganisation and narrative expression, and from the design concept, work The four dimensions of mechanism, talent training and applied ecology put forward a practical path. AIGC will not replace the main value of environmental design, but will shift design from "single technique competition" to "comprehensive judgement ability competition", providing new method support and transformation opportunities for the high-quality development of environmental design.

Keywords

AIGC; Environmental Design; Paradigm Transformation; Theoretical Construction; Practical Path.

1. Introduction

As an important practical field that connects space, life and social culture, environmental design has long been comprehensive and situational. Its design process relies not only on professional training, but also on the designer's comprehensive judgement of the site, user, materials, aesthetics and social needs. For a long time in the past, the core competitiveness of environmental design was mainly reflected in the accumulation of experience, program expression and project implementation ability. However, under the background of the continuous deepening of digital technology, the traditional design model has revealed problems such as limited efficiency, slow feedback and insufficient coordination[1-3]. In complex projects, from preliminary research to concept generation, from deepening design to achievement display, there is a real dilemma of information separation and high communication costs. Generative artificial intelligence (AIGC) provides a new tool for the symbolization and dynamization of cultural resources. Unlike traditional art interventions that rely on manual excavation of cultural motifs, AIGC is able to extract cultural symbols,

visual patterns and story motifs from local resources through deep learning technology, generating cultural content adapted to different media.

The entry of AIGC has changed this relatively closed operation logic, so that environmental design begins to have stronger rapid generation, dynamic correction and cross-media expression capabilities, and also promotes design activities from "around drawings" to "around problems and scenarios". Exploring the paradigm transformation of AIGC technology empowering environmental design is to respond to technological renewal, and to re-examine the knowledge base, method structure and practice direction of environmental design in the new era.

2. The Basic Logic of AIGC to Promote the Transformation of Environmental Design Paradigm

AIGC promotes the transformation of the environmental design paradigm, mainly due to the formation of a new matching relationship between the complexity of the design object itself and the supply of technology. Environmental design is not a simple modelling design, but a composite activity covering spatial organisation, behaviour guidance, emotional creation, ecological coordination and cultural expression. Its problems often have the characteristics of openness, dynamism and multivariate intertwining. Although the traditional design method emphasises originality and professional judgement, it is subject to manpower and time costs in the face of massive information screening, multi-scheme comparison and rapid iteration. Through text generation, image generation, semantic recognition, data integration and other capabilities, AIGC makes up for the originally weak "rapid cognition-instant translation-dynamic feedback" link in the design process, so that the design can no longer rely on the linear promotion of the designer's personal experience, forming a common participation of data, algorithms and professional judgement. Combined decision-making mechanism. In this sense, AIGC does not simply replace the original design labour, but introduces a new way of knowledge organisation in design activities to promote the transformation of environmental design from an experience-led paradigm to an intelligent collaborative paradigm.

3. Theoretical Construction of AIGC Technology Empowers the Transformation of Environmental Design Paradigm

Under the background of the continuous evolution of digital technology and the in-depth adjustment of the design industry, the practical conditions and knowledge structure of environmental design are undergoing significant changes. Traditional environmental design mainly relies on the designer's personal experience, professional intuition and phased promotion mode. Although a relatively stable method system has been formed in long-term practice, in the face of the new situation of complexity of spatial demand, diversification of user demands and normalisation of cross-professional collaboration, it is in information integration, scheme iteration and dynamic feedback. The limitations of this aspect are also increasingly apparent. It is on the basis of this reality that AIGC has entered the field of environmental design and gradually transformed from an auxiliary tool to an important force to promote paradigm transformation. From a theoretical point of view, this transformation is mainly reflected in three aspects. Design cognition shifts from the designer's one-way judgement to human-computer collaborative identification and generation; the design method shifts from linear segmentation to the dynamic mechanism of generation, evaluation and correction of mutual linkage. From a theoretical perspective, this transformation is mainly reflected in three aspects. To more clearly present the internal logic of how AIGC empowers the paradigm shift in environmental design, it can be summarized into the

following three theoretical dimensions, as shown in Table 1. The design value further returns to the basic position of "technology serves people", emphasising that intelligent generation must obey the improvement of spatial quality and the real needs of people. Please. AIGC empowers environment design not only to update tools, but also to systematically restructure the design cognitive structure, method logic and value order.

Table 1. Three Theoretical Dimensions of the Paradigm Shift in Environmental Design Empowered by AIGC

Dimension	Transformation Content	Implications
Design Cognition	From one-way judgment to human–machine collaboration	Strengthening the capabilities of recognition, generation, and integrated judgment
Design Methods	From linear progression to dynamic linkage	Achieving the integration of generation, evaluation, and revision
Design Value	From technology orientation back to a people-centered approach	Emphasizing technology serving spatial quality and real user needs

4. The Main Performance of AIGC Technology-enabled Environmental Design Paradigm Transformation

4.1. From Experience Creativity to Intelligence Enhancement Creativity

In traditional environmental design, creativity is usually based on the designer's aesthetic experience, case accumulation and site perception. This way has a distinct personal style, but it is also easily limited by cognitive inertia and expression efficiency. The intervention of AIGC has shifted creative generation from "single brain output" to "intelligent enhancement". Designers can quickly complete keyword expansion, style deduction, intention map generation and scene simulation with the help of large models, so as to establish a richer basis for scheme comparison in a relatively short time. It should be noted that this change does not mean that creative sources are replaced by machines, but that the front end of creative activities is greatly opened up. In the past, designers may only be able to conceive around a few familiar paths, but now they can screen, adjust and reorganise in a wider spectrum of schemes[4-5]. The most direct function of AIGC is not to "think for designers", but to help designers see more possibilities faster, and then make professional judgement to decide which is suitable for the specific site and which is in line with the project goals. From a result, environmental design has gradually moved from a closed creative model that relies on individual experience to an open creative model with intelligent assistance.

4.2. From Segmented Operation to Whole Process Coordination

Environmental design projects involve research, planning, concept, deepening, performance, construction docking and other links. Although these links were connected in the past, they did not really achieve efficient linkage. There is often a break between the early data and the later expression. The ideas in the conceptual stage may be overturned after entering the deepening stage, and it is also easy to produce information decay between design, construction and display. The application of AIGC has brought a reorganisation opportunity for this segmented operation. It can help the design team quickly integrate text, images, cases, specifications and other heterogeneous information, and reduce the loss of early research and scheme conversion. From another perspective, it can also continue to participate in expression optimisation, material deduction, spatial effect simulation and user feedback prediction in the process of design promotion, so that multiple stages that were originally separated from each other can achieve a higher degree of continuity. In this way,

environmental design is no longer just a mechanical series of several processes, but more like a continuous interaction and constantly modified dynamic system. The value of AIGC lies in this: it compresses the cost of time, changes the work structure itself, and makes the organisational mode of design transition to collaborative evolution.

4.3. From the Display of Results to the Immersive Narrative

In the past, the presentation of environmental design outcomes relied primarily on renderings, plans, physical models, and exhibition boards. While these methods are effective in conveying the visual results of a design, they often fall short of communicating the underlying spatial logic and the experiential qualities of space. This limitation becomes particularly evident when addressing non-professional audiences, for whom the technical language of drawings can be difficult to interpret, making it challenging to fully appreciate the value of a design proposal.

The development of AIGC technology, however, introduces new possibilities for representing environmental design. By enabling the integration of text and image generation, scenario-based scripting, dynamic spatial simulation, and multimodal information, AIGC expands design expression beyond the static display of a completed space. Instead, it allows designers to narrate how a space is approached, experienced, and integrated into everyday life.

This shift is significant because environmental design is not merely a form of visual representation, but a practice deeply connected to human behavior, emotion, and lived experience. AIGC facilitates a transition from static depiction to immersive storytelling, encouraging design communication to foreground process, participation, and everyday use. As a result, the mode of presenting environmental design is being reshaped: design outcomes are no longer passive objects for observation, but become spatial narratives that can be understood, imagined, and emotionally engaged with.

5. The Practical Path of AIGC Technology Empowers the Paradigm Transformation of Environmental Design

5.1. Establish a People-oriented Design Concept

Against the background of AIGC's rapid entry into the field of environmental design, it should be clear that technology can only be an amplifier of design ability, not an alternative to design value. Environmental design ultimately faces people's living experience, public communication, behavioural convenience, psychological feelings and cultural identity. If it is separated from this basic premise, no matter how efficient the generation technology is, it may also create a space scheme that is exquisite on the surface but lacks temperature. When promoting the application of AIGC, we must focus on "people-oriented" It is newly established as the fundamental principle of environmental design transformation[6-7]. Specifically, when using AIGC generation schemes, designers should not only pursue novel forms or visual stimulation, but should always take whether the space is suitable, whether it is comfortable, and whether it responds to real needs as the criteria for judgement. Beware of algorithm preferences causing one-way traction to design aesthetics, and avoid the tendency of design homogenisation due to excessive reliance on general models. The truly mature AIGC application is not to make the design more and more like algorithms, but to make technology serve people's feelings, people's lives and people's main position more deeply, and to give clear and stable value coordinates for the paradigm transformation of environmental design.

5.2. Build an AIGC Embedded Working Mechanism

To truly empower environmental design, the key to AIGC is not to use several tools sporadically, but to embed them in the actual mechanism of design work to form a sustainable,

replicable and evaluable operation process. The reason why many design practises fail to give full play to the real effectiveness of AIGC is not that the technology itself is immature, but that its use is still at the level of temporary supplementation and local testing. The State of Design & Make Report released by Autodesk in 2025 shows that in a survey covering 5,594 respondents in design and construction-related industries, as shown in the pie chart below, it shows that the bottlenecks of AIGC applications are more "Is there a tool" and "Is there a stable embedded mechanism"? In specific practice, environmental design institutions, college studios and project teams need to re-sort the task chain, clarify the specific position of AIGC in research and analysis, concept generation, program optimisation, performance communication and implementation coordination, and establish matching work norms. For example, which stages are suitable for the introduction of generative tools, which judgements must be dominated by the designer, how to verify the authenticity and applicability of the generated content, and how to share prompts, case libraries and revision standards within the team should be institutionalised. When AIGC is integrated into the daily workflow, it is not a "shortcut" that appears by chance. Its change in the environmental design paradigm will improve efficiency from the surface and further transform into deep organisational innovation.

5.3. Cultivate Composite Environmental Design Talents

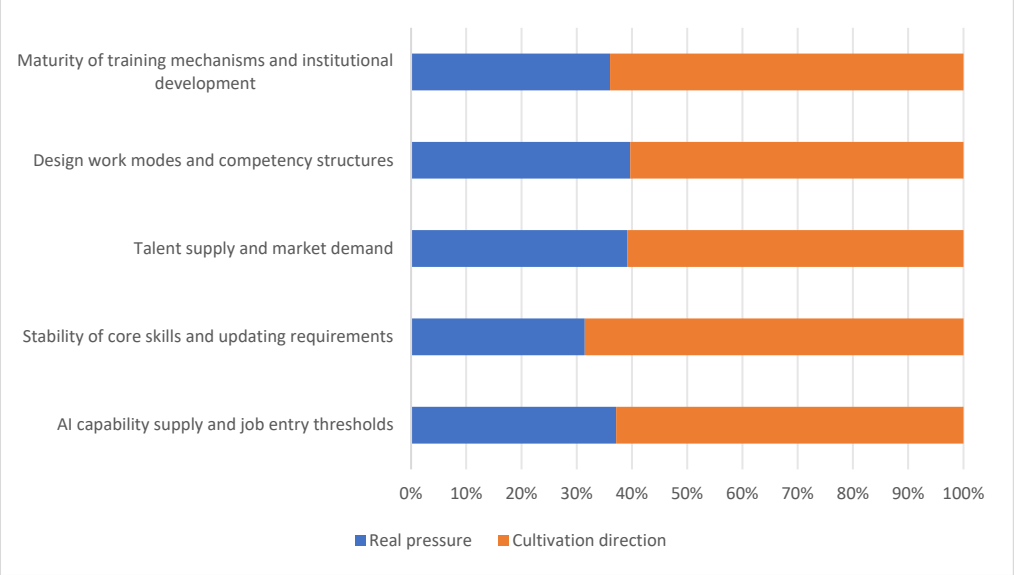

Figure 1. Comparison of the cultivation of interdisciplinary environmental design talents before and after the emergence of AIGC

The new requirements for environmental design talents in today's era are not simply to add a software skill, but to require designers to have stronger cross-border understanding, problem translation and comprehensive judgement ability. Traditional environmental design education attaches more importance to modelling training, drawing expression and engineering connection. Of course, these abilities are still important, but under the continuous penetration of generative technology, "drawing" and "drawing" alone are not enough to constitute core advantages. In the future, more competitive environmental design talents should be able to understand user needs, identify site problems, master basic data awareness, and have the ability to work with intelligent systems[8-9]. They should be able to transform vague design intentions into effective instructions, and be able to critically screen and recreate the generated results. As shown in Figure 1, after AIGC entered the design industry, the ability structure of talent training has changed significantly. AIGC did not lower the

professional threshold, but raised the requirements for talent training. Therefore, college and industry training needs to be adjusted in terms of curriculum setting, project practice and evaluation standards to promote the transformation of design talents from single skill type to composite ability type. Only when the talent structure is upgraded, the potential of AIGC empowering environment design will not stay at the tool layer, and will truly be precipitated into the continuous driving force for the development of the discipline.

5.4. Establish a Healthy and Orderly Application Ecology

The wide use of AIGC in environmental design has also brought practical issues such as copyright ownership, data source, content authenticity, division of responsibilities and ethical risks. If there is a lack of normative constraints, technological expansion may squeeze the original value, and even affect the industry order and social trust, and promote the transformation of the environmental design paradigm. We can not only talk about technology dividends, but also build a healthy and orderly application ecology at the same time. To this end, the boundaries of the use of AIGC generated content in design projects should be gradually clarified, especially when it comes to copyright materials, public projects and commercial landing, and a clearer audit mechanism needs to be formed. In addition, industry-oriented evaluation standards should be established to avoid misjudgement of "fast generation speed" as "high design quality", so as to correct the one-sided concept of efficiency. Finally, a healthy technical cooperation environment should be encouraged, so that platform developers, educational institutions, design enterprises and project owners can form a dialogue mechanism around the transformation of standards, data and achievements. Environmental design is a field that attaches great importance to responsibility and public nature[10]. The deeper the application of AIGC, the more it needs the synchronous follow-up of the system and ethics. When ecological construction is at the forefront, technological empowerment will not evolve into new disorder factors.

6. Conclusion

In general, the impact of AIGC on environmental design is no longer limited to the update of a certain tool, a certain software or a certain expression method, but has changed the way of thinking, organisation and value realisation of design at a deeper level. It promotes the traditional paradigm of environmental design dominated by experience accumulation and moves towards a new paradigm that is more open, more collaborative and emphasises dynamic feedback. This change is reflected in the improvement of creative generation efficiency, as well as the overall adjustment of process structure, expression and talent requirements. Of course, paradigm transformation is never a simple technological replacement process, but a long-term evolution accompanied by conceptual renewal, institutional adjustment and discipline restructuring. For environmental design, what is really worth paying attention to is not whether AIGC can make more gorgeous drawings, but whether it can help the design to understand people more deeply, respond to the place, coordinate functions and convey the spatial meaning. The future development direction of environmental design should be to actively absorb the method innovation brought by AIGC on the basis of adhering to professional values and humanistic positions, so that technical rationality and design wisdom can form a more powerful combination, and open up a more realistic and forward-looking transformation path for environmental design disciplines.

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