Research on Paradigm Transformation in Design Education and Innovative Talent Cultivation Mechanisms Driven by Generative AI Content (AIGC)

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Abstract: The rapid development of generative artificial intelligence (AIGC) has had a disruptive impact on the connotation and extension of design education, driving it to transform from a deep paradigm of "skill imparting" to "intelligent collaboration". This article aims to explore the core changes in design education under the drive of AIGC in terms of teaching objectives, content, models and evaluation systems, and directly confront the current practical predicaments of the design discipline education system, such as lagging curriculum, ethical misconduct and single evaluation. The core of the research lies in establishing a new mechanism for cultivating innovative talents in the digital age based on "thinking upgrade, human-machine collaboration, and value shaping", and proposing a practical plan with a four-dimensional path of "critical thinking cultivation, human-machine collaborative engineering literacy, interdisciplinary project-based teaching, and ethical framework embedding". It aims to provide theoretical references and practical guidance for the systematic reconstruction of design education in the intelligent era.

1. Introduction

With the maturation and popularization of generative artificial intelligence technologies such as Midjourney, Stable Diffusion, and GPT, the creative paradigm of the design industry is undergoing a fundamental reshaping. AIGC not only greatly enhances the efficiency of visual presentation, scheme conception and prototype iteration, but also profoundly challenges the design education system based on the traditional "handicraft" model. The previous educational model, which centered on technical training, formal aesthetics and one-way knowledge transmission, has a significant gap with the requirements for designers' capabilities of "curating, tuning, criticizing and integrating" in the AI era. Therefore, exploring the transformation of the design education paradigm driven by AIGC and systematically constructing an innovative talent cultivation mechanism that matches it has become an urgent issue concerning the future development of the discipline. This research is based on this background, aiming to deconstruct the connotation of transformation, analyze the current predicament, and ultimately propose a systematic framework for the cultivation mechanism of innovative talents.

2. The core dimension of AIGC driving the transformation of the design education paradigm

Paradigm shift implies a systematic transformation of educational philosophy, goals and methods, mainly reflected in the following three dimensions:

2.1 Educational Goal Transformation: From "Skilled Individuals" to "AI Curators and Decision-makers"

The traditional educational goal is to cultivate "skilled" talents who are proficient in design tools and formal rules. In the AIGC era, basic skill-based jobs can be largely replaced. The educational goal should shift towards cultivating "curatorial" and "decision-making" innovative talents who can define design problems, set generation directions, critically screen and optimize AI outputs, and make final value judgments. Its core competencies are advanced critical thinking, aesthetic judgment and ethical decision-making abilities.

2.2 Teaching Content Transformation: From "Knowledge System" to "Dynamic Literacy"

Static and stable design knowledge systems (such as fixed software teaching and composition rules) should give way to dynamic and iterative AIGC literacy. This includes: ①Prompt engineering and communication skills: Transforming design intent into precise text instructions and iterative logic; ② Principles of AI Models and Critical Understanding: Understand the capability boundaries and biases of different models to avoid being enslaved by "black box" output; ③ Human-machine collaborative workflow design capability: Flexibly arrange the roles and relay of AI and humans in each stage of research, conception, deepening, and expression.

2.3 Teaching Mode and Evaluation Transformation:

From "Result-oriented" to "Process Value-added"
"Drawing" is no longer the core difficulty in teaching. The role of teachers should shift from "skill transmitters" to "thinking stimulators, process guides and ethical supervisors". The teaching mode needs to shift towards project-based, discussion-based, and human-machine hybrid collaborative learning. Correspondingly, the evaluation system needs to shift from the sole assessment of work results to the management and evaluation of the process, with a focus on: the strategic nature of prompt words, the iterative optimization path, the contribution ratio of AI and human creation, as well as the originality and social value of the solutions.

3. The Current Practical Predicaments and In-depth Analysis Faced by Design Education
The impact of AIGC is not merely about introducing new tools, but rather a systematic challenge to the design education ecosystem. The current predicament is mainly reflected in the following four interrelated core levels:

3.1 Lagging curriculum system: A "generational gap" emerging with technological iteration and industrial demands
There is a "generational gap" between the current design curriculum system and the iteration speed of AIGC technology. The teaching content still mainly focuses on traditional software skills, and there is a lack of systematic integration of new tools representing "AI-native workflows" such as Midjourney and Figma AI, resulting in a serious disconnection from industry practice.

A deeper issue lies in the structural deficiency of core competencies. Prompt engineering as a "new design language", AI collaborative processes as a "new project management approach", and AI ethics as a "new design guideline" have not been incorporated into the core courses, making it difficult for students to take on leadership roles in human-machine collaboration.

The current curriculum system has a linear and closed structure, which cannot adapt to the nonlinear characteristics of AIGC's multi-modal integration and rapid iteration. It lacks a dynamic adjustment mechanism and is difficult to respond to the new requirements for design talents in the intelligent era.

3.2 The absence of ethical education: Falling into "value silence" in the Face of "efficiency first"
The current design education is slow to respond to the ethical issues raised by AIGC and has fallen into a state of value silence of "efficiency first". Students generally have a vague understanding of the copyright ownership of the generated content, the definition of originality, and the boundary between "imitation and plagiarism", facing serious legal and academic risks.

Meanwhile, the education system lacks critical training on algorithmic bias. The social and cultural biases embedded in AIGC are easily magnified unconsciously, and students who are not adequately educated to recognize data biases may design discriminatory products.

Ethical education still remains at the level of sporadic case discussions and lacks a full-process educational framework that runs from theory to practice. The lack of operational ethical decision-making tools (such as self-check checklists and assessment matrices) makes it difficult to implement ethical education effectively.

3.3 Simplistic evaluation criteria: falling into "result worship" while neglecting "thought processes"
The current design education evaluation system has fallen into a "result worship", overly focusing on the visual presentation of AI-generated works while finding it difficult to measure students' genuine thinking contributions in human-machine collaboration. This "black box" predicament makes it impossible for teachers' evaluations to penetrate the surface effect and assess the true value of students' creative thinking.

What is more crucial is the systematic lack of process evaluation. Educators have not yet established an assessment standard for the entire process of "Prompt strategy - iterative optimization - ethical consideration", resulting in students' core abilities such as strategic thinking and critical adjustment not being reflected in the evaluation.

This single evaluation mechanism has led to serious guiding deviations, essentially encouraging students to engage in "speculative" AI usage (such as simple generation and application) rather than "creative" application (such as inspiring and exploring the unknown), ultimately running counter to the fundamental goal of cultivating innovative talents.

3.4 The gap in teaching staff capabilities: The intergenerational challenge of "digital immigrants" teaching "digital natives"
Design education is currently facing a serious gap in teaching staff capabilities. As "digital immigrants", senior teachers generally have technical anxiety and insufficient knowledge reserves about AIGC tools, making it difficult for them to provide effective guidance to students.

What is more crucial is the extreme shortage of "dual-qualified" teachers. Teachers who are proficient in both design theory and AIGC technology and can integrate the two are scarce, which leads to teaching remaining at the level of tool operation and failing to delve into the thinking and paradigm levels.

In addition, the institutions lack a systematic teacher training system. Teachers' fragmented learning based solely on personal interests cannot achieve the

collaborative evolution of the entire teaching staff, which further exacerbates the structural crisis of the teaching staff.

This analysis indicates that design education is facing a systemic crisis. Any single-dimensional repair is difficult to be effective. A structural reform that runs through educational concepts, contents, methods and evaluations must be carried out.

4.The construction path of a new mechanism for cultivating innovative talents

To address the above-mentioned predicaments, it is necessary to establish a multi-dimensional mechanism for cultivating innovative talents:

4.1 Thinking remodeling mechanism: Strengthening critical thinking and metacognitive education

To strengthen critical thinking and metacognitive education and address current challenges, it is necessary to establish a new talent cultivation mechanism centered on thinking reshaping. The primary task is to break the passive acceptance of AI output and systematically embed critical thinking training in all professional courses.

Teaching should guide students to continuously ask three core questions: "Why is it generated in this way?" "How to optimize iteration?" " "What potential biases exist?" This helps cultivate their habit of deep thinking.

The ultimate goal is to enable students to develop metacognitive abilities that transcend AI, allowing them to define creative problems and maintain the core values and innovation dominance of human designers with the assistance of artificial intelligence.

4.2 Course reconstruction mechanism: Introduce the core course module of "AIGC Literacy"

The core of the curriculum reconstruction lies in establishing the "AIGC Literacy "curriculum module and constructing a three-level system of the basic layer, application layer and innovation layer. The basic layer focuses on tool principles and ethical norms, the application layer concentrates on the design of human-machine collaborative workflows, and the innovation layer explores the cross-border development of generation algorithms.

Among them, human-machine collaborative engineering should be comprehensively popularized as a basic course of "design Sketching" in the new era. This course will cultivate students' ability to have precise conversations with AI, enabling them to master the core skills of transforming design intentions into effective instructions.

Through this structured curriculum system, students will transform from tool users to design curators capable of handling AI for creative work, achieving a comprehensive upgrade from technical application to

innovation ability.

4.3 Teaching mode innovation mechanism: Promote "AI+ project-based" learning

Driven by real projects, students are required to form "human-machine hybrid teams" and plan the application strategies and ethical boundaries of AI from the very beginning of the project. As mentors, teachers focus on guiding how to set goals, adjust strategies and evaluate results, rather than providing technical answers.

4.4 Evaluation reform mechanism: Establish an integrated evaluation model of "process - result"

Innovation in teaching models requires the implementation of "AI+ project-based "learning, with real projects driving teaching. Students are required to form "human-machine hybrid teams" and plan the application strategies and ethical boundaries of AI from the project's initiation stage. The role of teachers should transform into that of mentors, focusing on guiding students in setting goals, adjusting strategies and evaluating results, rather than providing technical answers. This transformation has elevated the teaching focus from tool operation to the level of strategic thinking. By integrating AI collaboration throughout the entire project process, students' ability to master AI to solve complex problems is cultivated, enabling them to grasp the overall workflow and decision-making methods of human-machine collaboration in practice.

4.5 Teacher development mechanism: Establish an interdisciplinary teacher platform integrating "technology and education"

The key to the development of teaching staff lies in building an interdisciplinary platform of "technology + education". Institutions should actively collaborate with enterprises to jointly build laboratories and workshops, introduce technical expert resources, and break down the knowledge barriers between schools and enterprises. Through systematic training, teachers are promoted to transform from mere knowledge transmitters to curriculum designers, learning guides and value shapers. This role transformation is a core link in adapting to the teaching demands of the AIGC era. Ultimately, a sustainable teacher development system should be established to help teachers master the dual capabilities of applying AI technology and innovating teaching methods, providing a solid talent support for designing educational reforms.

5. Practical Cases and Implications

Leading design institutions at home and abroad have carried out systematic explorations in the field of AIGC education, and their innovative practices have provided important models for the reform of design education.

(1) In-depth practice of the "AIGC Design Experimental Class "at the Central Academy of Fine

Arts

The experimental class established by the Central Academy of Fine Arts in 2023 has constructed a three-dimensional curriculum system of "technology - ethics - creation". Its innovation is reflected in: 1) Setting "Generative Design Ethics" as a compulsory course, covering modules such as copyright law theory, algorithm transparency, and cultural diversity protection; 2) Implement process-based assessment, requiring students to submit a complete sequence of prompt words (including the number of iterations and keyword optimization paths) and design logs, detailing the entire creative process from AI generation to manual optimization. 3) Establish a joint research project system between schools and enterprises, and cooperate with companies such as ByteDance and Baidu to carry out AIGC design projects. According to the 2024 teaching assessment data, the enterprise adoption rate of students' works in the experimental class reached 75%, and the number of international awards won increased by 40% year-on-year.

(2) The interdisciplinary integration model of the College of Design and Innovation at Tongji University Tongji D&I College adopts a "deep integration of industry and education" strategy: 1) It has jointly established a "Design Intelligence Joint Laboratory" with Alibaba Cloud to develop an open-source AIGC design toolkit (including Prompt optimizer and bias detection module); 2) Establish a "Design Artificial Intelligence" course cluster, covering technical fundamentals (Transformer architecture principles), application practices (multimodal generation technology), and cutting-edge explorations (neural rendering, generative 3D modeling); 3) Implement the "dual-mentor system" and invite technical experts from SenseTime and Microsoft Research Asia to participate in the guidance of graduation projects. This model has achieved remarkable results. The "Rural Cultural Tourism AIGC Design Platform" developed by the student team won the Red Dot Best of the Best Award in 2024, and five invention patents have been applied for related technologies.

(3) The leading experience of international institutions The Rhode Island School of Design (RISD) integrates AIGC into its basic teaching and adds a compulsory course called "Creative Coding and Generative Arts" to the second-year curriculum. Delft University of Technology in the Netherlands has pioneered the "Critical AIGC" teaching method, requiring students to deconstruct cultural biases in generative algorithms through reverse engineering. These practices jointly prove that the transformation of AIGC education must go beyond the tool level and build a three-dimensional capability framework that encompasses technical literacy, critical thinking, and ethical awareness.

These cutting-edge explorations indicate that successful AIGC educational innovation requires three fundamental transformations: from skill imparting to thinking cultivation, from single disciplines to cross-border integration, and from outcome evaluation to process management. The core enlightenment lies in that educators should view AIGC as a strategic opportunity to reshape the design education ecosystem. By systematically reconstructing the curriculum system, teaching model and evaluation mechanism, they can cultivate a new generation of designers who can master artificial intelligence rather than be replaced by it. 6. Conclusion and Outlook

AIGC is not a substitute for design education, but rather a catalyst that propays it to a higher level. The essence of the paradigm transformation in design education is to elevate "creation" education to "planning" and "innovation origin" education. The future talent cultivation mechanism must be based on the new production relationship of human-machine collaboration, with the ultimate goal of fostering students' higher-order thinking, ethical awareness and sustainable innovation ability. Educators need to proactively embrace changes and systematically reconstruct the teaching system in order to cultivate innovative design talents who lead rather than follow the intelligent era.

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