

Research on the Cultivation of Collaborative Creativity Practical Ability for Master's Students Majoring in Design in the Era of Artificial Intelligence

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ABSTRACT

The rapid development of generative AI is shifting design from a "tool-assisted" to a "human-machine collaboration" paradigm, redefining core competencies for designers. This study examines the evolution of human-computer collaboration theory and the current state of design education. Analyzing cases from Stanford's D.school, MIT Media Lab, and the Central Academy of Fine Arts' "Future" initiative, it proposes strategies to cultivate "collaborative creativity" in design master's students. The aim is to advance design education from skill training to the holistic development of human-AI collaborative thinking and ethical judgment, meeting the innovation demands of the intelligent era.

KEYWORDS

Collaborative creativity; Human-machine collaboration; Practical ability cultivation; Artificial intelligence master of design

1 Theoretical Exposition and Analysis of Current Status

1.1 Development of Human-Computer Collaboration Theory

The rise of generative AI and deep learning is fundamentally reshaping design education. The logic of human-computer collaboration has evolved from an initial stage of functional division—"machine supplementation, human dominance"—to a current stage of "cognitive fusion, symbiotic innovation," centered on capability creation. The design industry is also experiencing transformations driven by generative AI. Image generation tools represented by Midjourney have been implemented in industrial applications. Designers now must not only master various AI tools but also understand how to effectively converse with them, possessing the discernment to identify high-quality creative ideas and the organizational ability to reasonably plan the division of labor between humans and machines ^[1].

At this stage, AI has evolved from a mere algorithmic tool into a creative partner capable of learning human tacit knowledge, exploring new frontiers alongside humans, and stimulating creativity. Research on human-AI collaborative creativity traces the evolving relationship from operation, to interaction, and ultimately to collaboration. This process is defined as creative behavior carried out through varying degrees of collaboration, based on the divergent, emergent, and convergent operations of creative thinking within the human cognitive system and the computational system of AI ^[2]. This insight reveals a shift in design practice and research: human-computer collaboration has moved beyond simple functional complementarity to a deeper, cognitive-level integration.

1.2 Current State of Master's Education in Design

Design serves as a vital carrier and expression of culture, with design works embodying specific social significance and cultural value ^[3]. Master of Design graduates are interdisciplinary professionals with integrated artistic and technical skills. They should balance humanities and sciences, art and technology, tradition and modernity, and individuality with common norms. Design master's education in China is currently in a critical phase of transformation, with universities reforming training objectives, curricula, and teaching models to meet socio-economic and industrial demands. Crucially, generative AI must be integrated as a core component of adaptive learning pathways, rather than treated as a peripheral supplement. Master of Design students require greater initiative and autonomy to utilize generative AI more effectively. Educators, in turn, must guide students in fully leveraging their self-directed learning abilities and advancing collaboratively with artificial intelligence ^[4].

Amid the AI wave, advancing "interdisciplinary integration" and "industry-academia-research collaboration" is a key trend. In 2024, the School of Advertising and Branding at Communication University of China relaunched its Master of Design program with a "dual-drive" framework integrating academic and professional degrees. This initiative explores new human-computer collaborative teaching paradigms to cultivate creative talent for the intelligent era. However, challenges remain in the training of design master's students, including misalignment between teaching philosophies and contemporary demands, mismatches between curriculum systems and training objectives, as well as inefficiencies in industry-academia-research-application collaboration. These issues make the integration of "art and science" difficult to achieve in practice ^[5].

1.3 The New Definition of "Collaborative Creativity" in the Age of Artificial Intelligence

Under the influence of artificial intelligence, collaborative creativity has acquired a new definition, with its core now expanded to encompass human-computer collaboration. In this new paradigm, the role of the designer is gradually shifting from creator to "creative curator" and "value leader". Their primary functions involve defining complex problems, constructing constraint frameworks, and employing critical thinking and aesthetic judgment to filter and make decisions among the vast array of solutions generated by AI ^[6]. AI primarily achieves its creative potential through "combinatorial innovation," a capability that complements designers' "breakthrough innovation." Therefore, cultivating collaborative creativity in the AI era requires developing students' planning and leadership abilities. Education must shift its focus from skill training to fostering critical thinking, value judgment, ethical deliberation in human-computer environments, and interdisciplinary collaboration, enabling students to fully realize the innovative potential of human-AI synergy.

2 Analysis of Typical Cases

2.1 Stanford University's D.school

2.1.1 The Core Model of Design Thinking at D.school

The design thinking advocated by Stanford University's D.school, with its core principles of being human-centered and iterative, provides an innovative methodology that can serve as a reference for Master of Design education. Its design thinking model fosters team collaboration and innovation by forming diverse teams through interdisciplinary integration ^[7], thereby creating a sustainable environment for innovation. The D.school design thinking model consists of five key stages, forming a dynamic and non-linear process: Empathize, Define, Ideate, Prototype, and Test.

2.1.2 Empowerment by Generative AI

In the era of artificial intelligence, Stanford University's D.school focuses on integrating human-centered design thinking with generative AI to reinvent design methodologies, educational models, and industry boundaries. The D.school has infused the design thinking methodology with new meaning in the AI era, emphasizing problem definition through empathy based on genuine human needs. It concentrates on transforming ambiguous phenomena into structured, AI-processable data problems, with generative AI assisting designers in concept divergence, style exploration, and prototype generation ^[8]. To address AI-era challenges, Stanford's D.school has implemented educational reforms centered on shifting from skill instruction to cultivating higher-order thinking, positioning AI as a collaborative partner that enhances creativity. Through experiential learning, it prevents deskilling, emphasizes ethics, and cultivates designers capable of effectively harnessing AI.

2.2 MIT Media Lab

2.2.1 The "Anti-Disciplinary" Philosophy

MIT Media Lab, with its "anti-disciplinary" research philosophy and technology-driven model, offers a new paradigm for Master of Design education that breaks through disciplinary boundaries and encourages original innovation. This model aims to enable students' designs to directly address industry needs. This philosophy fundamentally challenges traditional disciplinary classifications; it differs from ordinary interdisciplinary research and does not settle for simple collaborative efforts across disciplinary boundaries. Instead, it seeks to thoroughly deconstruct disciplinary limits, exploring and innovating within the gaps between disciplines ^[9]. This philosophy is primarily manifested at three levels. In knowledge production, it emphasizes transdisciplinarity and integration, with its research scope encompassing dozens of fields, including psychology, computer science, and art and design. In research methodology, it focuses on exploration and problem orientation, not being confined to the methodologies of any specific discipline. In organizational structure, it maintains fluidity and openness, dynamically adjusting team composition based on research questions. This philosophy and practice have made the Media Lab "a model of interdisciplinary research".

2.2.2 Educational Empowerment in the Age of Artificial Intelligence

The "anti-disciplinary" philosophy of the MIT Media Lab gains renewed relevance in the age of AI. It supports design education through multiple approaches to foster innovative talent. Emphasizing student plasticity, the lab builds a fully immersive learning environment that enables personalized, technically-supported education. AI courses adjust their difficulty and delivery according to students' application needs, achieving deep human-AI integration and precise instruction. By combining project-based learning, multidisciplinary teams, and deep industry engagement, the lab cultivates collaborative creativity, offering a new model for AI-era design education. It also automatically generates verifiable credentials from student work, integrating them into a talent database. This evaluation system records not only academic achievements but also the growth of students' collaborative creative abilities.

2.3 Central Academy of Fine Arts "Wei-Future" Initiative

2.3.1 Core Philosophy of the "Wei-Future" Initiative

The Central Academy of Fine Arts' "Wei-Future" initiative fosters an innovative educational ecosystem by breaking cultural and spatiotemporal barriers through an "educational community" model. It builds a global collaborative platform with worldwide institutions and societal sectors. The initiative unfolds in three phases: "Activating Innovation" engages over thirty global universities, including Harvard and the Royal College of Art, in dialogues on key issues in design education; "Youth Agency" brings together students and faculty in cross-domain workshops on themes like AI-aided design and future cities; and "Education Unbounded" consolidates outcomes through a presidential forum. Guided by social design and humanistic values, it positions design at the intersection of technology, culture, and ethics to address the transformation of design education in the AI era.

2.3.2 Cultivation Pathways for Collaborative Creativity in the Age of Artificial Intelligence

The Central Academy of Fine Arts' "Wei-Future" global education initiative breaks down disciplinary barriers through interdisciplinary project practices, promoting deep integration between design and fields such as technology, humanities, and technology ethics. This cultivates students' ability to integrate diverse knowledge to solve complex problems. The initiative innovates the human-machine collaborative teaching model by positioning artificial intelligence as a creative partner rather than a mere tool, guiding students to strengthen systems thinking and foresight capabilities through application^[10]. Through specific formats such as workshops and experimental courses, it helps students develop creative dialogue skills with AI systems. In terms of teaching methodology, the initiative emphasizes the organic combination of mentor guidance and independent exploration, reinforcing students' humanistic agency within technological applications^[11], to ensure they maintain a dominant role in design decision-making throughout human-machine collaboration. Simultaneously, the initiative embeds an ethical education dimension into the curriculum system, fostering students' sense of social responsibility and critical innovative awareness through technology ethics discussions and social practice research. This comprehensive educational innovation enables students to maintain a rational perspective on technological development while mastering cutting-edge applications, forming a complete pathway for cultivating design talent in the age of artificial intelligence.

3 Strategies for Cultivating the Practical Competency of "Collaborative Creativity" among Master of Design Students in the Age of Artificial Intelligence

3.1 Combinatorial Innovation-Oriented Value Leader

Master's design education is evolving in the AI era, moving from individual skill acquisition to a pedagogy of human-computer "collaborative creativity." The goal is to shape students into "combinatorial innovation-oriented value leaders" who can leverage generative AI, integrate cross-disciplinary knowledge, and steer value creation.

Guided by the non-linear, iterative design-thinking process, students learn to translate user insights into precise AI-executable instructions. They use generative AI for ideation, exploration, and prototyping while retaining professional judgment and directional control. This approach blends technological and humanistic values, cultivating collaborative thinking, ethical discernment, and innovation leadership—enabling students to thrive as capable designers in the AI era.

3.2 Interdisciplinary Project-Based Practice

To foster "collaborative creativity" in Master of Design students, multidisciplinary project-based practice and deeper industry-academia-research integration are recommended. Universities can partner with companies to develop dynamic case libraries and workshops, transforming real-time industry needs into teaching resources. Project teams, formed around specific design problems, should leverage diverse disciplinary perspectives and real-world requirements to drive innovation. This ensures meaningful industry engagement, enabling students to hone collaborative creative skills through solving complex problems. Modular courses such as "Design + AI + Humanities" can further institutionalize interdisciplinary teaching, strengthening students' capacity to synthesize knowledge within complex systems.

3.3 Building a Fully Immersive Learning Environment

The cultivation of practical competency in "collaborative creativity" requires that schools or educators leverage artificial intelligence tools to construct personalized, differentiated teaching environments, thereby forming a fully immersive learning environment. This initiative will provide an efficient learning setting that nurtures students as leaders in creative design and fosters a deep connection with generative artificial intelligence. The fully immersive learning environment, utilizing AI technology, enables personalized support by dynamically adjusting knowledge delivery based on individual student differences, and provides a foundation for diverse team collaboration.

3.4 Integrating Ethics Education

In the age of artificial intelligence, the operationalized implementation of ethics education should be pursued. An assessment indicator library for intelligent technology ethics can be established, cultivating students' ability to anticipate and address risks in technology applications through scenario simulations and case discussions. Evaluation dimensions for AI ethics should be set to examine students' ethical awareness, cultural sensitivity, and sense of social responsibility demonstrated during their use of generative AI, as well as to assess their understanding and response strategies regarding issues such as AI technology ethics and data privacy.

3.5 Building an Innovative Evaluation System

To cultivate the creativity of Master of Design students within human-computer collaboration, it is essential to establish a multi-level competency development system. This system should systematically integrate the mastery of intelligent tools, critical thinking, and design ethics. Correspondingly, the curriculum should adopt a modular design.

The proposed structure comprises three core modules: one focusing on the principles of human-computer collaboration, another on hands-on practice with AIGC tools, and a third dedicated to innovation project implementation.

4 Conclusion

The rise of the AI era is reshaping design industry paradigms and posing new challenges and opportunities for Master of Design education. This study systematically traces the evolution of human-computer collaboration theory, analyzes current conditions and challenges in design master's education, and examines domestic and international case studies. Findings indicate that AI advancement is fundamentally transforming design education. Such education must move beyond traditional skill-transfer toward a competency framework centered on "collaborative creativity." Sustained research and timely refinement of training models are needed to support the sustainable development of design master's education in the AI era, allowing the technology to truly empower student innovation.

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