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Paradigm Transformation in Art and Design Education Driven by AIGC: Taking Animation Creation Courses as an Example

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Abstract: This paper explores the reconstruction of teaching paradigms for art and design majors in colleges and universities driven by AIGC technology. It proposes and practices a new "teacher-machine-student" ternary collaborative teaching paradigm, reconstructing the teaching process through the integration of AIGC tools: revolutionizing teaching content by incorporating AIGC artistic language, computational thinking, and human-machine collaborative creation methods; innovating teaching methods through project-driven and reverse engineering approaches; and constructing a diversified evaluation system that emphasizes process assessment and creative integration capabilities. This paradigm aims to enhance creative efficiency and diversity, stimulate innovative thinking, facilitate personalized learning, transcend spatial and temporal constraints, ultimately improving teaching quality and cultivating interdisciplinary design talents capable of adapting to industry transformations. Taking the practice of animation creation courses as an example, this paper provides a referenceable path for AIGC to empower the reform of art and design education.

Keywords: AIGC; Art and design education; Teaching paradigm; Animation creation; Human-machine collaboration

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1. Introduction: Challenges of the times and educational responses

Currently, AIGC technologies centered around Diffusion Models and Generative Adversarial Networks are deeply penetrating various fields of content creation, significantly enhancing creative efficiency and expanding the dimensions of expression with their cross-modal generation capabilities. However, the cultivation of art and design talents in universities still largely follows the traditional path of "teacher demonstration - student imitation," neglecting the cultivation of higher-order abilities such as AI-assisted decision-making and critical consciousness, as well as lacking reflection on the logic of creative generation and technological ethics. The empowerment of animation creation by AIGC technology not only compresses redundant technical processes but also shifts the focus of teaching from "how to draw" to "what to draw" and "why to draw," providing a technological opportunity for the transformation of teaching paradigms. This study aims to explore a systematic teaching reform path from tool empowerment to mindset reconstruction.

2. The inevitability of transformation: The dual reshaping of AIGC on animation creation and education

2.1. The inherent bottlenecks in traditional animation production processes

Firstly, the core aspects of traditional animation production processes are characterized by being "labor-intensive" and "time-intensive" [1]. The smooth motion in animation relies on the frame-by-frame drawing of thousands of hand-drawn sketches. Research cases indicate that labor costs can account for up to 80% of the entire animation project budget [2]. Within the core production phases, "in-betweening" and "coloring" consume a significant amount of work hours due to their highly repetitive nature. Data reveals that when handling complex limb interaction animations, manual reference-based completion requires 6 to 8 hours, whereas AI-assisted methods only take 2 to 4.5 hours [3].

Secondly, the rigid reliance on skilled human capital directly leads to the traditional digital animation industry facing severe risks of "production capacity ceilings" and "project delays." Animation production heavily depends on a small number of experienced core creative personnel, and the global animation industry is currently confronting the dilemmas of creative talent drain and a shortage of backup forces [4]. The scarcity of core human resources, such as skilled animators and directors, has become a key bottleneck restricting the development of the industry [5].

2.2. The negative impact mechanism of bottlenecks on animation education

The technical and efficiency bottlenecks rooted in traditional processes, when placed in the specific context of animation education, have their negative effects significantly amplified, directly or indirectly distorting teaching priorities and stifling students' creativity.

Firstly, they lead to a deviation in teaching focus, creating a dilemma of "emphasizing technique over artistry." Intermediate drawing, cleanup, coloring, and other stages in traditional processes consume the vast majority of time and energy, causing teaching practices to often lean towards these technical and repetitive tasks while neglecting in-depth understanding and training in core animation elements such as motion rhythm, performance design, and narrative logic. Studies have pointed out that in current animation teaching, students generally lack "training in motion laws," resulting in stiff animation movements [6].

Secondly, they suppress innovative spirit and the enthusiasm for trial-and-error exploration. Animation creation should inherently involve constant experimentation, iteration, and optimization, but the extremely low fault tolerance and high modification costs of traditional processes pose significant obstacles to creative exploration. When students realize that minor changes entail redrawing a large number of frames, they tend to choose the most conservative approach. This objective reality of "extremely high trial-and-error costs" severely stifles students' creative impulses and experimental spirit [7].

2.3. The evolution of AIGC's role: From automated tools to intelligent creative partners

Since 2023, AIGC's role in the field of digital animation has been shifting from that of an "automated tool" to an "intelligent creative partner." This transformation necessitates a reevaluation of human-machine relationships and the establishment of a new concept of "human-machine collaboration." Under this concept, AIGC is viewed as a powerful "cognitive exoskeleton" and a "creative catalyst," with its core value lying in assistance rather than dominance, and in inspiration rather than replacement. Research and practice have demonstrated that current AIGC has fundamental flaws in understanding complex emotions, narrative logic, and cultural contexts [8]. The content it generates may be visually stunning, but it often lacks emotional depth and genuine originality. Therefore, the core values of humans remain irreplaceable: posing questions and defining objectives, defining style and making aesthetic judgments, integrating narratives, and imbuing them with meaning. In animation education, it is crucial to guide students in correctly understanding the role of AIGC.

3. Construction of a new paradigm: Theory and practice of the "Teacher-Machine-Student" ternary collaboration

Faced with the opportunities and challenges brought by AIGC, the traditional "teacher-student" binary structure, centered around teachers and supplemented by software, is no longer sustainable. To address this, we propose and construct a brand-new "teacher-machine-student" ternary collaborative teaching paradigm. This paradigm elevates artificial intelligence from a passive tool to an active teaching entity on equal footing with teachers and students, forming a dynamic, open, and efficient collaborative educational ecosystem.

3.1. Theoretical connotations and role redefinition

The "teacher-AI-student" ternary collaborative paradigm is rooted in constructivism, connectivism, and personalized learning theories. Constructivism posits that learning is a process where learners actively construct the meaning of knowledge [9], and teachers should transition from being authorities on knowledge to designers and facilitators of the learning environment [10]. Connectivism suggests that learning is a process of forming connections within a vast network [11], with AIGC serving as a core intelligent node within this learning network. Personalized learning theory emphasizes adjusting teaching strategies according to students' unique needs, and the introduction of AIGC significantly enhances its feasibility. Based on these theories, the new paradigm thoroughly redefines three core roles.

3.1.1. The role of teachers

Teachers shift from being the sole disseminators of knowledge to becoming "learning navigators, aesthetic gatekeepers, and AI commanders." Their primary task is to design inspiring project-based learning tasks that stimulate students' motivation and guide them in autonomous exploration. Secondly, teachers need to guide students in critically examining and selecting content generated by AIGC, teaching classical aesthetic principles, and cultivating their aesthetic judgment. Finally, teachers must also become experts in teaching students how to "command" AI, namely, teaching the art of "prompt engineering" and fostering students' ability to integrate diverse technologies and resources.

3.1.2. The Role of AIGC

AIGC has transitioned from being a passive software tool to an "all-weather intelligent learning companion, an infinite inspiration generator, and an efficient skill training ground." AIGC can transcend temporal and spatial constraints, providing students with immediate and personalized feedback. It offers students a vast array of creative materials that transcend stylistic and imaginative boundaries, serving as a powerful catalyst for creativity. Simultaneously, it creates a low-cost, high-efficiency trial-and-error environment for students, enabling them to rapidly conduct dynamic previews of animation principles and keyframe tests for character performances using AIGC, thereby accelerating the internalization and maturation of skills.

3.1.3. The role of students

Students have transformed from passive recipients of knowledge to "leaders in learning, chief directors of creativity, and integrators of technology." Students need to learn how to engage in efficient dialogue with AI, actively seek directional guidance from teachers, and solicit specific knowledge and materials from AIGC, becoming the true masters of their learning process. In specific animation projects, students assume the role of chief directors of creativity, serving as the highest decision-makers in the entire creative process, responsible for establishing themes, narrative rhythms, and artistic styles. Furthermore, students must evolve into integrators of technology, mastering the ability to efficiently integrate content generated by AIGC with professional animation production software, forming a unique "human-machine collaboration" workflow of their own.

3.2. Reconstruction of teaching content: Design of a "Four-Stage" curriculum module integrating AIGC

To systematically cultivate students' comprehensive capabilities in animation creation in the era of AIGC, we have designed a set of progressive and spirally ascending "four-stage" curriculum modules.

3.2.1. Stage one: AIGC artistic language and computational thinking

This stage serves as the cornerstone, with the core objective of establishing a comprehensive understanding of AIGC among students and enabling them to engage in efficient "dialogues" with AI. The course content begins with an overview of the technological evolution of AIGC, briefly introducing core concepts such as Diffusion Models. The practical focus is on the systematic teaching of operations on mainstream AIGC platforms and "Prompt Engineering," instructing students on how to precisely control key parameters and conduct stylistic and aesthetic analyses of AI-generated images.

3.2.2. Stage two: AIGC-assisted pre-production development in animation

This stage shifts the teaching focus to the actual process of animation creation, with an emphasis on pre-production development. Students will utilize AIGC tools as a powerful "creative engine" to efficiently accomplish tasks such as world-building, character design, scene design, and storyboard creation. The training emphasis is not on generation itself, but rather on cultivating students' abilities to efficiently filter, accurately refine, deconstruct, and creatively recombine the vast array of results produced by AIGC.

3.2.3. Stage three: Animation production experiment driven by AIGC

This phase guides students in exploring the experimental applications of AIGC in the "production" aspect of animation, officially transitioning from static image generation to dynamic video generation. The course will introduce mainstream text-to-video and image-to-video tools and organize students to conduct experiments in dynamic storyboarding and short film creation. The core challenge lies in addressing two major difficulties in current AIGC video generation: consistency and controllability. This phase encourages students to conduct "mixed media" creative experiments, synthesizing AI-generated complex dynamic texture backgrounds or special effects elements with hand-drawn frame-by-frame animated characters.

3.2.4. Stage four: Integrated creative workflow of human-machine collaboration

This phase represents the pinnacle, requiring students to complete a complete animated short film through a comprehensive project-oriented approach. Students need to independently select topics, plan, and design a complete human-machine collaborative workflow, integrating the knowledge learned in the first three phases. The focus of assessment is no longer on the proficiency in operating a single software, but on the comprehensive abilities of students as project leaders: how to plan workload, manage digital assets, resolve technical challenges, and maintain the unity of artistic style and clarity of narrative expression throughout the entire hybrid workflow.

3.3. Teaching method innovation: Centered on "Reverse Engineering" and "Project-Driven" approaches

3.3.1. Reverse Engineering Pedagogy (REP)

This method guides students to deduce the creative process from the results by deconstructing outstanding AIGC animation works. Students are required to dissect the toolchains, prompt strategies, and post-production synthesis techniques employed in these works, thereby gaining an in-depth understanding of the generation logic behind AIGC animations. For instance, when analyzing dynamic lighting and shadow rendering effects, students need to reconstruct the entire technical pathway, from prompt design to post-production layered synthesis. This approach significantly enhances students' technical insights, while teachers assist in establishing systematic thinking models by setting up structured analytical frameworks.

3.3.2. Project-Based Learning (PBL)

This method utilizes complete artistic projects as vehicles to embed course knowledge within them, stimulating technological exploration through real-world problem scenarios. Teachers need to construct driving questions with multi-dimensional openness, such as "How can AIGC technology be used to restore the dynamic aesthetics of Dunhuang murals?" At the initial stage of the project, students analyze cases through reverse engineering to establish a technical benchmark; during project implementation, AI provides real-time generation solutions, enabling students to compare the technical gaps in their own works and form a spiral upward pathway of "technical deduction → practical verification → AI feedback → iterative optimization."

The synergy between these two methods relies on a division of labor mechanism involving the tripartite roles of "teacher-AI-student." Teachers take the lead in instructional design, AI tools function as technological toolchains, and students, as cognitive subjects, dominate decision-making and iteration, ultimately forming personalized knowledge systems through technological exploration.

4. Empirical verification: Quantitative and qualitative analysis of the effectiveness of teaching reform

To verify the practical effects of the "teacher-machine-student" ternary collaborative teaching paradigm, we conducted a longitudinal comparative study on student works from the "Two-Dimensional Animation Creation Course" from 2023 to 2025. With no changes in the teaching staff, teaching conditions, or grading team, the study focused on the overall quality of the works and the changes in the number of outstanding works as reflected in the collective grading results by teachers.

4.1. Quantitative analysis: Significant leap behind the data

Through the collation and analysis of collective grading data from three teachers, we observed that in 2023 and 2024, before the introduction of AIGC technology, the overall quality of student works remained stable, with only one work being rated as "outstanding" each year. In 2025, after the full implementation of AIGC-assisted teaching, the number of works rated as "outstanding" increased to three. This represents a 200% increase compared to 2023. This quantitative result strongly demonstrates that the teaching reform centered on AIGC has achieved breakthrough results in improving the quality of student works, particularly in generating high-level works.

4.2. Qualitative analysis: Transformation of the creative process enabled by AIGC

Behind the leap in quantitative data lies the profound reshaping of the students' animation creation process by AIGC technology. By analyzing outstanding works from 2025 and records of students' creative processes, we found that AIGC primarily plays a crucial enabling role in the following aspects.

4.2.1. Richness and professionalism of visual presentation

Thanks to the high-quality backgrounds and materials generated by AI, the works in 2025 are generally more visually full and refined, achieving a professional standard that previously required several times the amount of time to attain.

4.2.2. Complete realization and deepening of creative concepts

Creative ideas that had to be simplified in the past due to technical or time constraints can now be fully realized with the help of AIGC. Students have more time to polish scripts and refine animation performances, resulting in a deeper expression of the themes in their works.

4.2.3. Significant increase in production efficiency

AIGC undertakes a large amount of repetitive and labor-intensive work, allowing students to focus their precious time on the core aspects of creation. As a result, they have been able to complete more complex and complete projects within the limited semester.

4.2.4. Deep integration of technology and art

Students are no longer just software operators; instead, they have learned to become “directors” who collaborate efficiently with AI. This creative model of “human-machine collaboration” itself represents a cutting-edge capability, which is also reflected in the innovation and experimentation of their works.

The core of the success of this teaching reform lies in the fact that AIGC technology does not simply replace students’ work but serves as a “creative catalyst” and a “productivity amplifier”. It liberates students from the arduous task of technical execution, enabling them to return to the essence of creation—thinking and expression.

5. Risk response and future prospects

5.1. Risks and response strategies

The practice of this model faces multiple risks. At the technological level, AI “hallucinations,” data bias, and outdated knowledge updates are the primary obstacles; at the ethical level, the prominent issues are academic integrity risks and challenges related to data privacy and security; at the pedagogical level, students may develop intellectual laziness due to over-reliance on AI. Addressing these risks requires a multifaceted approach. Firstly, at the technological level, it is essential to develop domain-specific AI and explainable artificial intelligence, and strengthen the “human-in-the-loop” review mechanism. Secondly, at the institutional level, clear conventions for AI use and academic integrity policies should be established, and the assessment system should be restructured. Finally, at the competency level, efforts should be made to cultivate students’ higher-order thinking, AI criticality, and a sense of responsible use, while enhancing teachers’ leadership in AI-assisted teaching.

5.2. Future prospects

Future research should focus on the transferability of paradigms, exploring how they can be extended to disciplines such as graphic design, film and television production, and environmental design. Concurrently, it is essential to continuously track the evolution of AIGC technology towards higher-dimensional advancements, such as controllable long-form video generation, and to proactively anticipate its impact on the core skill requirements across various design disciplines. Lastly, there is a need for a deeper exploration of the humanistic dimension. In the new era of human-machine symbiotic creation, future research urgently needs to delve into how design ethics and AI ethics education can be more closely integrated into technical instruction, along with the development of corresponding assessment systems for humanistic qualities. This ensures that while students master cutting-edge technologies, their humanistic spirit, aesthetic judgment, and social responsibility are also concurrently enhanced.

6. Conclusion

This study systematically demonstrates the urgency and necessity of paradigm innovation in college animation education amidst the wave of AIGC technology. The core argument is that, faced with the transformation of artificial intelligence from a supporting tool to a collaborative partner, the traditional binary structure of “teacher-student” is no longer sustainable, necessitating a systematic shift towards a ternary collaborative teaching paradigm that integrates technological agency: “teacher-machine-student”. This paradigm does not merely involve introducing AIGC as a teaching tool into the classroom but represents a profound reconfiguration at the levels of educational philosophy, teaching structure, and value orientation. Through the systematic reshaping of teaching content, innovation in teaching methods, and reform of the evaluation system, this paradigm aims to effectively address the challenges of the times, enhance teaching quality, and ultimately cultivate interdisciplinary and innovative talents capable of mastering future technologies and leading industry development. Empirical research data attests to the effectiveness of this paradigm, while discussions on its support system, risks, and future pathways provide a clear roadmap for subsequent in-depth reforms. This is not merely a technology-driven educational improvement; it represents a value reshaping concerning the cultivation model for future creators, with the ultimate goal of nurturing future designers who can master technology and lead creative directions with profound humanistic concern.

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