

The Challenges and Development of Digital Transformation for Design Teachers in Universities Based on Topic Analysis

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Abstract: The rapid iteration of artificial intelligence technology is profoundly reshaping the knowledge production and talent cultivation models in design education. As the transformational subjects, teachers are facing multiple-dimensional deep dilemmas such as adapting to technology, making ethical choices, and redefining their identities. This study adopts the thematic analysis method in qualitative research and conducts semi-structured in-depth interviews with 8 design educators. Using the six-stage thematic analysis framework by Braun and Clarke, the core themes are extracted. The study finds: 1) Design educators have deficiencies in adopting AI technology and conducting ethical education. Most teachers admit that their ethical cognition is insufficient to support systematic ethical teaching, and they lack clear judgments on key issues such as the originality definition of AIGC and copyright ownership; 2) Teachers' attitudes towards the use of AI tools show a three-stage evolution: tool confusion period, exploration and experimentation period, and critical integration period; 3) The current evaluation system lacks incentives for teaching innovation, the lack of cross-university professional exchange communities, and the absence of targeted training, which constitute three major institutional obstacles restricting teachers' digital and intelligent transformation. Based on the research findings, this study proposes a design education digital and intelligent transformation path of ethics-first, hierarchical advancement, and community empowerment, providing theoretical basis and practical references for universities to formulate teacher development policies and training systems.

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1. Introduction

With the breakthrough progress of generative artificial intelligence technology, design education is undergoing an unprecedented paradigm shift. From Midjourney to Stable Diffusion, from ChatGPT to Sora, AI tools are penetrating into every aspect of design teaching at an astonishing speed, changing the traditional patterns of creative generation, scheme development, and work evaluation. The UNESCO released the "Framework for Teachers' AI Competence" in 2024, clearly stating that teachers not only need to master the operational skills of AI tools, but also need to possess ethical judgment and value leadership capabilities, so as to guide students to critically examine the boundaries and potential risks of AI technology in teaching. However, in sharp contrast to the technological development and policy advocacy, the real experiences, deep dilemmas, and intrinsic needs of frontline teachers in the digital transformation process have not been fully attended to and deeply understood. Existing research mostly describes the composition dimensions and training paths of teachers' AI literacy at the macro level, or remains at the ideal policy appeal level, lacking in-depth description of the dynamic experiences of teachers' transformation and the exploration of the internal mechanisms.

As a discipline highly dependent on creative output and aesthetic judgment, design teachers in the digital transformation process of design education face unique and more complex challenges. On the one hand, the powerful generation ability of AI tools brings possibilities for efficiency improvement and creative expansion in design teaching. Teachers can use AI to generate a large number of design schemes for students to compare and analyze, and also use AI for rapid prototype verification and user testing. On the other hand, the development of algorithmic generation logic and traditional aesthetic judgment power has triggered deep anxieties among teachers about the essence of the discipline, the definition of originality, and the teaching value. Van der Burg et al. (2026) pointed out that in creative-

intensive design education, the efficiency-oriented AI usage model may eliminate the core reflective practice of design education, making teaching become a prompter engineering training. This makes the digital transformation of design education teachers not only a technical adaptation issue, but also involves issues of disciplinary identity recognition, teaching philosophy reconstruction, and ethical value choices. Just as Van (2026) emphasized in the 'slow design' concept, teaching design in the AI era should return to the authenticity of the process, critically explore the relationship between AI and design thinking at each stage, rather than simply pursuing maximum efficiency. Based on this, this study uses thematic analysis as the methodological basis, through in-depth interviews with 8 design teachers, the study aims to provide theoretical explanations and practical suggestions for the digital transformation of design education based on the subjective experience of teachers.

2. Literature Review and Theoretical Framework

2.1 A Theoretical Perspective on the Digital Transformation of Design Teachers

The digital transformation of teachers is a complex process involving cognitive restructuring, behavioral change, and identity negotiation, and requires the integration of multiple theoretical perspectives for understanding. The Intelligent-TPACK framework proposed by Celik (2023) provides an important theoretical perspective for understanding this process. This framework adds an ethical assessment dimension to the classic TPACK, emphasizing that teachers need to establish integrated knowledge between technical ability, teaching wisdom, and ethical sensitivity. However, this framework is mainly based on quantitative surveys of K-12 teachers and lacks sufficient attention to the specific contexts in higher education, such as the rapid changes in the creative industry, the immediate needs for students' employability, and the high emphasis on originality. The core of design education lies in cultivating students' creative thinking and critical expression skills. This educational goal determines that the digital transformation of design teachers cannot simply be equated with the improvement of technology adoption rates, but involves deeper updates of teaching beliefs and the reconfiguration of disciplinary identity.

From the perspective of teacher professional development theory, teacher transformation occurs in the interaction of personal domain knowledge, beliefs, attitudes, process domain including teaching practice, professional experiments, and context domain such as school culture, policy environment. In the context of digital transformation, teachers not only need to update technical knowledge and teaching beliefs in the personal domain, but also need to develop new teaching practices in the process domain and respond to multiple influences from institutional systems, disciplinary cultures, and industry norms in the context domain. Understanding the transformation predicament of design teachers must be examined in the specific disciplinary context and institutional environment, rather than simplifying it as an issue of individual incompetence. Zhu Zhiting (2018) also emphasized in the discussion of smart education that teacher development needs to go beyond surface-level training of technical operation and shift to deep capacity building centered on data wisdom, achieving the organic unity of 'technological wisdom' and 'educational wisdom'. Liu Bangqi and Yuan Tingting (2019)'s research shows that the rise of intelligent education requires a transformation of teachers' roles from knowledge transmitters to learning guides, but this transformation process is accompanied by significant psychological costs and professional development pressures, which require systematic support at the institutional level.

2.2 The Ethical Dilemmas and Identity Anxiety Arising from the Integration of Teacher AI

The widespread application of AI technology in educational design has triggered a series of profound ethical controversies, which constitute the core obstacle to the digital transformation of design teachers. Unlike mathematics or physics teachers who mainly focus on the correctness of AI output results, design teachers must confront the understanding of author identity and style ownership by AIGC. Currently, when AI generates dozens of visual solutions in just a few seconds, the boundary of originality needs to be clearly defined. When students' works are largely integrated with AI-generated elements, their genuine design ability needs to be evaluated, and it needs to be considered. When algorithms are trained based on a large amount of existing works, the issue of implicit infringement by style transfer on original designers needs to be considered. These problems have no ready-made standard answers, but they constitute the ethical challenges that design teachers cannot avoid in their daily teaching. Tzortzoglou (2025) emphasizes that an anticipatory ethical governance mechanism needs to be established at the teaching design stage to mitigate the unexpected consequences brought by AI integration.

This technological change has also triggered deep disciplinary identity anxiety among teachers. On the one hand, some senior teachers view AI tools as a potential risk to their professional authority, and the knowledge authority of teachers is challenged. On the other hand, young teachers, although proficient in technical operations, lack guidance on how to integrate AI organically into teaching design, and are trapped in the dilemma of being able to use tools but not teaching design. This dual anxiety: the anxiety of technology replacing humanistic values and the anxiety of insufficient teaching ability, constitutes the core psychological obstacle for the digital transformation of design teachers.

At the methodological level, the thematic analysis method (Thematic Analysis) provides a theoretical tool for this

study to systematically analyze interview data. Braun and Clarke (2006) proposed a six-stage thematic analysis framework that emphasizes the active construction and deep interpretation of data by researchers, rather than simple induction of surface patterns. This methodological orientation is highly consistent with the research goals of this study. This study not only hopes to describe the dilemmas faced by teachers, but also hopes to understand the deep mechanisms behind these dilemmas and their interaction with disciplinary culture, institutional environment. Through systematic coding, theme generation, and theoretical construction, the thematic analysis method can help researchers identify core patterns with theoretical explanatory power in rich qualitative data, providing evidence-based references for the policy-making of the digital transformation of design education.

3. Research Design

This study employed a purposive sampling strategy to select 8 representative design teachers as the subjects for in-depth interviews. The sampling followed the principle of 'maximizing information richness' to ensure that the interview subjects had sufficient heterogeneity in key dimensions such as teaching experience, academic title, institution level, and discipline direction, in order to capture the diverse experiences within the design teacher group. Specifically, the interview subjects covered the entire career spectrum from 3 to 22 years of teaching experience, including assistant teachers, lecturers, associate professors, and professors, and were distributed across four types of institutions: double-first-class construction universities, independent art colleges, comprehensive universities, and art colleges. They involved five professional directions: environmental design, digital media art, visual communication design, product design, and fashion and apparel design. The basic information of the respondents is shown in Table 1 (to protect privacy, real names have been replaced with numbers). The sample size was determined following the saturation principle of qualitative research. Guest et al. (2006) conducted a meta-analysis of 60 qualitative studies and found that in groups with higher homogeneity, 6 in-depth interviews could capture approximately 80% of the core themes. In this study, at the 7th interview, no new themes emerged, and the 8th interview was mainly used to verify and enrich the existing themes and confirm data saturation.

Table 1. Basic Information of Interviewees

Code	Subject Area	Years of Teaching	Gender	Title	Type of institution
T1	Environmental Design	15 years	Male	Associate Professor	Top-notch University
T2	Digital Media Art	4 years	Female	Lecturer	Top-notch University
T3	Visual Communication Design	8 years	Male	Lecturer	General University
T4	Visual Communication Design	20 years	Male	Professor	Art College
T5	Digital Media Art	3 years	Female	Teaching Assistant	General Undergraduate Institution
T6	Product Design	22 years	Male	Professor	Engineering University
T7	Product Design	11 years	Male	Associate Professor	Comprehensive University
T8	Fashion and Apparel Design	6 years	Female	Lecturer	Art College

4. Research results

Based on a systematic analysis of the in-depth interview data of 8 design teachers, this study identified three core themes: the structural gap between technology adoption and ethics education, the three-stage evolution model of teachers' attitudes towards AI, and the institutional predicament and autonomous breakthrough. These three themes encompass 9 sub-themes, forming a systematic explanation of the challenges and mechanisms of the digital transformation of design teachers. The following sub-themes are elaborated in detail.

Topic 1: Imbalance between Technology Adoption and Ethical Education

This topic reveals the contradiction within the group of design educators between the rapid adoption of AI technology and the lagging of ethical education, encompassing three sub-themes: the development of technology and reliance on efficiency, the ambiguous area of ethical cognition, and the concern over the decline of creativity. In terms of technology development and reliance on efficiency, three quarters of the respondents expressed positive evaluations of the powerful functions of AI design tools and developed a high reliance on technological efficiency in their teaching practices. Respondents T3 and T5 explained this reliance from the perspective of teaching competitiveness:

"Midjourney enables me to see twenty different scenario simulations in just one class. This was something that

previously required students to spend a week hand-drawing it. Now the teaching pace is completely different." "If you don't offer courses with AI tools, students will think you are out of touch. They use them more proficiently in private and it's better to guide them on how to use them correctly."

However, in sharp contrast to the proficiency at the tool level is the widespread ambiguity at the ethical cognition level. In the ambiguous sub-themes of ethical cognition, most respondents were vague or indicated that they had not discussed AI ethical issues systematically when asked about whether they had systematically addressed such issues in the course. The confusion of respondent T5 was:

"I understand that ethical norms are important, but when students use AI for design assistance, should this be regarded as cheating or as the proper use of a tool? I'm still not sure about the boundary here."

This ambiguous state of the teachers' own ethical cognition makes it difficult for them to effectively guide students in establishing a critical perspective on the use of AI. It is worth noting that a few teachers who have begun to explore ethical teaching have shown more profound reflections. Respondent T4 shared their practice in the course, where he set up an AI design thinking training week in each class, requiring students to generate images using the same set of prompts on different platforms, compare the differences in results, and discuss algorithmic biases.

In the sub-theme of deep concerns about insufficient creativity, some senior teachers expressed concerns that AI might erode students' core design abilities. Respondent T8's statement was representative. She described her concern as the deterioration of students' creativity. For example, she mentioned the core value of designers is the cultivation of design thinking, and what needs to be cultivated in students is the aesthetic judgment ability that AI cannot replace, rather than the operator who can write prompts. This concern reveals the dilemma faced by design teachers in the digital transformation, which is different from other subject teachers who mainly focus on the correctness of AI output. Design teachers must confront the clear definition of author identity and style ownership by AIGC. Respondent T6 expressed similar concerns from another perspective, mentioning that in the past, when students did design, they had to observe life and understand users, and this process itself was the cultivation of design thinking. Now some students directly let AI generate solutions, skipping the thinking process. These deep concerns from the teaching front reflect the anxiety of design teachers about the erosion of the essence of the discipline by technology, and also reveal the potential conflict between the current usage methods of AI tools and the core goals of design education.

Topic 2: The Three-Stage Evolution Model of Teachers' Attitudes towards AI

This topic reveals the three-stage dynamic evolution experienced by design teachers during the adaptation to AI technology, including three sub-themes: the tool confusion period, the exploration and experimentation period, and the critical integration period. This discovery provides a new theoretical perspective for understanding the dynamic process of teachers' digitalization teaching capabilities. In the first stage, the tool confusion period, teachers generally experience anxiety, unease, and defensive mentality, viewing AI as a potential threat to their professional identity and capabilities. This phenomenon is particularly prominent among novice teachers and some experienced teachers. Respondent T2 described the sense of helplessness when first encountering AI:

"The students seem to be born with the ability to use these tools. Instead, I have to ask them for help. This feeling is quite frustrating. At first, I even consciously avoided these tools, thinking that not touching them would be fine."

Respondent T6 expressed deeper confusion from the perspective of knowledge authority, pointing out that the transformation and use of tools were not flexible enough to meet students' new needs for AI design, and the collapse of knowledge authority was uncomfortable. Specifically, "I have been teaching design for over twenty years, and suddenly I realized that I don't know how to teach anymore." The core feature of the tool confusion period is the doubt about one's professional capabilities and the fear of technological change. During this stage, teachers often adopt avoidance or passive resistance coping strategies.

The second stage is the exploration and experimentation period. With the passage of time and the accumulation of usage experience, teachers gradually shift from panic to curiosity and experimentation, beginning to actively explore various possibilities of AI tools in teaching. Respondent T3 shared the journey from confusion to exploration:

"About two or three months later, I started to be less afraid. I thought, since students are using these tools, I might as well take the initiative to learn about them and see if I can find some new teaching ideas."

More meaningful exploration is reflected in the attempts to integrate AI organically into the teaching process. Respondent T7 described a creative teaching experiment:

"I no longer view AI as an opponent, but as a collaborator. I have students first sketch their plans, then use AI to expand possibilities, and finally compare the pros and cons. This comparison process itself has strong teaching value. Students can intuitively see the essential differences between the AI-generated plans and their own thoughts."

The core feature of the exploration and experimentation period is the shift from being a simple tool user to a teaching designer, attempting to find a new teaching balance in the human-machine relationship. Respondent T5 also recalled that they began to actively try to use AI for course demonstrations, although the results were unstable, they gradually found some methods. The key is that the mindset changed, from being afraid of being replaced to thinking about how

to integrate and create better courses.

The third stage is the critical integration period. A few teachers (mainly T4 and T8 in this study) reached this stage, capable of critically examining the capabilities and ethical risks of AI technology and transforming it into teaching resources for cultivating students' critical thinking. Respondent T4 explained her understanding of critical integration: "Now I can use AI more proficiently, but I am clearer about where its boundaries lie. I will analyze the differences in results generated by different platforms with students to help them understand the logic and biases behind the algorithms. But in the end, breakthrough creative ideas still come from human aesthetic judgment and value choices, and this AI cannot replace them. Respondent T8 further emphasized the importance of maintaining the designer's subjectivity:

"I now use AI, but I am not led by AI. I will tell students that AI is a toolbox, and you can use the tools inside, but when to use them, how to use them, and to what extent, these decisions must be made by you as a designer. The key is to maintain the designer's own subjectivity and not let the algorithm make decisions for you."

The critical integration period teachers have achieved a development leap from technology adaptation to technology transcendence, being able to maintain the designer's subjectivity and judgment in the human-machine collaboration. It is worth noting that the transition from the exploratory experimentation phase to the critical integration phase is a crucial bottleneck stage. Most teachers can successfully reach the exploratory phase, but only a few can advance to the integration phase. This transition not only requires the accumulation of technical skills and teaching integration capabilities, but also the development of critical meta-cognition towards AI technology, that is, the higher-level ability to examine the boundaries of the technology, ethical risks, and educational value.

Topic 3: Institutional Constraints and Independent Breakthrough

This topic reveals the external institutional factors that constrain the digital transformation of design teachers and their proactive responses under such external constraints, including the innovation inhibition of the evaluation system, the scarcity of professional exchange communities, and the minor practical explorations of autonomous exploration. In the sub-theme of innovation inhibition of the evaluation system, respondents generally reported that the current evaluation system for university teachers severely lacks incentives for teaching innovation. Respondent T1 pointed out this structural contradiction:

"I spent a lot of time integrating AI into the curriculum, redesigning teaching plans, making courseware, and organizing cases, but these efforts hardly counted when it came to obtaining tenure. Compared to publishing a CSSCI paper, the return on investment was too low."

Respondent T7 further analyzed from a rational choice perspective:

"It's not that I don't want to innovate, but the system doesn't encourage you to do so. When you spend time on AI teaching, your research output decreases, and without a promotion, you won't have resources. This is a vicious cycle."

This evaluation orientation that prioritizes research over teaching makes investing in teaching innovation a rational choice with high risks and low returns, dampening teachers' enthusiasm for exploring digital and intelligent teaching. Even if teachers recognize the importance and urgency of AI teaching innovation, they often lack sufficient motivation to delve deeply into study and practice under the existing incentive mechanism.

In the sub-theme of the scarcity of professional exchange communities, respondents generally reported that the design education field lacks specialized academic exchange platforms and experience-sharing mechanisms for AI teaching, leaving teachers in a state of individual exploration. Respondent T7 lamented:

"I really long for the opportunity to have cross-university exchanges. Everyone regularly shares cases, discusses issues, and exchanges with industry experts. Now everyone is exploring on their own, and others have to repeat the mistakes they have made. The efficiency is too low."

"The attitudes of my colleagues towards AI teaching vary greatly. Some are very proactive, while others are very resistant. It's hard to find like-minded people to exchange with. Everyone seems to be competing secretly and unwilling to share their unique secrets."

This lack of exchange communities makes teachers' digital and intelligent exploration lack peer support and collective wisdom, which delays individual professional growth and leads to a large amount of inefficient repetitive exploration. More critically, the absence of institutionalized learning opportunities and expert guidance forces teachers to rely on personal exploration to cope with the rapidly evolving technological environment, which significantly increases the uncertainty and psychological burden of exploration.

Despite facing many constraints at the institutional level, some respondents still demonstrated positive initiative and creative response strategies. In the sub-theme of minor autonomous exploration practices, respondent T4 formed an AI teaching interest group independently, collaborating with 5 colleagues to regularly conduct teaching experiments and case sharing, forming a small professional learning community to share their classroom attempts, avoiding repeating the same mistakes. Respondent T5 used online open course resources for self-study and transformed the learned content into course modules for their own school:

"I took an online course on AI for Design, learned a lot of new ideas, and then made local adjustments based on our school's actual situation."

Respondent T8 adopted another strategy, actively establishing connections with industry designers to understand the application status and ethical controversies of AI in real design projects:

"I regularly invite industry designers to the classroom to share their real project experiences. What they talk about is more persuasive than the theory I present in class. Students can also learn about the boundaries of AI usage in real workplaces."

These self-formed exploration practices, although limited in scale, demonstrate the initiative and creativity of teachers under institutional constraints, providing an exemplary prototype for the construction of a systematic support system at the institutional level.

5. Conclusions and Recommendations

5.1 Research conclusion

This study employed thematic analysis to systematically analyze the in-depth interview data of 8 design teachers, and the following main conclusions were drawn. Design teachers encounter an imbalance between technology adoption and ethical education during the digital transformation. Although most teachers can quickly master the operational skills of AI design tools, they lack clear understanding of key ethical issues such as the originality definition, copyright ownership, and algorithm bias of AIGC. This state of technical proficiency and ethical ambiguity directly leads to the absence of ethical education in the classroom. Subsequently, teachers' attitudes towards the use of AI tools undergo three stages of evolution: tool confusion period, exploration and experimentation period, and critical integration period. The tool confusion period is characterized by anxiety and defense, the exploration and experimentation period by curiosity and experimentation, and the critical integration period by metacognition and subjectivity. The leap from the exploration period to the integration period constitutes the key bottleneck in teachers' professional development, requiring the development of critical metacognitive abilities. Moreover, the innovation inhibition of the current evaluation system, the lack of professional communication communities, and the absence of targeted training constitute the three major institutional obstacles restricting the digital transformation of teachers. Despite these constraints, some teachers have demonstrated positive initiative by forming interest groups, utilizing online resources, and establishing industry connections.

5.2 Solutions and suggestions

Based on the above research findings, this study proposes a design education digital transformation path that prioritizes ethics, progresses in a hierarchical manner, and empowers communities. The term "ethics first" means that AI ethics education should be placed at the core of teachers' digital literacy training, rather than being an additional component of technical training. Specific measures include: universities jointly collaborate with design associations to formulate AIGC design teaching ethics guidelines, clearly defining the boundaries of AI tools' availability, attribution norms, and evaluation weights at different course stages; launching AI ethics special training modules for design teachers, enhancing their ethical and teaching guidance capabilities through real-case analysis; incorporating the ethical dimension of AI usage into the course evaluation system to guide students to develop a responsible human-machine collaborative design concept. The term "hierarchical progression" refers to providing differentiated support strategies based on teachers' different development stages: for teachers in the tool confusion stage, psychological counseling and basic skills training are emphasized to help them overcome technical anxiety; for teachers in the exploration and experimentation stage, case sharing and peer communication in teaching integration are emphasized to help them expand their teaching innovation ideas; for teachers in the critical integration stage, leadership responsibilities are assigned.

The term "community empowerment" means breaking through the individual exploration difficulties of teachers and building multi-level professional learning communities. Within the institution, interdisciplinary AI teaching innovation teams can be formed to regularly conduct teaching experiments, case discussions, and experience sharing; within the institution, regional design education AI teaching alliances can be established to promote the sharing of high-quality resources and best practices; at the industry level, AI teaching practice platforms for school-enterprise cooperation can be built, inviting front-line designers to participate in course development and teaching evaluation, enabling teachers to promptly understand the application status and ethical controversies of AI technology in real design scenarios. Through community empowerment, not only can the professional growth of individual teachers be accelerated, but also a disciplinary culture and organizational ecosystem conducive to digital transformation can be cultivated. In addition, institutions should reform the teacher evaluation system, incorporate AI teaching innovation into the weight of professional title evaluation and performance assessment, establish recognition standards and reward mechanisms for teaching innovation achievements, and from the institutional level, motivate and guarantee teachers' investment in digital teaching exploration.

5.3 Research Limitations and Prospects

This study has the following limitations. Firstly, the sample size is relatively small (8 teachers), although data saturation has been achieved, the universality of the research findings still requires verification with a larger sample. Future research can expand the interview sample to include teachers from different regions and different types of institutions to test the cross-context applicability of the three-stage evolution model. Secondly, the study adopts a cross-sectional design, capturing the experiences of teachers at different development stages at the same time point, but failed to track the longitudinal evolution process of the same group of teachers. Future research can adopt a longitudinal study design to conduct multiple interviews with the same group of teachers and further verify the evolution model. Thirdly, the study mainly relies on teachers' self-reports, which may have recall bias and social expectation effects. Future research can combine multiple data sources such as classroom observations, student evaluations, and teaching file analysis for triangulation of methods. The study focuses on university design teachers. Future research can include teachers from vocational colleges to expand the application boundaries of the theory and compare the similarities and differences of teachers from different types of institutions in the digital transformation.

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