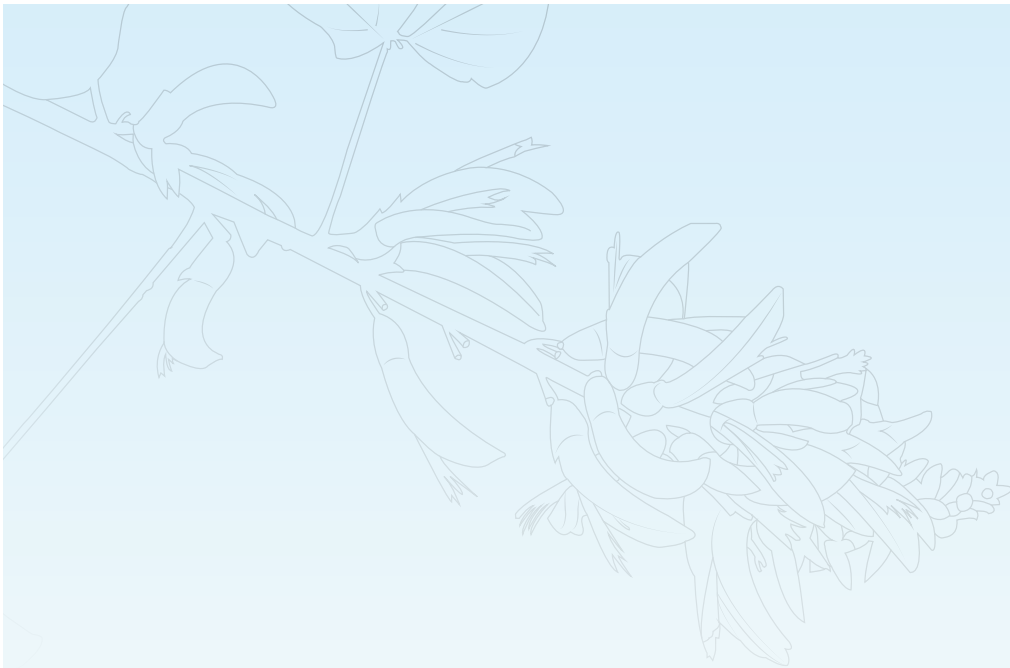


The Application of an “AI Software + Creative Design” Teaching Model for Enhancing Creativity in University Design Education

Lin Zhu^{1*}



¹ International College, Dhurakij Pundit University, Bangkok, 10210, Thailand

*Corresponding author: E-mail address: lin.zhu@dpu.ac.th

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Abstract

This study examines the application of the “AI Software + Creative Design” teaching model in university-level creative design education, with the aim of exploring its implementation and pedagogical effectiveness. As artificial intelligence technologies rapidly advance, AI tools are increasingly adopted in creative design, offering new perspectives and methodological support for teaching innovation. In response to evolving educational demands, this research investigates how AI software can be effectively integrated into teaching practices. The study was conducted in three main steps. First, research participants were selected from six groups of undergraduate students majoring in creative design using a random sampling method to ensure representativeness. Second, various AI tools were introduced and applied in teaching activities, including automated design generation tools, intelligent image editing software, and virtual reality-based platforms, with attention to their educational applications. Third, teaching outcomes were evaluated through instructional experiments and classroom case studies, focusing on students’ creative thinking, design process optimization, and overall learning efficiency. The results indicate that integrating AI software significantly enhances students’ design skills and innovative capabilities while improving traditional teaching approaches. AI-supported instruction also promotes a more personalized and interactive learning environment, increasing students’ motivation and sense of achievement. This study concludes by highlighting the benefits and challenges of AI integration and offering recommendations for future research and teaching development in creative design education.

Keywords: Artificial Intelligence, Creative Design, Enhance Creativity

Introduction

With the rapid advancement of artificial intelligence (AI) technologies, their applications have expanded across a wide range of fields, including creative design and higher education. AI-driven methods such as machine learning, computer vision, and natural language processing have begun to reshape design workflows, creative decision-making processes, and innovation paradigms within the design industry [1]. In recent years, the diffusion of generative AI tools has been particularly pronounced among university students. According to the Student Generative AI Survey 2025 conducted by the Higher Education Policy Institute [2], 92% of university students reported using AI tools in their academic work in 2025, a sharp increase from 66% in 2024, while 88% reported using generative AI specifically for assessments, compared with 53% the previous year. Global surveys further indicate that over 86% of university students worldwide engaged with AI tools in their studies by 2025, with many using these systems on a weekly or daily basis. These findings suggest that AI has rapidly shifted from an auxiliary technology to a routine academic resource supporting tasks such as concept explanation, visual generation, design ideation, and research assistance.

Despite the widespread adoption of AI by students, university-level creative design education faces persistent pedagogical challenges. Over the past five years, studies in design education have consistently reported difficulties in adapting traditional teaching models to rapidly evolving digital design environments. The conventional “teacher + textbook + courseware” instructional framework often struggles to foster interdisciplinary thinking, technological fluency, and innovation-oriented competencies required by contemporary creative industries [3]. Recent institutional surveys indicate that fewer than 40% of design instructors in higher education systematically integrate AI tools into their teaching practices, and even fewer institutions have established formal guidelines or assessment standards for AI-supported design learning. Common challenges include insufficient AI literacy among faculty, fragmented curriculum integration, limited access to structured AI teaching resources, and uncertainty regarding the evaluation of AI-assisted student outputs. These issues have become increasingly evident between 2020 and 2025, as AI technologies have advanced faster than curricular reform in design education.

From a broader educational perspective, countries and regions such as the United States, the United Kingdom, Canada, and Japan have explored intelligent teaching systems since the 1970s, emphasizing technology-enhanced learning and adaptive instructional design [4]. Recent developments in intelligent teaching models highlight AI’s potential to support interdisciplinary learning, learner autonomy, and deep cognitive engagement [5]. In higher education contexts, AI-assisted teaching environments—supported by cloud platforms, big

data analytics, human–computer interaction technologies, and high-speed networks—have transformed traditional instructional methods into more flexible, data-driven, and interactive learning systems [6]. However, much of the existing research focuses on general educational applications of AI, with relatively limited attention to discipline-specific pedagogical models in creative design education.

In creative design education specifically, AI software integrated with design tools offers new opportunities for intelligent lesson preparation, trend analysis, generative ideation, and iterative design exploration. In recent years, many universities have introduced AI-enhanced design courses or incorporated AI tools into studio-based teaching. Industry reports suggest that AI-assisted tools are increasingly used in design education for image generation, layout optimization, style transfer, and virtual prototyping [7]. Nevertheless, current applications are often fragmented and tool-driven, lacking systematic pedagogical frameworks that align AI usage with learning objectives, instructional processes, and assessment criteria. Moreover, empirical studies evaluating the educational effectiveness of AI software in creative design classrooms—particularly from a student-centered and practice-oriented perspective—remain relatively scarce.

This situation reveals a clear research gap: while AI tools are widely adopted by students and increasingly introduced into design curricula, there is limited empirical research examining how AI software can be systematically integrated into university creative design teaching and to what extent such integration enhances students’ creative thinking, innovation capacity, and design skills. Furthermore, existing studies often overlook the practical classroom-level implementation of AI-assisted teaching models and their impact on both student learning experiences and instructors’ teaching practices [8].

In response to these challenges and gaps, the primary aim of this research is to investigate the practical application and educational effectiveness of the “AI software + creative design” teaching approach in university-level creative design programs. This study focuses on classroom-based teaching and learning activities in creative design courses, examining how AI software supports students’ creative processes, addresses limitations of traditional teaching models, and s creativity, innovation, and design competencies. Within this defined scope, the research evaluates the impact of AI-assisted teaching on students’ learning experiences and instructors’ pedagogical practices, while also identifying the practical value, challenges, and limitations of integrating AI software into creative design education. Through this investigation, the study seeks to provide empirical evidence and practical insights to inform future teaching reforms in university creative design programs.

The research holds significant theoretical and practical value. Theoretically, it will provide new perspectives and methods for the application of AI in education and enriching the intersection between educational technology and creative design teaching. Practically, the study will offer specific teaching reform suggestions for creative design programs in universities, aiding lecturers in better utilizing AI tools to enhance teaching effectiveness and students' learning experiences. Additionally, the result of the research will be provided to educational policymakers which help them to promoting the modernization of higher education system.

Objective

1. To analyze the challenges and requirements in university creative design education and explore the integration of AI software into teaching methods.
2. To evaluate the effectiveness of AI software in enhancing students' creative thinking, optimizing design processes, and improving teaching efficiency through experiments and real teaching cases.
3. To summarize the advantages and challenges of AI in creative design teaching and propose future research directions and practical recommendations for teaching reforms in university creative design programs.

Methodology

This study adopts a design-based research (DBR) framework, supplemented by elements of action research, to systematically explore and refine the application of the “AI software + creative design” teaching model in higher education creative design programs. DBR is particularly suitable for educational innovation research, as it emphasizes iterative design, real classroom implementation, and the continuous optimization of teaching strategies through empirical feedback. By combining qualitative and limited quantitative methods, this study aims to enhance both the practical relevance and analytical rigor of its findings.

1. Research Population, Sample, and Scope

The research population consists of undergraduate students and instructors enrolled in creative design-related majors at a comprehensive university. The study involved six intact class groups from creative design programs, covering disciplines such as visual communication design, digital media design, and product design. From these six groups, student participants were selected using a random sampling method to ensure representativeness and reduce selection bias.

In total, approximately 80 students participated in the teaching experiments (with each group containing approximately 6–15 students), along with 3 instructors who were directly involved in course design and implementation. The scope of the study is limited to classroom-based creative design courses at the undergraduate level and focuses on the integration of AI software into design ideation, visual generation, and project development processes. The research does not aim to generalize findings to all disciplines but seeks to provide transferable design principles applicable to similar creative design education contexts.

2. Research Design Framework and Content Structure

Drawing on the “5W” analysis method proposed by Harold Lasswell and its extended “5W+IH” model, this study constructs a structured research framework aligned with the DBR process. The framework addresses the following dimensions: who participates (students and teachers), what AI tools are used, why AI is integrated into design teaching, how AI-supported teaching activities are implemented, and with what outcomes learning effectiveness is evaluated.

The research content framework includes:

- (1) The integration modes and pedagogical roles of AI technologies in creative design education.
- (2) The educational application of different categories of AI design software, including automated design generation tools, intelligent image editing software, and virtual simulation platforms.
- (3) Student-centered creative practice case studies involving AI-assisted design projects.
- (4) Evaluation of teaching effectiveness based on student design outputs, learning experiences, and instructional outcomes.

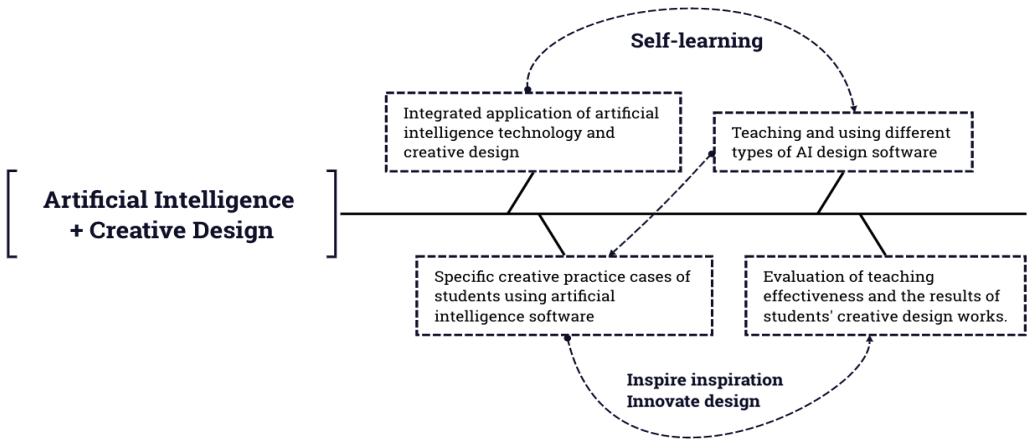


Figure 1. Research content framework

Source: Content Framework created by the author

3. Research Methods and Data Collection Tools

To strengthen methodological rigor and support analytical triangulation, this study employs a mixed-methods approach, combining qualitative analysis with basic quantitative measures.

(1) Literature Review Method: A systematic literature review was conducted by analyzing peer-reviewed journal articles, conference proceedings, policy reports, and authoritative online resources related to AI in creative design education. This method establishes the theoretical foundation, identifies current research trends, and clarifies existing research gaps.

(2) Case Study Method: Multiple teaching cases from the experimental courses were selected for in-depth analysis. Data sources include lesson plans, student project documentation, classroom observation records, and reflective teaching notes. These cases were analyzed to examine AI software usage patterns, teaching strategies, student engagement levels, and learning outcomes.

(3) Design-Based Teaching Experiment (Practical Teaching Method): Based on DBR principles, AI-integrated teaching modules were designed, implemented, evaluated, and refined through iterative cycles. AI software was embedded into project-based learning tasks, collaborative design activities, and interdisciplinary practice sessions. Teaching effectiveness was assessed through:

- Classroom observations
- Student assignments and final design works
- Instructor reflections and peer feedback

Student learning processes emphasized autonomous inquiry, task-driven exploration, and collaborative problem-solving. Teachers facilitated contextualized learning scenarios in which students identified design problems, applied AI tools to generate solutions, and refined outcomes through iterative practice.

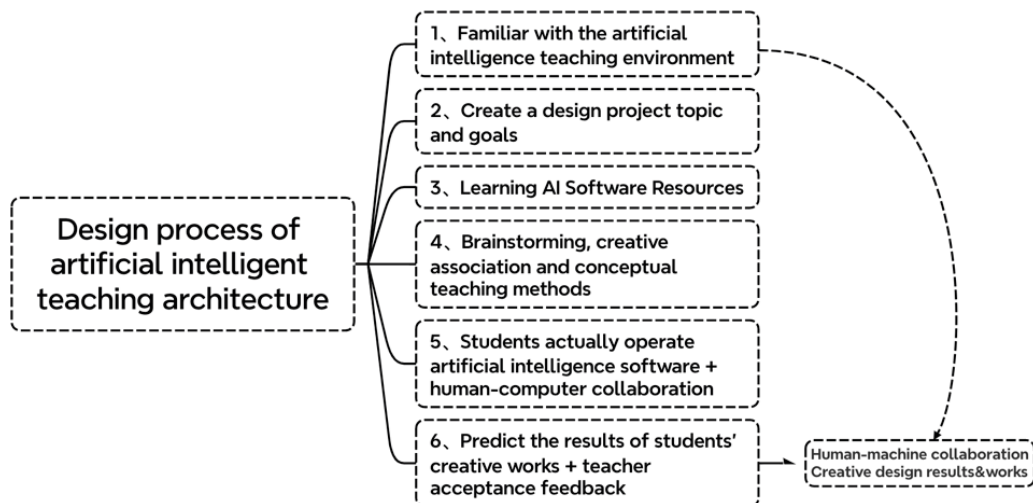


Figure 2. Design process of artificial intelligent teaching architecture

Source: Design created by the author

(4) Data Collection and Evaluation Instruments

To address concerns regarding research generalizability and effectiveness evaluation, both qualitative and quantitative data were collected. Qualitative data included student reflective reports, design group feedback, and instructor 's evaluation feedback on student work. Quantitative data were obtained through pre- and post-course questionnaires measuring students perceived creativity, AI tool proficiency, and learning engagement using Likert-scale items. Descriptive statistical analysis was applied to compare changes before and after AI-assisted teaching interventions.

Literature Review

1. The concept of AI and the applicational characteristics of intelligent software

Contemporary learning theories emphasize the active role of learners in knowledge construction through interaction, experience, and collaboration. Constructivism conceptualizes learning as a process in which learners actively construct meaning based on prior knowledge and contextual engagement, rather than passively receiving information [9]. Building upon this view, connectivism highlights the significance of digital networks, technological mediation, and information flow in shaping knowledge acquisition, particularly within technology-rich learning environments. Experiential learning further underscores learning through direct experience, reflection, and iterative practice. Collectively, these theoretical perspectives provide a pedagogical foundation for understanding how emerging technologies—especially artificial intelligence—can support learner-centred, interactive, and practice-oriented educational models.

Artificial intelligence (AI) is an interdisciplinary field that seeks to simulate human cognitive abilities and intelligent behaviors through computational systems. It integrates knowledge from mathematics, linguistics, psychology, neuroscience, philosophy, and education, thereby forming a comprehensive framework for understanding and replicating human intelligence [10]. As a core component of contemporary information technology, AI primarily relies on computer systems to emulate human cognitive processes and intelligent behaviors, including searching, reasoning, memory, speech recognition, knowledge representation, and fuzzy information processing. Through these functions, AI systems can perform tasks that traditionally require human intelligence, enabling higher-level cognitive operations and decision-making processes.

Rather than merely imitating human intelligence, AI extends human cognitive capabilities by providing highly intelligent technologies that exceed the limitations of human perception, processing speed, and data-handling capacity [11]. Since the early 21st century, AI technologies have developed rapidly and achieved significant breakthroughs across diverse domains, including education, healthcare, manufacturing, and the creative industries. In this context, AI software refers to computer programs that apply AI technologies to learn from data, recognize patterns, and generate adaptive responses or decisions.

From an applicational perspective, intelligent software exhibits several defining characteristics. First, automation and efficiency enhancement enable AI systems to execute repetitive or time-consuming tasks with greater speed and accuracy, thereby reducing human workload. Second, advanced data-processing and analytical capabilities allow AI software to manage large-scale and complex datasets, extract meaningful insights, and support informed decision-making. Third, human-machine interaction is significantly enhanced through technologies such as natural language processing (NLP), speech recognition, and computer vision, facilitating more natural, intuitive, and interactive communication between users and intelligent systems.

More importantly, contemporary AI applications increasingly emphasize human-AI collaboration rather than technological replacement, particularly within creative domains [12]. In *AI Creativity and the Human-AI Co-creation Model*, Wu et al. [12] define AI creativity as a process in which humans and AI systems co-exist and co-create by leveraging their complementary strengths throughout the entire creative cycle. They propose a Human-AI Co-creation Model that conceptualizes creativity as a cyclical and iterative process comprising six interrelated stages: perception, cognition, expression, collaboration, construction, and testing. Within this framework, AI systems primarily support idea generation, exploration, and execution, while human participants retain control over creative intention, value judgment,

and overall creative direction, as illustrated in Figure 3.

This model underscores that AI should not be regarded as a substitute for human creativity, but rather as an augmentative partner that expands creative possibilities, enhances efficiency, and enables more inclusive and flexible creative practices [12]. Accordingly, the Human–AI Co-creation Model provides an important theoretical foundation for understanding the applicational characteristics of intelligent software in creative design education, where innovation emerges through continuous interaction between human designers and intelligent systems.

Within this framework, the concept of human–machine co-creation aligns closely with the principles of constructivism, connectivism, and experiential learning. The cyclical model—comprising perception, cognition, expression, collaboration, construction, and testing—emphasizes iterative learning, collaborative engagement, and reflective practice between human learners and intelligent systems [13]. This perspective highlights the role of AI not merely as a technical instrument, but as an active cognitive partner in creative and learning processes, particularly within design education and technology-enhanced learning environments.

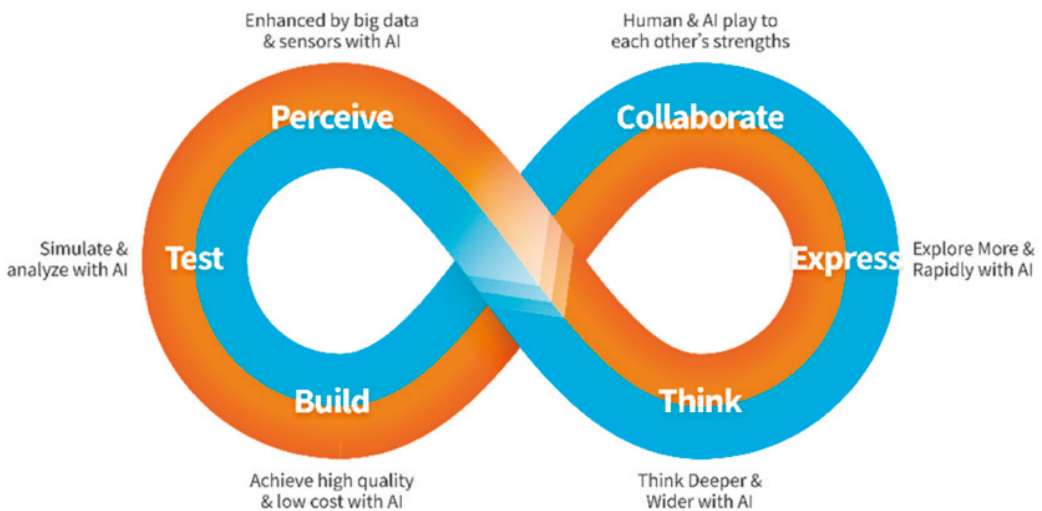


Figure 3. The Human-AI co-creation model

Source: [12] *AI creativity and the Human-AI co-creation model*. In M. Kurosu (Ed.), *Human-Computer Interaction. Theory, Methods and Tools: HCII 2021* (Lecture Notes in Computer Science, Vol. 12762, pp. 171–190). Springer.

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2. Types of AI software apps for creative design

In the field of creative design, there exists a various of AI design software, showcasing diverse applications. These mainly include several types of applications:

Firstly, Generative Design Tools such as Adobe Sensei, which can automatically generate design elements to assist students in their creative work. As part of Adobe Creative Cloud, Adobe Sensei utilizes machine learning and AI technologies to automatically generate design elements, enhance images, and intelligently fill content. It helps students gain insights from data and automatically perform complex design tasks like image restoration and style transformation.

Secondly, Image Recognition and Processing Tools like DeepArt and Prisma, which use AI technology to transform photos into artistic-style images. These applications convert ordinary photos into various artistic styles using AI techniques. For example, Prisma employs neural networks to transform photos into styles resembling famous artists such as Van Gogh or Picasso. These tools not only enhance image processing capabilities but also enable users to easily translate their creative ideas into reality. Students utilizing these tools for assisted design not only enhance their independent learning abilities but also broaden their visual perspectives.

Additionally, there are Text and Natural Language Generation AI Painting Tools like Midjourney, Playground, Stable Diffusion, and Leonard AI, which generate creative copy and design concepts based on input text and keywords. This AI software can produce high-quality creative content and design ideas quickly, helping students swiftly obtain inspiration and creative materials. Such tools play a crucial role in commercial painting, business advertising design, logo design, packaging design creation, and corporate brand innovation.

Lastly, 3D Modeling and Animation Software such as Autodesk's Generative Design, which uses AI technology to optimize 3D models and animation effects. Autodesk's generative design tools optimize 3D models and animation effects using AI technology. It generates multiple design solutions based on students' input goals and constraints and assisting students in finding the best design solutions [14]. This tool is particularly beneficial in fields like architectural design, product design, and animation production, enhancing design efficiency and innovation capabilities through AI technology and helping students find creative inspiration and achieve a sense of accomplishment in excellent creative design.

In conclusion, these AI software applications significantly enhance the efficiency of creative design by offering automated design functions, enhancing image processing capabilities, generating creative text, and optimizing 3D designs. They not only expand the possibilities and innovation space of design but also enable students to achieve more

creativity in shorter periods, keeping pace with the technological advancements of our era and meeting the precise requirements of creative design and course teaching.

3. The development methods and approaches of AI software in creative design teaching

In today's context of intelligent education, students have vastly increased channels for accessing information. Traditional creative design teaching methods struggle to meet students' developmental needs as they lack enthusiasm for passive and monotonous instructional media. There is a pressing and significant need to research and promote intelligent educational design patterns. "AI-assisted instructional design," based on constructivist theory and centered around student centric principles, utilizes next-generation information technologies such as mobile internet, IoT, big data, cloud computing, and artificial intelligence [15]. This approach aims to provide intelligent and efficient teaching guidance throughout the entire instructional process—from pre-class, in-class, to post-class activities. AI-assisted instructional design integrates artificial intelligence with creative digital technology software, representing a vital component of creative design education. By combining intelligent software technologies with teaching methodologies, it emphasizes mutual penetration between "teaching" and "learning." It involves planning teaching resources, creative tasks, instructional segments, and methodologies, culminating in specific teaching cases [16].

Building upon the Human–AI Co-creation Model, the application of AI software in creative design education can be understood as a pedagogical extension of human–AI collaborative creativity. In the context of university-level creative design teaching, AI software does not function merely as a technical tool but as an intelligent learning partner embedded throughout the design process. This approach aligns closely with the student-centered and practice-oriented teaching philosophy increasingly adopted in contemporary design education.

The six stages proposed in the Human–AI Co-creation Model—perception, cognition, expression, collaboration, construction, and testing—correspond naturally to key phases in creative design pedagogy. When integrated into teaching practice, these stages form the structural foundation of the “AI software + creative design teaching” model, in which AI tools support and enhance students’ learning and creative outcomes at each step of the design workflow. At the perception stage, AI software assists students in gathering visual, cultural, and contextual information through image recognition, trend analysis, and data-driven inspiration systems. This broadens students’ exposure to diverse design references and helps them perceive design problems from multiple perspectives. During the cognition stage, AI tools support idea development and conceptual thinking by analyzing precedents, generating alternative design solutions, and visualizing abstract concepts, thereby strengthening students’ analytical and creative reasoning abilities. In the expression stage, generative design tools,

AI-assisted sketching software, and text-to-image systems enable students to rapidly transform ideas into visual forms, lowering technical barriers and allowing greater focus on creative intent. The collaboration stage is enhanced through AI-supported platforms that facilitate real-time feedback, peer interaction, and teacher–student communication, promoting collective learning and iterative refinement. At the construction stage, AI software assists in optimizing materials, structures, colors, and compositions, enabling students to refine design outcomes with greater precision and efficiency. Finally, in the testing stage, AI-driven evaluation tools can simulate user responses, analyze usability, and provide data-based feedback, supporting reflective learning and continuous improvement.

Through this integrated teaching model, AI software acts as a cognitive amplifier rather than a creative replacement, reinforcing the role of human designers in decision-making, value judgement, and cultural interpretation. Teachers shift from knowledge transmitters to learning facilitators and design mentors, guiding students in critically engaging with AI outputs and maintaining creative autonomy. Consequently, the “AI software + creative design teaching” model embodies the core principle of human–AI co-creation by embedding intelligent software into the full cycle of design education, fostering innovation, autonomy, and deeper learning.

4. Critical Perspective on AI in Creative Design

Artificial intelligence (AI) has increasingly influenced creative design by enhancing efficiency, expanding design possibilities, and supporting data-driven decision-making. AI tools enable rapid generation of design alternatives, automate repetitive tasks, and assist in visualization and analysis, allowing designers to explore broader creative spaces and focus more on conceptual development. In this sense, AI functions as an augmentative tool that extends human creative capacity rather than replacing it. Despite these advantages, the application of AI in creative design presents notable challenges. AI systems are largely trained on existing datasets, which may lead to the replication of prevailing styles and the homogenization of design outcomes, potentially constraining originality. Over-reliance on AI-generated outputs may also weaken designers’ critical thinking, creative autonomy, and foundational design skills, particularly in educational contexts [17]. Furthermore, unresolved issues related to authorship, intellectual property, and ethical responsibility complicate the integration of AI into creative practice. Overall, while AI offers substantial opportunities to support creative design, its use requires careful critical oversight. Effective application depends on balancing technological efficiency with human creativity, reflective judgment, and ethical awareness. Future research should focus on human–AI co-creation frameworks that preserve creative agency while enhancing meaningful design outcomes.

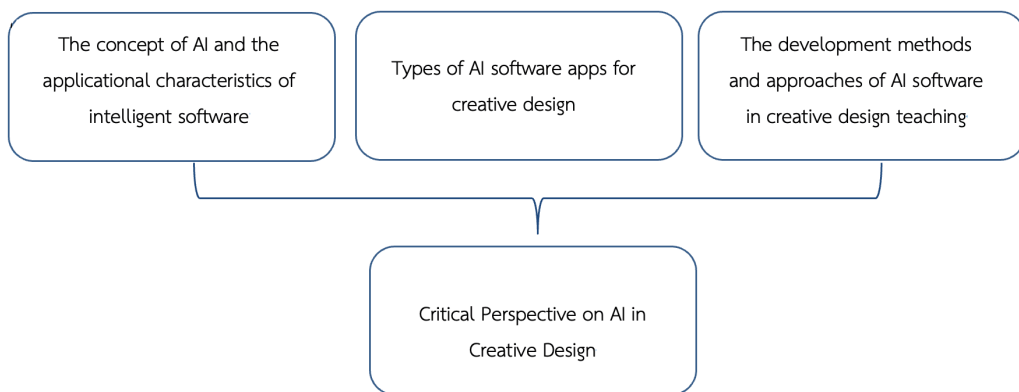


Figure 4. The conceptual framework for literature review synthesis

Source: The author's own research and collation

Research Results

1. The Content and Analysis of AI Software in Practical Teaching Processes

The “AI Software + Creative Design” course consists of 45 class hours. This includes 15 hours of foundational theory courses and 30 hours of project-based practical sessions. The teaching content is structured into three progressively deeper stages.

(1) Familiarity with Artificial Intelligence Theory and Application Software

This stage of teaching is tailored to the characteristics of students in the creative design major, aiming to help them understand the basic theories of artificial intelligence and develop practical application skills within frameworks, rather than delving into the underlying principles and algorithms related to computer science and information. Thereby effectively alleviating students' fears of computers and coding. This phase will focus on deep learning theories and frameworks in the field of artificial intelligence, as well as the application of AI software and platforms relevant to implementing creative design solutions. Given the multitude of AI software available for creative design. The author has selected four typical and friendly software programs for introduction. The approach to integrating artificial intelligence software into creative design teaching methods includes several key aspects. Firstly, teachers will introduce intelligent design software, such as Midjourney, Playground AI, Stable Diffusion, Leonardo AI, etc., to help students understand where the different AI software applications fit within specific design domains. Secondly, AI technologies can be integrated into specific design learning through project-based learning methods, allowing students to comprehend and apply AI tools in practical operations. Thirdly, initiating design project topics and conducting surveys encourage students to actively explore the potential of AI technology during the design process, validating its effectiveness through practical

cases and experiments. At last, establishing platforms for collaboration and communication among students and between students and teachers facilitates the collective exploration and sharing of experiences and achievements in AI application within creative design, thereby continuously refining and innovating teaching methodologies.

Artificial Intelligence Creative Design Software			
AI	Usage	Purpose	Expected Outcomes
Midjourney 	Midjourney is primarily used through a Discord bot. Users can input text prompts to generate images. It involves joining the Midjourney Discord server, using specific commands, and customizing the prompt to get the desired image.	To create high-quality, unique, and artistic AI-generated images based on textual descriptions.	Generates visually appealing and creative images. Suitable for artists, designers, and content creators looking for innovative visuals.
Playground AI 	Playground AI allows users to experiment with various AI models, including GPT-3, by inputting text and receiving generated content. It involves accessing the Playground interface, choosing the desired model, and crafting input prompts.	To facilitate learning and experimentation with AI models for generating text, images, and other data.	Produces a wide range of AI-generated content, including written text, dialogues, and basic image generation. Great for educational purposes and AI research.
Stable Diffusion 	Stable Diffusion is an advanced AI model for generating detailed images. Users can interact with it via various interfaces, including web apps and command-line tools, to input prompts and refine the output.	To generate high-quality, realistic images from text prompts.	Creates highly detailed and realistic images. Useful for professionals in creative industries, including game design, virtual reality, and advertising.
Leonard AI 	Leonard AI is designed for assisting with creative writing and content generation. Users input text prompts or partial drafts, and Leonard AI provides suggestions, completes text, or generates new content.	To assist writers, marketers, and content creators in generating creative and engaging written content.	Produces coherent and contextually relevant text, enhancing productivity and creativity in writing tasks. Suitable for content creation, marketing copy, and storytelling.

Figure 5. Introduction to AI software mainly used in creative design

Source: The author’s own research and collation

(2) Application of AI Software in Innovative Practical Teaching Cases

This stage of teaching content involves explaining and using actual cases, enabling students to further familiarize themselves with theories and frameworks while enhancing their practical application skills in deep learning. This also facilitates artificial intelligence software technologies to realize design concepts of later application. In view of the characteristics of creative design and the fact that creative design should be dominated by visual image effects and communication. Starting from simple to difficult, the first choice is playground AI software has been selected for image style modification and transfer techniques. The second choice is Midjourney software for AI-generated creative proposal painting and image generation technology. The third choice is Stable Diffusion software for transforming 2D to 3D animation generation and commercial product advertising design technology. The fourth choice is Leonardo AI for one-click video generation technology. The reason for selecting these four AI software design cases is that they are highly relevant to AI painting, visual imagery, and product design. For example, playground AI software can easily modify and transfer styles in images, allowing changes to makeup, adding backgrounds, and modifying or replacing background images, which is easier and quicker compared to traditional Photoshop software

edits. Midjourney software enables the easy creation of UI creative expression patterns based on students' textual creative proposals. Stable Diffusion software effortlessly converts pre-drawn 2D character illustrations into 3D animated characters, and students can use Stable Diffusion for commercial advertising layout design after conceptualizing product ideas. Leonardo AI software automates the production of videos for commercial flat advertising designed by students. These practical cases are based on students' foundational operational skills, making them simple to learn and apply.

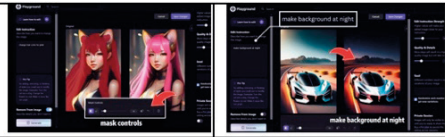
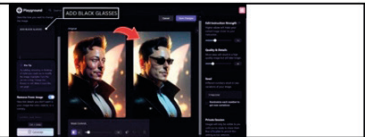
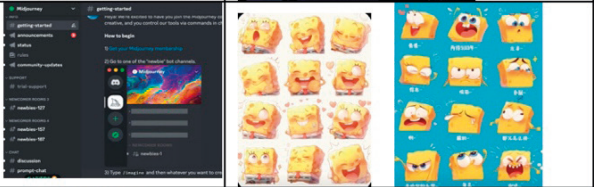
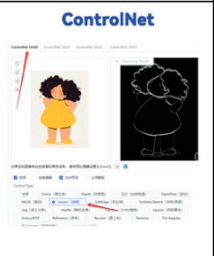
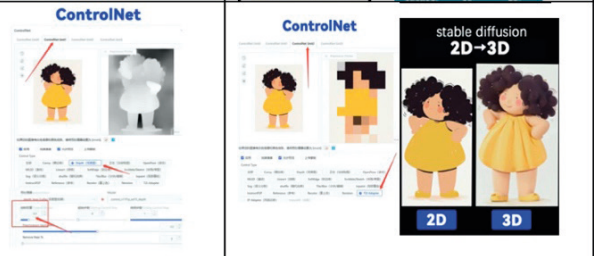
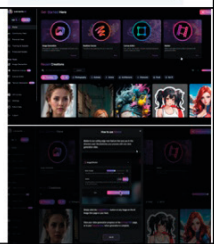
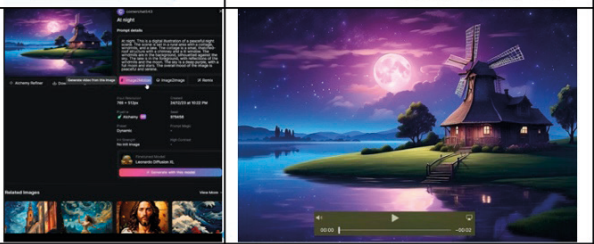
Playground Image modification Migration technology		
Midjourney Creativity Text proposal Text-generated images AI painting		
Stable Diffusion Text proposal Text-generated images Creativity Lora style 2D to 3D		
Stable Diffusion Text proposal Text-generated images Lora style product design Business Design		
Leonardo AI Image to video (Motion) Image Generation Realtime Canvas Canvas Editor		

Figure 6. The teaching practice cases
 Source: The author’s own research and collation

The author has identified two issues from this stage of teaching. Firstly, in the initial phase, students from design backgrounds lacking in computer basics find it challenging. Some students who are not adept at creative thinking also struggle with slower mastery. Therefore, the author personally teaches the design steps and the application of AI software, gradually easing students' fear of practical applications and helping them adapt to computational thinking. Simultaneously, guidance is provided on how to better utilize textual keywords in English to generate image creation technologies, explaining complex and profound deep computational parameters and results to assist in understanding and using deep learning. Secondly, in the later stages, some students with stronger abilities become obsessed with advanced features of AI software applications, pursuing deep technical implementations. Therefore, the author constantly reminds students that should focuses on technical applications and encourages them to think more about how to use these technologies to enhance additional innovative aspects of their designs rather than simply pursuing technical depth.

(3) The Launch of Design Project and Research Analysis

After mastering the basic AI software and technology, it is necessary to return to the core mode of this course, which is problem oriented. Students in design studies good at starting from practical problems and focusing on the abilities to identify problems. Which to analyses them and solve them. Combining AI technology within this framework helps students expand their innovative thinking in solving real-world problems and further enhances their creative design literacy. At this stage, firstly, teachers assign design project topics. The topic is "Original Brand Product Design," with no restrictions on content and form. Students are required to utilize extracurricular time for data retrieval and market research, cultivating their research and analysis capabilities to explore the demand points for " AI + creative design" Working in groups, students learn from and educate each other, fostering independent thinking and problem-solving skills while enhancing teamwork awareness. Research contents include market survey, product analysis, technical analysis, user positioning analysis, and analysis of design work outcomes. Secondly, organize students brainstorming sessions for innovative design positioning based on research findings and user requirements. Proposing directions for "AI + creative design" The author encourages students to enhance design creativity through AI technology implementation, adding more design and functional points to products based on demand points, and considering how to realize design concepts through AI technology. Through the process of problem discovery and analysis, students in this stage have identified many innovative points based on " AI + creative design" and achieved desirable teaching outcomes.

2. Education Achievements about AI Software in Practical Teaching

This study focuses on undergraduate students majoring in creative design-related fields, including visual communication design, digital media design, and product design. The research population was drawn from six intact classes, with participants selected through random sampling for the teaching experiment. Six sets of practical design works were further randomly chosen for analysis. After the design topics were released, students independently selected topics based on insights gained from practical research, with a focus on assessing their ability to address practical problems and implement solutions, rather than employing theoretical assessment methods commonly used in computer science education. Although the topics were open-ended and not bound to specific paradigms, the researcher provided phased guidance to all six design teams, steering them to explore design conceptualization and implementation through appropriate AI technologies, thereby enhancing creativity in commercial design. Emphasis was also placed on developing students' teamwork skills, encouraging interdisciplinary and cross-disciplinary collaboration. Following the three-phase instructional process, the students produced a series of works and outcomes centered on the theme of "AI + Creative Design." These have been compiled into a collection of teaching cases to promote and showcase their achievements. The figure below presents the project presentations of the six student groups on "AI + Creative Design".

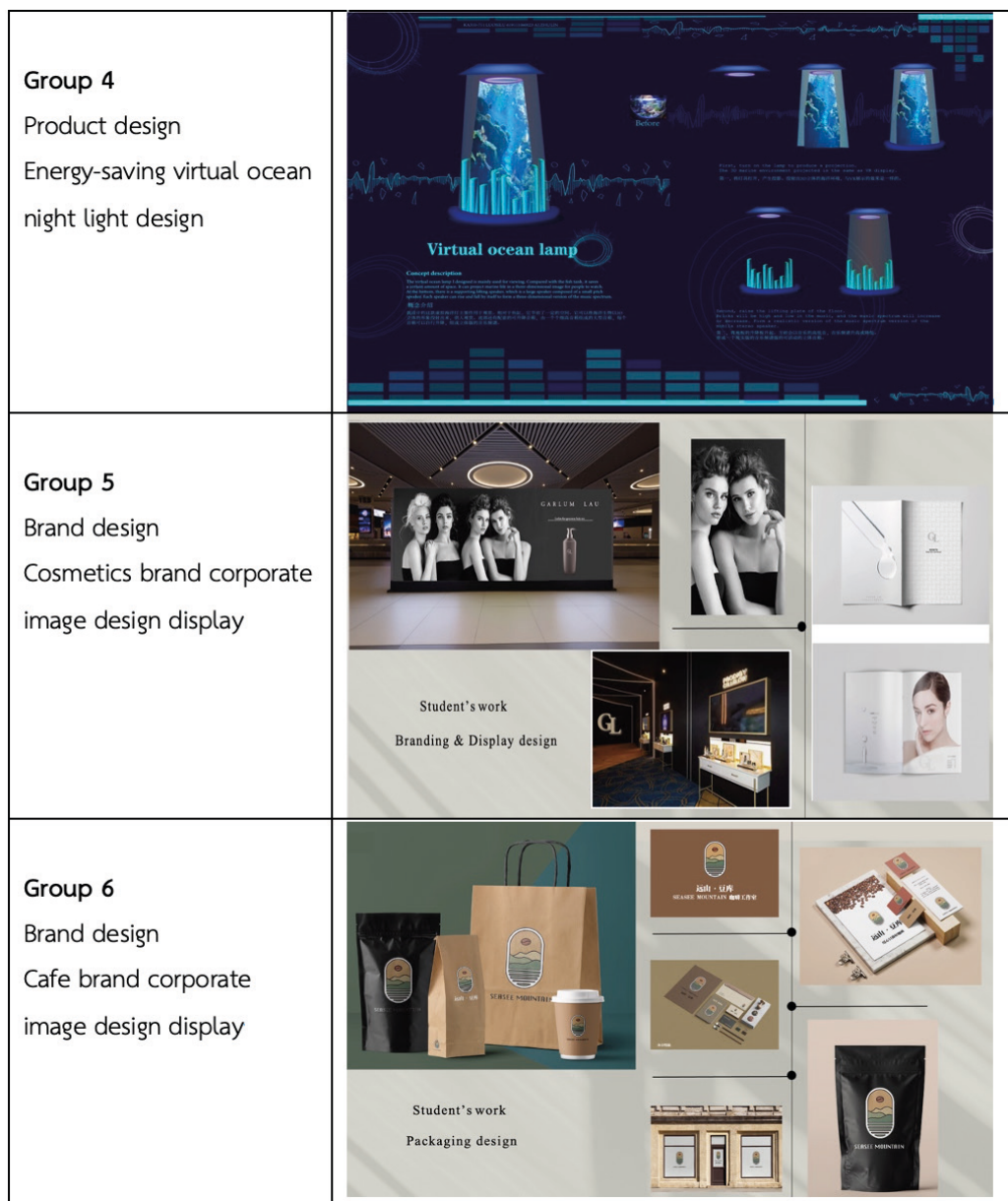


Figure 7. Creative design works from six groups of students

Source: The author's own research and collation

3. Evaluation and Feedback on Teaching Practice Achievements and Creative Design Works

The evaluation of student creative works adopts a simulated roadshow format. Students present their design works and demonstrate functional prototypes in an auditorium, emphasizing the concept of “AI + innovative design.” They are required to articulate their projects in relation to market demands and business models. The audience (judges) consists

of students, teachers, and professional designers. The evaluation criteria include innovation (35%), technical implementation (35%), market viability (15%), and AI cyclic design integration (15%). Among these, AI cyclic design integration (which indicate assesses how effectively student projects apply the six-stage AI cyclic model—perception, cognition, expression, collaboration, construction, and testing—to demonstrate a coherent, iterative, and human-centered design process. This criterion emphasizes students’ understanding of AI not merely as a tool, but as an evolving partner within a continuous design loop. During the simulated roadshow, students not only enhance their presentation and communication skills but also receive multi-perspective feedback from the design community, which helps prevent overly fanciful or impractical ideas. In the exchange session of the roadshow, teachers and professional designers provide in-depth feedback on both conceptual thinking and technical execution of student works. Furthermore, upon the conclusion of the event, the panel of judges conducted a systematic review and synthesis of the strengths and limitations of the participating works.

Strengths highlighted include:

(1) The six projects demonstrate strong practicality and innovation within a commercial market context.

(2) Based on initial market surveys, students have learned to apply AI software in design through innovative thinking, emphasizing human–machine collaborative work rather than relying solely on automatic image generation.

(3) The six projects present excellent creative outcomes that balance emotional expression and rational analysis under the human-centered design principle.

(4) Students show an emerging ability to structure their design processes according to the AI cyclic model, reflecting iterative refinement through perception analysis, cognitive interpretation, expressive output, collaborative interaction, system construction, and testing-based optimization.

Suggestions include:

(5) Incorporating more interactive technologies (such as language-based interaction and intelligent feedback mechanisms) into innovative conceptual product designs to enable more natural and dynamic human–machine interaction.

(6) Encouraging students to further explore how to consciously control and master AI software operations and semantic image generation through human-centered creative thinking, with the aim of constructing an innovative co-evolutionary system between creative design and intelligent machines, thereby producing more sustainable and high-quality creative works.

4. Results of Evaluation Dimension Indicators Before and After AI-Assisted Creative Design Teaching

To enhance the rigor of the research findings, this study also employed quantitative analysis in addition to the analysis of the qualitative results mentioned above. Quantitative analysis was conducted to examine changes in students perceived creativity, AI tool proficiency, and learning engagement before and after the implementation of the AI-assisted creative design teaching model. A total of 80 undergraduate students from six creative design classes participated in the pre- and post-test questionnaire survey.

Table 1. Pre-test and Post-test Comparison of Students’ Learning Outcomes in AI-Assisted Creative Design Teaching (n = 80)

Measurement Dimension	Test Time	Mean (M)	Standard Deviation (SD)	t value	P value
Perceived Creativity	Pre-test	3.21	0.62	6.56	< .001
	Post-test	3.87	0.58		
AI Tool Proficiency	Pre-test	2.98	0.71	9.51	< .001
	Post-test	4.05	0.55		
Learning Engagement	Pre-test	3.34	0.65	5.45	< .001
	Post-test	3.92	0.60		
Learning Satisfaction	Post-test	4.12	0.57	—	—

Note. A five-point Likert scale was used (1 = strongly disagree, 5 = strongly agree). Differences between pre-test and post-test scores were analyzed using paired-samples t-tests.

Source: The author’s own research and collation

The results indicate a statistically significant improvement in perceived creativity, with the mean score increasing from 3.21 (SD = 0.62) before the intervention to 3.87 (SD = 0.58) after the intervention (t = 6.56, p < .001). Similarly, students’ AI tool proficiency showed the largest gain among the measured variables, rising from a pre-test mean of 2.98 (SD = 0.71) to a post-test mean of 4.05 (SD = 0.55), with the difference reaching statistical significance (t = 9.51, p < .001).

In terms of learning engagement, the post-test results (M = 3.92, SD = 0.60) were significantly higher than the pre-test results (M = 3.34, SD = 0.65), indicating that AI-assisted teaching positively influenced students’ classroom participation and learning motivation (t = 5.45, p < .001). In addition, students reported a high level of overall learning satisfaction with the AI-integrated creative design courses, with a mean score of 4.12 (SD = 0.57) in the post-test survey.

Overall, the quantitative findings suggest that the integration of AI software into creative design teaching has a positive effect on students' creative capabilities, technical proficiency, and learning engagement, providing empirical support for the effectiveness of the proposed "AI software + creative design" teaching model.

Conclusion

Based on both qualitative teaching observations and quantitative pre- and post-test data, this study demonstrates that the integration of artificial intelligence software into creative design education can significantly enhance students' perceived creativity, AI tool proficiency, and learning engagement. Through a structured learning process—including AI theory comprehension, software familiarization, skill application, creative conceptualization, and project-based practice—students effectively achieved the course objectives of problem-oriented innovation and AI-supported design thinking. Quantitative results from 80 undergraduate students across six creative design classes indicate statistically significant improvements in perceived creativity, AI tool proficiency, and learning engagement after the implementation of the "AI software + creative design" teaching model, providing empirical evidence for its instructional effectiveness.

From a pedagogical perspective, the findings suggest that AI-assisted teaching can meaningfully transform traditional creative design education by shifting it toward a more student-centered, exploratory, and practice-oriented learning model. The integration of AI tools supports personalized learning paths, accelerates design iteration processes, and encourages active participation, thereby fostering both creative confidence and technical competence. Rather than replacing human creativity, AI functions as a cognitive and technical catalyst that expands students' design possibilities and supports interdisciplinary thinking. These outcomes highlight the practical value of embedding AI software into design curricula through project-based learning, collaborative tasks, and reflective evaluation mechanisms.

As creative design education continues to intersect with emerging digital technologies, the "AI software + creative design" model proposed in this study offers a transferable instructional framework for similar educational contexts. Although standardized curricular frameworks for AI-integrated design education are still evolving, the teaching practices and empirical insights presented here provide valuable references for curriculum development, instructional reform, and the cultivation of innovative design talents in higher education. Overall, this research underscores the necessity of continuous pedagogical innovation in response to technological change and contributes to the ongoing discourse on human-AI co-creation in design education.

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