Innovative Methods of Human-AI Collaboration in Art Education

Waiyawat Saitum

Division of Computer and Information Technology, King Mongkut's University of Technology Thonburi, Bangkok, Thailand
Email: waiyawat.sai@kmutt.ac.th
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***Abstract*—This paper presents a conceptual and design-based framework for integrating Artificial Intelligence (AI) into higher education art instruction through human–AI collaboration, focusing on prompt-based generation systems such as Adobe Firefly. The study proposes an instructional model that positions AI as a co-creative partner supporting creativity, reflection, and critical thinking in art education. While AI is increasingly used in creative fields, most existing studies focus on its technical capabilities rather than its pedagogical potential. This study was conceptual research addresses that gap by proposing a structured instructional model that positions AI as a co-creative partner in the learning process, not just a tool for production. The study was ideally suited for undergraduate students in an art and multimedia program. The instructional upon design framework comprises three interconnected components: (1) AI as a creative partner, (2) prompt as a pedagogical tool, and (3) curriculum integration for critical reflection. The paper illustrates how these elements can be applied through hypothetical classroom activities, such as prompt development workshops, mapping exercises, and iterative refinement tasks. These design scenarios demonstrate how prompt-based engagement with AI can cultivate creative exploration and critical awareness. The proposed conceptual model serves as a foundation for future empirical research and curriculum innovation, offering educators adaptable strategies for incorporating AI-supported creativity and ethical reflection across diverse learning contexts. This paper does not report empirical data or classroom implementation. Instead, it proposes a conceptual and design-based framework intended to guide future empirical and curriculum-based studies in human-AI collaboration.**

***Keywords*—Artificial Intelligence (AI), art education, human-AI collaboration, visual art, generative tools, higher education**

I. Introduction

The integration of Artificial Intelligence (AI) into education is no longer merely about reducing teachers' workload or increasing efficiency—it is reshaping the core structure of learning, including content, processes, and participant roles. In higher education, where complex knowledge and critical analysis are essential, AI has evolved from a support tool into a "co-thinker" and "co-creator." This shift is especially relevant in art education, which traditionally emphasized human creativity. With advancements in machine learning, Large Language Models (LLMs), and text-to-image generation, AI now enables learners to act not only as creators but also as co-designers of the creative process. "Generative AI tools are being used to generate text, images, music, and videos, which can stimulate students' creative processes and enhance their critical-thinking abilities" [1].

Prompt-based generation systems allow students to interact with AI through natural language commands. Crafting a "prompt" is not merely giving instructions—it involves design thinking, word precision, visualization, and iterative refinement. These skills simultaneously promote creative and critical thinking. As noted in recent research, "AI systems can act as assistants or co-creators, providing suggestions and generating content that complements human input, as seen in creative writing and visual design" [2]. Despite growing interest, a gap remains in pedagogical frameworks that support meaningful human–AI collaboration. Most existing studies focus on tool capabilities rather than learning design that may foster critical and reflective engagement.

This research aims to explore innovative approaches to designing learning experiences that promote human–AI collaboration in higher education art programs, with an emphasis on enhancing creativity and critical thinking. The research addresses three key questions: In what ways can AI technology support and enhance learners' creative processes through human—AI collaboration in higher education art programs? What is the impact of AI usage on students' artistic development, particularly regarding creative capacity and skillful engagement with AI tools? And how can learning curricula be effectively designed to integrate AI and promote creativity and critical thinking in visual art education?

This research primarily aims to propose a conceptual framework and instructional design guidelines that support Human-AI collaboration in higher education art instruction. The focus is on the development of a theoretical model that integrates generative AI tools into the learning process, particularly through the design and refinement of prompts as pedagogical tools. Rather than testing a specific teaching innovation or developing a comprehensive curriculum, this study seeks to contribute a foundational structure for future research and practice. The framework emphasizes creative interaction between students and AI systems, reflecting current shifts in digital pedagogy and artistic practice. While empirical implementation is beyond the scope of this study, the framework and instructional strategies presented are designed to be adaptable for future pilot testing, curriculum integration, and classroom experimentation.

II. Literature Review

The integration of AI technology into art education is a topic of widespread interest in the digital age, especially with the development of AI tools that can generate images and artistic compositions from human input (prompt-based generation), such as DALL E, Midjourney, Adobe Firefly, and Runway Machine Learning (ML), which significantly impact the learning and creation process in the context of art education at the tertiary level.

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In recent years, education has begun to significantly change from integrating AI technology into learning, especially in the field of art, which is a field that requires creativity and visual communication. AI not only acts as a digital resource, such as a virtual museum or online image gallery, but also plays a role in supporting modern teaching and learning and facilitating the design of learning experiences that are appropriate for learners in the digital age.

"AI technology offers broader access to digital art collections, online galleries, and virtual museums, enriching students' understanding and appreciation of art" [3].

"AI applications are actively being utilized to enhance various aspects of art education. These technologies offer significant advantages in supporting student creativity, personalizing learning experiences, and streamlining assessment processes within visual arts education" [4].

"AI is being used to modernize art education by integrating smart teaching methods and enhancing the quality of teaching in art design courses" [5].

Human-AI Collaboration is a concept that is gaining increasing attention in various fields, including education, especially in the context of learning arts, which requires high levels of learner engagement. AI is designed to support humans in managing complex data and providing rapid insights, while humans continue to play a role in strategic decision-making, creativity, and communication, qualities that cannot yet be fully replaced by automation.

"Quality is a crucial aspect of Human-AI Collaboration. This quality encompasses the effectiveness, reliability, and ethical implications of AI systems when integrated into collaborative environments" [6].

"AI helps in reducing human cognitive biases, leading to more objective decisions [7].

"AI's role in creative processes extends to automating repetitive tasks, allowing designers to focus on activities requiring creativity and critical thinking. In visual design projects, AI assists in content planning, text and graphics generation, and finalization, enhancing design efficiency and pushing creative boundaries [8].

One of the key mechanisms for working with AI, especially in text-based image generation systems, is the "prompt" or command that humans use to communicate with AI. The ability to design prompts effectively has a direct impact on the quality and relevance of the results. Designing prompts that are clear, detailed, and have the right context will help make the resulting artwork more complete. Therefore, it is important to include them in the design of digital art learning activities.

"We conducted simulation and user studies, which showed that RePrompt significantly improves the emotional expressiveness of AI-generated images, especially for negative emotions" [9].

"Effective prompt design requires clarity, detail, and relevance to ensure that the AI model accurately interprets the user's intent. This involves crafting prompts that are specific and descriptive to guide the AI in generating high-quality images" [10].

"The design of user interfaces for generative AI platforms significantly impacts how users engage with prompt creation. Features that simplify the process or offer shortcuts can reduce the depth and creativity of prompts, highlighting the need for interfaces that encourage exploration and detailed input" [11].

From the review of related literature, it was found that artificial intelligence technology plays an important role in changing the learning model of art in higher education, especially in the dimension of creating creative interactions between humans and AI, which can be classified into 3 important aspects: 1) using AI as a tool to promote creativity and understanding of art, 2) designing a collaborative process between humans and AI using the concept of Human-AI Collaboration, and 3) developing effective prompt design skills to guide the creation of art through AI systems.

From the analysis of related literature, it was found that the trend of using AI technology in art education is not limited to using it as a tool for producing works, but also extends to being a "co-creator" through the process where humans and AI work together interactively, both in terms of thinking processes, design, and interpretation, which is called Human-AI Collaboration.

"By placing creativity at the core of teacher competency development, this review highlights pathways to cultivate a more responsive, empowered, and future-ready teaching workforce in the field of visual arts" [12].

In particular, the generation of images from text (prompt-based image generation) has become an important turning point for learning Visual Art at the higher education level [13, 14]. From the above issues, this research synthesizes the conceptual framework into 3 main interconnected components.

Research Gaps: Although many previous studies have explored the integration of AI into art education, most of them primarily emphasize technological functionalities or learning outcomes rather than the pedagogical design process that fosters creativity, reflection, and critical engagement between humans and AI. There remains a lack of conceptual frameworks that systematically address how human–AI collaboration can be structured to promote process-based learning, prompt literacy, and reflective artistic practice. Moreover, few studies have examined AI's role as a co-creative partner in curriculum design or developed a structured model for integrating prompt-based generation tools within higher education art instruction.

This study addresses these gaps by proposing a conceptual and design-based framework that positions AI not merely as a production tool but as a collaborative agent that enhances creative exploration, critical thinking, and ethical reflection within art education contexts.

III. Research Methodology

A. Research Type

This research is a conceptual study aimed at designing and defining a conceptual framework for integrating human-AI collaboration into higher education art instruction. This research does not involve empirical data collection or experimental classroom application. Instead, it focuses on synthesizing theoretical perspectives, pedagogical principles, and design concepts into a structured model that can guide future empirical studies. This focus is on conceptualizing and defining instructional models, which serve as a foundation for future research and curriculum development.

B. Methodological Foundation

The methodological foundation of this research is based on the principles of Design-Based Research (DBR), a flexible, iterative structure that connects theory and practice through design, reflection, and refinement. Although this research does not fully utilize the DBR cycle, the process follows the core logic of DBR: theory generation and learning environment design, which can be subsequently empirically tested.

The conceptual framework was developed through five interconnected steps, consistent with DBR reasoning. This includes contextual analysis to identify gaps and challenges in art education integrated with AI, theoretical synthesis, and integrating creative thinking, reflective practice, and design thinking, leading to the design of the conceptual framework. It describes a structured human-AI collaboration model, provides conceptual validation, aligns components with existing pedagogical theories, and plans future iterations by suggesting empirical applications for future research.

Therefore, the DBR serves as a methodological foundation that guides the design, refinement, and positioning of a conceptual framework for practical application.

This study adopts a design-oriented conceptual approach inspired by the principles of DBR. However, it does not report completed DBR cycles or empirical data collection. Instead, it formulates a set of design conjectures and an instructional framework intended to guide future DBR implementations within higher education art contexts. The proposed framework integrates insights from constructivism, reflective practice, and design thinking to model human-AI collaboration in creative learning. Future research will operationalize this framework through iterative DBR cycles—context analysis, prototype implementation, reflection, redesign, and re-evaluation—conducted within authentic classroom environments. The process consists of the following stages:

1) Literature review

A comprehensive review was conducted on academic literature related to AI in education, human-AI collaboration in creative practices, and instructional design in art education. This review identified current challenges and opportunities in integrating AI tools into learning environments.

2) Theoretical framework analysis

Key learning theories—such as constructivism, design thinking, and reflective practice—were analyzed to establish pedagogical principles relevant to AI-assisted creativity. These theories informed the conceptual alignment of the framework with cognitive and creative development processes.

3) Design framework development

Insights from the literature and theoretical foundations were synthesized to construct a design framework outlining essential elements for integrating AI into visual art instruction. These elements include prompt formulation, iterative creation, peer critique, and reflective assessment.

4) Instructional model construction

Based on the design framework, a practical instructional model was developed. The model incorporates real-world generative AI tools and supports process-based learning through prompt workshops, studio-based practice, and critical reflection.

5) Conceptual validation and recommendations

Although empirical testing and expert validation were not conducted within the scope of this study, the model was designed to align with established pedagogical theories and current practices in digital art education. Recommendations for future research include expert validation and classroom-based implementation to further evaluate the model's effectiveness and adaptability.

Human-AI Collaboration in Art Education

(1) AI as Creative Partner = Creative tools + Experimentation

AI acts as a tool to support learning and creativity, where students use AI to explore ideas, prototype, and experiment with artistic elements through artificial intelligence systems such as Midjourney, DALL E, or Adobe Firefly.

(2) Prompt as Pedagogical Tool = Develop creative thinking

Prompt writing is a design skill that integrates linguistic expression and visual imagination. It serves as a pedagogical tool to foster critical thinking and visual literacy.

(3) Curriculum Integration = Curriculum + Critical reflection

Integrating AI into the curriculum requires attention to both content and process, ensuring that learners remain in control of technology rather than passive users. Reflection and critique of AI-generated work should be embedded throughout the learning process.

Table 1. Human-AI collaboration in art education

Key components	Roles and meanings	Application guidelines in teaching contexts
1. AI as a Creative Partner	- AI as a Creative Partner AI is a co-creator and a tool for experimenting with artistic concepts, such as text-based image generation (prompt-based generation) - Organize activities for students to use AI to create art	- Analyze and reflect on the results of using AI from the prompts they write - Compare the results of modifying the prompts
2. Prompt as Pedagogical Tool	- Prompt design is an important skill that promotes creative thinking and visual literacy - Create activities to practice writing prompts in various forms (e.g. prompt iteration)	- Provide peer critique for prompts and results - Use prompt mapping to analyze thought structures
3. Curriculum Integration and Reflection	- Purposefully integrate AI into the curriculum and promote analytical thinking and self-reflection - Design a curriculum or workshop that uses Human-AI Collaboration as the core	- Create a reflection exercise on the work created with AI - Organize a session for students to critically analyze and critique their own and others' work

This conceptual framework Table 1 in the integration of AI into art education through three main dimensions: (1) AI

as Creative Partner, which emphasizes the role of AI as a tool to foster creativity and experimentation, where learners use AI systems such as Midjourney or DALL E to explore ideas and develop work; (2) Prompt as Pedagogical Tool, which highlights the role of design prompts as learning tools to develop critical thinking skills and visual understanding by using design language to communicate with AI; and (3) Curriculum Integration, which emphasizes designing curricula to encourage learners to critically engage

with AI through reflective and critical activities involving work with technology. All of this aims to make students not just users of technology, but also ethical and understanding controllers and creators of meaning with AI.

C. Challenges in Prompt Design

While prompt writing may appear straightforward, crafting effective prompts that yield meaningful visual outcomes requires attention to numerous variables. Students often struggle with vague or abstract wording, resulting in outputs that diverge from their creative intent. Common challenges include insufficient specificity, ambiguous descriptors, conflicting elements, or inconsistency in mood and tone.

D. Structured vs. Unstructured Prompt

One key pedagogical strategy within this framework involves analyzing the differences between structured and unstructured prompts. This helps students understand how linguistic precision, visual logic, and creative intent influence AI-generated results.

For example, a structured prompt such as "30th-floor apartment, living room, dome ceiling like the Pantheon in Rome, floor made from Matterhorn stone"—when used with GPT-4o and Adobe Firefly—produced visually consistent and vivid results. In contrast, an unstructured prompt like "a nice room with art and soft lighting" yielded generic images lacking control and specificity.

Through peer critique and iterative feedback, students learn to refine prompts to better communicate with AI, thereby developing visual literacy and critical analysis skills.

E. Prompt Iteration and Refinement through Feedback

Students may encouraged to refine their prompts by comparing generated results with their original design intentions. Through peer critique and reflection, they adjusted word choice, visual emphasis, and sequencing of information. For instance, one student noticed that placing "glass wall" too late in the prompt caused AI systems to omit it entirely, while emphasizing it earlier improved consistency across platforms.

The process of iterative prompting not only enhanced students' visual outcomes, but also deepened their understanding of the relationship between language, technology, and creativity.

F. Future Implications

The structured prompt design process serves not only as a creative exercise but also as a metacognitive tool, encouraging learners to reflect on how their linguistic decisions shape creative outcomes. Incorporating real-time AI feedback loops into instruction could further enhance learners' ability to evaluate, adapt, and refine their creative directions.

Collectively, the three components (as outlined in Table 2) establish an integrated human-AI learning experience that supports creativity, analysis, and self-reflection in contemporary art education, as describe in Fig. 1.

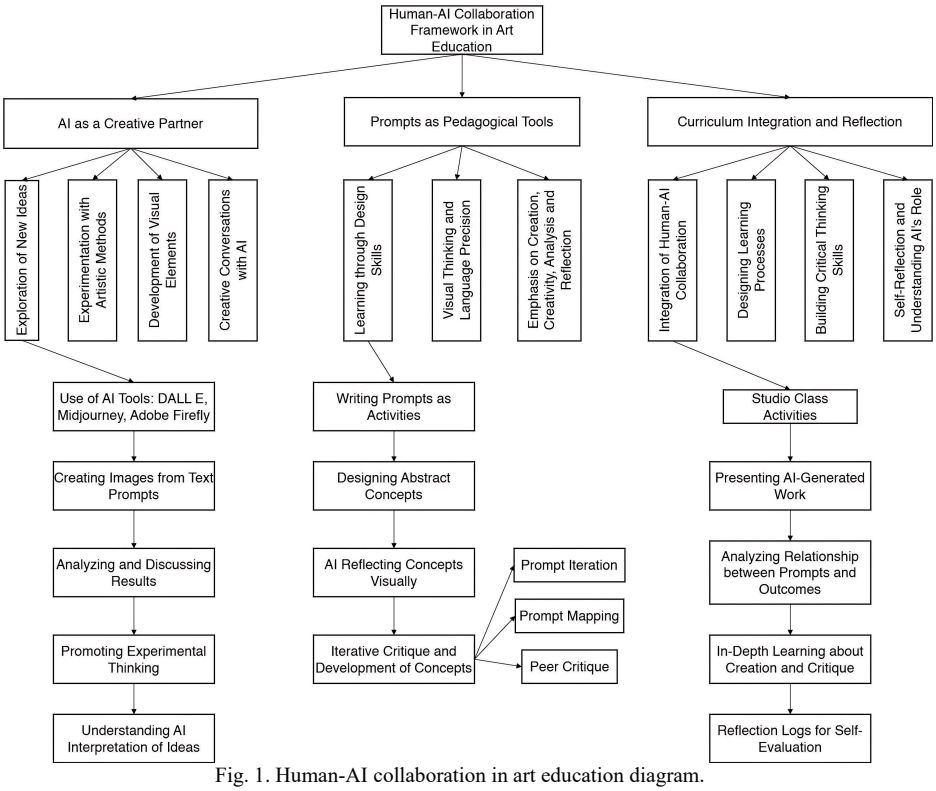

Fig. 1. Human-AI collaboration in art education diagram.

In an undergraduate visual communication course, for example, students may begin by crafting prompts to explore abstract visual themes. Using Adobe Firefly, they refine these prompts based on aesthetic goals, peer feedback, and comparative AI outputs. Reflection sessions allow students to discuss how prompt design influenced the results and which

creative decisions were mediated by AI. These activities demonstrate the practical application of all three framework components within authentic learning environments.

Table 2. Operational guidelines

Theoretical Component	Instructional Activity	Assessment Strategy
AI as Creative Partner.	Use of generative tools (e.g., Midjourney, Firefly) in conceptual design and exploration.	Process portfolio, peer critique, AI-augmented image analysis.
Prompt as Pedagogical Tool.	Prompt writing workshop, prompt mapping, prompt iteration.	Rubric-based evaluation of prompt quality and revisions.
Curriculum Integration.	Integration into studio-based courses and reflective practice.	Reflection papers, discussion of human-AI roles.

Although the conceptual framework has not yet undergone empirical testing, it has been purposefully designed to align with established learning theories and real-world creative practices. Each component includes practical application guidelines adaptable for actual course implementation. Future research should pilot this model in classroom settings, assess its impact on learning outcomes, and gather feedback from both students and instructors.

IV. Proposed Model

This research provides a conceptual framework and practical guidelines for applying human-AI collaboration in the context of art education, focusing on creating learning experiences that promote creativity, visual literacy, and critical thinking through the use of AI as a tool for co-creating art, with three key components as follows.

A. The Conceptual Framework of Human-AI Collaboration in Art Education

The proposed model is based on three complementary elements:

Learners use AI to explore concepts, experiment with compositions, and develop artworks, with an emphasis on the process of experimentation and reflection on the results.

Designing prompts as learning tools, would helping students practice linguistic and visual design skills, as well as analyzing the relationship between prompts and the resulting artwork.

Integrating human-AI collaboration into higher education courses, such as experimental art courses, critical design, or studio classes with systematic reflection activities.

B. Effective Prompt Usage Guidelines

In the context of art education that integrates AI technology to play a role in the creation of works, "prompts" are considered the heart of the collaborative process between humans and AI. Because it is the main channel that humans use to communicate intentions, ideas, and imaginations for AI to interpret and create into works of art. Therefore, designing effective prompts is not only a technical skill, but also a learning tool that helps enhance understanding of the AI system and develop learners' critical thinking skills and visual literacy.

One approach to practicing effective prompt usage is Prompt Iteration, which allows learners to experiment with editing, modifying, or adding elements to the prompts used to observe the differences in the results generated by the AI. This method not only helps learners understand the mechanisms of the AI system in interpreting language, but also promotes the learning process through repeated experimentation and comparative analysis.

"Iterative prompt design involves systematic experimentation to understand how different prompt variations affect model behavior. This process can provide insights into the underlying mechanisms of LLMs and inform the development of more effective prompts" [15].

The next approach is Prompt Mapping, or analyzing the structure of a prompt by breaking down its components, such as emotional adjectives, color tones, artistic elements, or visual context. This helps learners see the relationship between linguistic elements and visual output more clearly, leading to more precise and creative prompt design.

"ChatGPT can facilitate teaching and learning by generating discussion and follow-up questions, helping students conduct research, and creating interactive learning activities like quizzes and games. It can also personalize learning experiences based on student performance" [16].

The final approach is to use Peer Critique, a process of exchanging ideas and analyzing work among students, with a focus on both the written prompt and the AI-generated output. This collaborative critique of work and ideas provides a space for students to exchange perspectives, practice reasoning, and learn from each other—a critical learning approach that promotes the development of creativity in the context of learning with AI.

"Establishing peer-critique partnerships can increase student engagement and motivation. By providing criterion-based feedback, students can help each other move beyond mere editing to true revision, enhancing the overall quality of their work" [17].

In Fig. 2, such systematic and targeted training in prompt design skills will enable learners to more effectively control and direct the outcomes of AI, and promote learners to play a role as designers rather than users of technology, an important skill in an era where humans must coexist creatively and critically with intelligent systems.

C. Application of the Concept to the Curriculum or Teaching Activities

In an era where AI technology plays an important role in the art world, designing teaching that integrates human-AI collaboration is a necessary approach to prepare learners for new creative environments where technology and human creativity must work closely together.

The Human-AI Collaboration framework can be applied to art courses that emphasize experimentation and conceptual design, such as Experimental Art, Conceptual Design, or Studio Practice. Instructors can design activities that allow students to use AI as a "creative partner", not just a tool for producing work. Learners will learn to design prompts to communicate with AI, practice analyzing work generated by AI, and learn through critical reflection on their ideas. This

assessment approach does not focus only on the final outcome of the work, but also on the learning process, such as writing reflections that demonstrate understanding of the relationship between humans and AI, creating a portfolio that records the experimental steps and results obtained from using AI, and systematically presenting the ideas behind the work. These assessment methods allow learners to have the opportunity to deeply consider the role of AI in the creative process and how much they have contributed to determining the direction of the work.

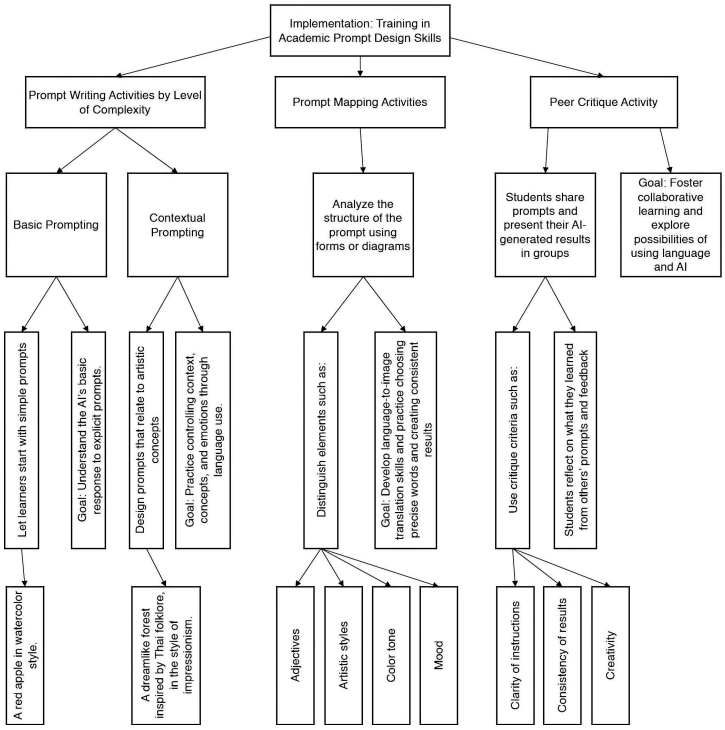

Fig. 2. Effective prompt usage guidelines diagram.

"The curriculum is not just a static document but a dynamic system that evolves with educational needs. It functions as a guideline for classroom activities and is essential for achieving educational goals, such as cognitive, affective, and psychomotor development" [18].

"Art education can also serve as a platform for integrating ideological and political education, helping students develop critical thinking skills and social responsibility" [19].

In addition, critical reflection sessions are an important component of this approach, where students analyze and discuss the relationship between "human-tool-creativity" through real case studies or their own work. This approach not only develops critical thinking and communication skills, but also cultivates an attitude that values technology as a "thought partner" rather than just a "productivity tool."

"Effective critical reflection requires dedicated time and a structured approach. Providing a supportive environment where participants can engage in introspection and dialogue is crucial. This includes setting aside specific times for reflection and ensuring that sessions are well-organized to facilitate meaningful engagement" [20].

This type of learning design therefore aims to develop learners to be artistically critical, have a deep understanding of AI, and be able to use technology ethically, creatively, and responsibly within cultural and social contexts.

V. Artificial Intelligence and Education

To effectively integrate AI technology into art education, the tools used to create the images include Adobe Firefly, ChatGPT (GPT-4o). OpenArt created all the images on May 6, 2025, which are free licensing, as shown in Appendix Table A1. This research proposes operational guidelines in two main dimensions: training in academic prompt design skills and integrated instructional design and assessment, as follows:

A. Prompt Workshop

Activity 1: Prompt Development Workshop

Students practice writing prompts, starting from basic levels (Basic Prompt), such as describing simple images, to complex prompts (Contextual Prompt) that reflect ideas, art, or emotions.

The teacher provides examples and analyzes the structure of the prompt to guide learning.

Activity 2: Prompt Mapping Exercise

Students analyze the components of the prompt, such as adjectives, color tone, composition, media & style.

Use diagrams to show the relationship between words used in the prompt and the results obtained to practice systematic thinking skills.

Activity 3: Peer Critique and Iterative Refinement

Students exchange ideas about the prompts they designed, along with the images created by the AI.

Practice improving the prompt (Prompt iteration) by listening to feedback from classmates.

Record changes in the results from adjusting the prompt to reflect learning and understand the AI's response.

Table 3 shown operational guidelines in 3 activities.

This research employs a conceptual methodology grounded in the principles of Design-Based Research (DBR), focusing on the iterative design and theoretical refinement of a framework for human–AI collaboration in art education.

The model was developed through an analysis of relevant literature and pedagogical design theories. It has not yet been implemented in real classroom settings, and no empirical data have been collected from students or participants. Future research is therefore required to empirically test and validate the framework within authentic educational contexts.

Table 3. Framework-activity-assessment alignment

Activities	Details	Tools
Activity 1: Prompt Development Workshop	Students practice writing basic to complex prompts, ranging from simple image descriptions to artistic or emotional reflections.	AI tools such as Midjourney, DALL E, Adobe Firefly, and tutorial documents.
Activity 2: Prompt Mapping Exercise	Students analyze the components of the prompt such as adjectives, color scheme, visual elements, media and style to practice systems thinking skills	Paper/brochure for diagrams, AI tools used in experiments.
Activity 3: Peer Critique and Iterative Refinement	Students discuss the prompt and the AI-generated output, and refine the prompt based on feedback to create a better outcome.	AI tools, notepads, feedback sharing tools.

B. Prompt Experimental

Setting a prompt must have clear details, like ordering someone to continue. It is divided into categories such as location, room type, wall type, ceiling type, floor type, material used, mood and tone, lighting in the room, external light, internal light, surrounding atmosphere, time, details of decoration, materials, colors, household items, camera angles, and more.

And here is an example of writing a prompt that is used to create an image like the example shown next.

- 30th floor apartment
- Type: living room
- ceiling Appearance: Pantheon (Rome) dome ceiling like original
- floor: Stone from the Matterhorn mountain in Switzerland
- Wall: Bare cement
- Wall: The wall in front of the camera is facing the camera angle. Opposite the camera is a clear glass that shows the sky.
- Mood and Tone: The living room atmosphere is comfortable. The temperature in the room is about 23 ℃
- Environment: Clear sky with cumulonimbus clouds
- Time: Noon 12.00 pm
- Decoration Item: Painting by Piet Mondrian "Composition with Red, Blue and Yellow" in 1930 painting
- Decoration items: Sculpture Venus de Milo in white
- Decoration ceiling lamp: It is a semi-sculpture lamp. In this lamp, there are There are 4 pieces attached together. Piece 1 blue color code is RGB 0,0,255 Piece 2 red color code is RGB 255,0,0 Piece 3 green color code is RGB 0,255,0 Piece 4 white color code is RGB 255,255,255 There are 4 bulbs.
- Furniture: Couch from Cow Skin
- Furniture: Curtain Made from silk fabrics
- Lighting: Shine halogen light into the wall
- Interior Lighting ambient: Fluorescent Warm Light
- Exterior Lighting: Strong sunlight
- Camera Angle: Perspective 2 points angle as perspective sketch drawing. The camera angle is rotated 30 degrees to the left.

This prompt was applied to 3 AI generative programs: GPT-4o, Adobe Firefly and OpenArt. A rough hand-drawn sketch was uploaded as raw data for creating an image close to the hand-drawn sketch, as in Fig. 3. The results were then generated as follows.

Figs. 4–6 illustrate the results of applying structured prompts across three AI generative tools—GPT-4o, Adobe Firefly, and OpenArt—using the same hand-drawn sketch and detailed instructions. These outputs demonstrate how different platforms interpret visual and contextual information embedded in the prompt. In classroom settings, these images are not used merely as outputs but as catalysts for reflection and refinement. Students are asked to compare outputs, identify mismatches between intention and result, and revise prompts accordingly. This process enhances their ability to think critically about language-image relationships and the limitations of generative AI systems. It also supports peer critique and visual literacy by encouraging students to evaluate the impact of prompt components on image composition, mood, and symbolism.

Fig. 3. The rough sketches were hand-drawn and uploaded as raw data for creating a close-up image. The hand-drawn sketches include the interior of the room, lamps, a painted sofa, and a sculpture, glass and curtain.

Fig. 4. Images generated by GPT-4o.

Fig. 5. Images generated by Adobe Firefly.

Fig. 6. Images generated by OpenArt.

Then, following the steps presented, you can take the generated results and edit them manually or order the AI to create a new image again.

C. Integrated Assessment

To enhance learning from specific skills to a holistic learning experience, this research proposes an instructional design approach that emphasizes human-AI engagement in the context of higher education art courses, such as Experimental Art, Conceptual Design, or Studio Practice.

1) Process-focused assessment

Assessment through the creation of a portfolio that shows the process of working with humans and AI, from writing prompts, experiments, modifications, to the final product.

Use a reflection paper to have students reflect on their ideas about using AI and how it influences their creativity.

In addition to reflecting on the creative support AI provides, students are asked to consider what AI cannot do. For example, they may explore how AI failed to capture subtle emotional tones or cultural symbolism in their work. This helps foster critical awareness and reinforces the view of AI as a tool—not a substitute—for human expression.

Organize a session for discussion and critique of the work together in class, asking students to explain the relationship between "humans - tools - creativity".

D. Using AI in Assessment

1) Using AI to check the process and work

Use AI tools such as Grammarly or Turnitin to check the content of the reflection paper to analyze the structure of students' thinking and writing.

Use AI to analyze the portfolio to see the development of the work. And examine the experiment at each step, such as using AI to compare changes from each iteration of the prompt and select elements in the artwork.

2) Using AI for visual assessment

Use AI tools such as Artbreeder or DeepArt to assess the appropriateness and feasibility of the AI artwork by analyzing the form, style, and artistic expression.

The AI system will provide scores or suggestions on the balance of elements in the image and matching it to the concept chosen by the student.

Fig. 7 shows how assessment method works.

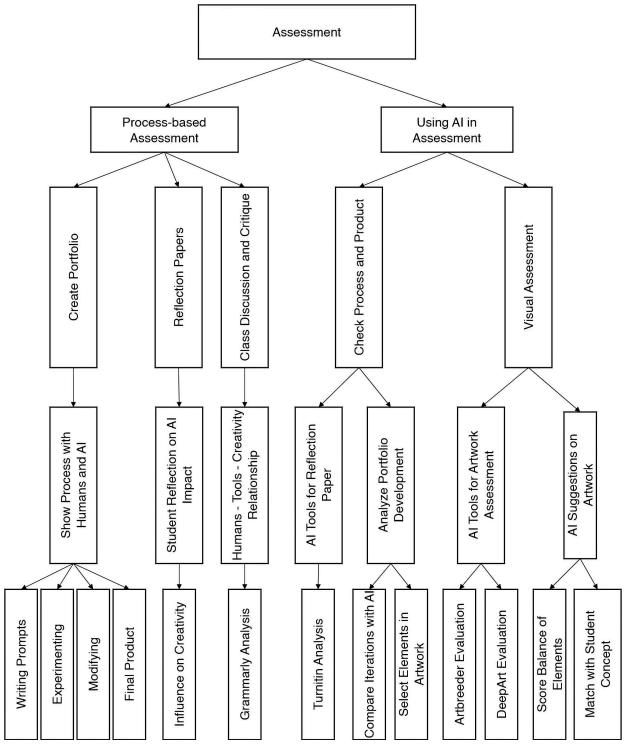

Fig. 7. The assessment.

This study presents a conceptual framework for Human-AI collaboration in art education, developed through theoretical analysis and pedagogical design principles. As the nature of this research is conceptual, no empirical data or classroom trials have been conducted at this stage. However, the instructional guidelines and proposed activities were designed to serve as a foundational model for future pilot implementations. The absence of student work or observational evidence is acknowledged as a limitation, and further studies are encouraged to empirically apply, evaluate, and refine the framework in real-world educational contexts. Directions for such future research have been outlined in the concluding section.

To support process-based assessment, Table 4 presents a sample rubric used to evaluate students' creative use of prompts and portfolio development. This rubric includes learning outcomes and performance indicators related to creativity, iterative refinement, and understanding of human-AI interaction.

Following rubric focuses on evaluating students' engagement with Human-AI collaboration. It provides structured criteria for assessing both the process and the final output, as shown in Table 5.

To clarify the evaluative dimensions of this framework, three core constructs of creativity, visual literacy and critical reflection were operationally defined and aligned with

observable indicators used in rubric-based assessment.

"Creativity" refers to the learner's ability to generate original and meaningful artistic concepts through human-AI collaboration. Observable indicators include the originality of ideas, diversity of approaches, and coherence between conceptual intent and visual outcome.

"Visual Literacy" is defined as the ability to interpret, analyze, and intentionally construct visual messages through interaction with AI-generated imagery. Observable indicators include the effective use of visual elements (composition, tone, contrast, and symbolism) and the learner's ability to link linguistic prompts with visual design results.

"Critical Reflection" denotes the learner's capacity to analyze and evaluate their creative process and ethical engagement with AI. Observable indicators include the depth of analysis in reflection papers, recognition of AI's role and limitation, and articulation of personal and cultural meaning.

These operational definitions ensure that assessment is conceptually grounded, observable, and replicable across different instructional settings.

Table 4. Sample rubric for AI-supported creative process

Assessment Criteria	Learning Outcome	Performance Indicators
Prompt Structure and Clarity (Visual Literacy)	Demonstrate ability to design structured and meaningful prompts that connect linguistic description with visual outcomes	Clearly defined prompt elements; appropriate use of visual terminology; relevance to artistic intent and composition
Iterative Refinement and Feedback (Creativity)	Exhibit the ability to generate original ideas, experiment through multiple iterations, and refine outputs based on critique and analysis	Documented prompt adjustments; evidence of exploration and innovation; articulation of conceptual development across versions
Portfolio Coherence and Depth (Critical Reflection)	Demonstrate understanding of Human-AI collaboration through cohesive presentation and reflective discussion of process	Logical progression of work; image–concept alignment; depth of written reflection and ethical awareness

Table 5. Structured criteria for assessing both the process and the final output

Assessment Criteria	Excellent	Good	Fair	Needs Improvement
1. Prompt Structure and Clarity	Clearly structured prompt with specific language, rich visual and conceptual elements.	Generally well-structured with clear descriptions, but some details may be vague.	Basic prompt with limited structure or vague elements.	Incomplete, confusing, or incoherent prompt.
2. Iteration and Refinement	Demonstrates systematic experimentation and refinement based on AI outputs and peer feedback.	Shows some iterations and attempts to improve results.	Minimal experimentation with limited reflection.	No clear evidence of iteration or experimentation.
3. Concept–Image Alignment	Final image strongly reflects the intended concept with aesthetic balance and originality.	Concept is generally clear with some connection to visual outcome.	Weak connection between concept and image.	No clear concept or artistic intent evident in the final work.
4. Reflection and Process Understanding	Provides deep insights into the creative process and the role of AI through reflection or critique.	Some reflection present, identifying strengths and weaknesses of AI interaction.	Limited reflection with surface-level observations.	No meaningful reflection or analysis of AI's role in the process.

E. Ethical and Intellectual Property Considerations

Ethical engagement with AI tools is a central aspect of this instructional framework. Students are encouraged to critically examine the cultural, legal, and creative implications of AI-assisted image generation.

Students are advised to avoid direct use of artist names or copyrighted works in prompts to prevent unintentional imitation or copyright infringement. Instead, they describe stylistic attributes such as color harmony, composition etc. using original language.

Classroom discussions address how AI models are trained on datasets that may include copyrighted or culturally sensitive materials. Students explore issues of bias, representation, and authorship by comparing outputs generated from different linguistic and cultural perspectives.

Students receive a briefing on responsible AI use, including fair use, attribution, and intellectual ownership. Clear "allowed" and "forbidden" prompt patterns are provided to support ethical decision-making.

The rubric may excludes credit for work that replicates copyrighted content or culturally sensitive imagery. Instead, assessments reward originality and ethical awareness demonstrated through process documentation and reflective statements.

VI. Discussion

The integration of AI technology into the teaching and learning process at the tertiary level of art has opened up opportunities for changes in the methods of creativity and development of artistic concepts. By combining humans and AI tools, creative processes have been expanded and developed in a more diverse way. The results from the activities and learning processes presented in this research therefore clearly reflect the relationship between "human-tool-creativity".

A. Development of Creative Concepts and Experimentation

Students who would practiced designing prompts and using AI to create works developed systematic thinking skills, especially in analyzing the components of prompts, such as adjectives, color tones, or image compositions. Students were able to learn to modify and experiment with multiple methods to systematically change the results, which helped to enhance their understanding of the mechanisms of AI's operation and the connection of artistic creation with technological tools. The experiments that students conducted in the Prompt Mapping Exercise showed that understanding the structure of the prompt is important in controlling the results from AI. Learning from these experiments allowed

students to create works that reflected a variety of thoughts and emotions and were in line with their own artistic intentions. In addition, students' peer-reviewed guidance in working with AI helped to continuously develop and improve their works.

For instance, students in the Prompt Mapping activity noted that changing the order of descriptive elements in a prompt such as moving "glass wall" earlier in the sentence resulted in more accurate AI-generated images. This concrete example reflects how linguistic awareness shaped creative outcomes

Some students initially struggled with balancing creative freedom and AI control. Prompts that were overly poetic or abstract often yielded incoherent images. Others found that too much technical detail constrained the AI's interpretation, producing overly literal results. These tensions reflect a key pedagogical challenge in prompt-based collaboration.

"Generative prompt tuning reformulates tasks like relation classification as infilling problems, which allows for more flexible label verbalizations compared to traditional methods that rely on fixed-length verbalizations. This approach exploits the rich semantics of entity and relation types, enhancing the model's ability to handle complex label spaces" [21].

"A major challenge in deploying vision-language models is prompt engineering, which requires domain expertise and can be time-consuming. Context Optimization (CoOp) addresses this by automating the design of task-relevant prompts using continuous representations, improving data efficiency and robustness to distribution shifts" [22].

B. Integrating AI into the Creative Process

The introduction of AI into the creative process has expanded the scope of art creation. Previously, humans had to use specialized skills in design and creation. However, the use of AI allows humans to experiment with things they had never thought of before, such as creating images in styles that are different from their own abilities or exploring more complex concepts in a variety of areas. Using AI as a tool to help experiment and develop concepts (conceptual development) in conceptual design and experimental art provides an opportunity for students to develop new ideas and enhance their skills in presenting art in a different way. AI can be used to help create images that reflect profound ideas or challenge traditional thinking.

Haase and Pokutta identify four levels of interaction in human-AI co-creativity: "Digital Pen, AI Task Specialist, AI Assistant, and AI Co-Creator. These levels illustrate the progression from AI as a tool to AI as an active creative partner, capable of autonomous creativity" [23].

"The use of AI-generated images, such as those produced by DALL-E 2, is transforming advertising by offering new creative possibilities and efficiencies. However, this also raises concerns about the changing roles of human creatives and the potential for AI to disrupt traditional workflows" [24].

C. Process-Based Assessment

Using a process-based assessment format allows students to fully reflect on their learning and skills development through the creation of a portfolio and writing a reflection paper, which allows students to consider and reflect on the relationship between the creative process and the tools used. The assessment through the portfolio and reflection demonstrates the importance of tracking the learning process and reflecting on the development of the work in a step-by-step manner, allowing students to gain deeper learning and improve their creative process based on the results of using AI.

"In the context of open education, PLR can drive transformation and knowledge creation by promoting a culture of knowledge production through active practice. This approach fosters reflexivity among researchers and practitioners, enabling them to contribute to sustainable and scalable educational practices" [25].

D. Reflections on the Relationship between Humans, Tools, and Creativity

One of the issues that was explored in detail in the critique session was the relationship between humans, tools, and creativity. Students reflected on the role of AI in supporting and expanding the boundaries of human creativity. Some saw it as a tool that could enhance the potential for creativity that could not be achieved by humans alone, while others saw it as a tool that could only stimulate thinking, with humans still setting the direction and the main ideas. The critique of this relationship illustrated the struggle between relying on technology and maintaining humanity in the creative process, a crucial question in an era where technology plays a role in every aspect of life. The discussion and reflection helped students understand the importance of maintaining a human role in controlling and shaping the creative process, even as AI empowers such creativity.

"AI technologies, such as Generative Adversarial Networks (GANs) and neural networks, have revolutionized artistic creation by enabling machines to autonomously generate art. These technologies allow for the creation of compelling artistic works that can rival human creations in terms of complexity and appeal" [26].

"Creativity can also be differentiated based on its context. Subject creativity is related to individual activities and problem-solving, while social creativity involves communication and interaction with others. These types differ in their development and are influenced by educational systems" [27].

It shows that Human-AI Collaboration not only promotes learners' creative processes, but also opens up a space for learners to explore their roles as "creators" with technology through systematic prompt design, reflection, and critique of artistic concepts in a new context. The use of AI does not diminish human creativity, but rather encourages deep questioning of the meaning of art, and the learning process itself shifts from focusing on outcomes to learning through processes, which is consistent with the goals of modern education that focus on critical thinking, meaning-making, and ethical learning with technology.

In addition to pedagogical considerations, the ethical dimensions of using AI in art warrant reflection. The rise of generative technologies challenges traditional notions of authorship and originality, as artworks may result from a shared creative process between human and machine. Furthermore, there is a concern that over-reliance on AI tools may diminish students' technical skills or discourage deep conceptual thinking. To address this, students were

encouraged to critically examine these issues through guided critique sessions and reflective writing, fostering awareness of both the potential and limitations of AI in the artistic process.

E. Practical Recommendations for Educators

- Design courses that integrate prompt-writing as a core skill, not just a tool.
- Encourage peer critique to improve prompt outcomes and language precision.
- Allow students to reflect on ethical, emotional, and cultural gaps in AI responses.
- Use AI outputs not as final works, but as drafts for human refinement.

The proposed framework suggests that prompt-based collaboration between humans and AI may foster creativity, visual literacy, and reflective learning by encouraging students to iteratively explore how linguistic precision influences visual outcomes. Although no empirical data were collected, this assumption is grounded in constructivist and reflective learning theories that emphasize knowledge construction through iterative design and critical dialogue.

VII. Conclusion

This research proposes a conceptual and design-based approach to integrating AI into higher education art instruction through structured prompt design and process-based learning. The study highlights the importance of human–AI collaboration not only in generating creative outputs but also in fostering critical thinking, experimentation, and artistic reflection.

Through a series of activities—including prompt development workshops, mapping exercises, and iterative refinement—students can develop a deeper awareness of how language and visual logic interact to produce AI-generated imagery. For example, they may learn how the placement and specificity of terms within a prompt can significantly influence visual results, and how multiple iterations can help refine their creative intentions. Reflection papers and portfolio assessments revealed that learners became increasingly capable of articulating artistic goals and analyzing the relationship between tools and ideas.

While this study does not report empirical classroom implementation, the design of the instructional framework anticipates several pedagogical challenges. For instance, learners may struggle to balance technical precision with creative openness when crafting prompts. Overly abstract language can lead to vague outputs, whereas excessively detailed prompts may constrain imaginative exploration. These anticipated tensions highlight key areas where AI's limitations—such as interpreting emotional nuance or cultural depth—necessitate reflective instructional strategies.

Moreover, as AI's role expands within creative education, ethical considerations become increasingly significant. A central concern involves the ambiguity of authorship when artworks are generated using AI systems, raising questions about originality and the extent of human contribution. Additionally, growing dependency on AI tools may diminish learners' intrinsic artistic engagement or critical judgment if not addressed pedagogically. This research recognizes these concerns and emphasizes that the integration of AI into art education must be guided by reflective practice. Students should be encouraged to critically examine the origins, meanings, and implications of AI-generated content, thereby cultivating ethical awareness alongside creative competence. Future instructional designs should incorporate discussions of intellectual ownership, authenticity, and the responsible use of generative technologies in artistic contexts.

Based on these insights, educators are encouraged to incorporate prompt-writing exercises and AI-supported explorations into creative curricula, while also providing opportunities for ethical and cultural critique. Researchers may further investigate how prompt literacy, tool fluency, and reflective practice develop over time and across disciplines. The framework presented in this study offers a flexible foundation for designing AI-integrated learning environments that promote not only creativity but also critical awareness and artistic agency in a technology-driven world.

The proposed framework and instructional approach are designed to be adaptable across diverse educational settings, including blended and online learning environments. By emphasizing prompt design as a bridge between human intention and AI capability, this model can extend beyond art education to other disciplines where creativity and critical thinking are essential. In global contexts where technological infrastructure and pedagogical readiness vary, the framework allows for flexible implementation, enabling educators to explore co-creative teaching methods that align with local needs while fostering cross-cultural dialogue through AI-assisted creation

Appendix

Table A1. Tooling and configuration

Tools / Platform	Date of Access	Usage Context	Licensing
Adobe Firefly	6 May 2025	Original hand draw picture / text-to-image generation / Prompt that is used to create an image from Subtopic (B. Prompt Experimental) from Page 6	Free
ChatGPT (GPT-4o)	6 May 2025		Free
OpenArt	6 May 2025		Free

Conflict of Interest

The author declares no conflict of interest

References

[1] E. Creely and J. Blannin, "The implications of generative AI for creative composition in higher education and initial teacher education," in *Proc. ASCILITE 2023 Conference Proceedings: People, Partnerships and Pedagogies*, Australasian Society for Computers in Learning in Tertiary Education, 2023, pp. 357–361. doi: 10.14742/apubs.2023.618

[2] M. N. Kabir, "Unleashing human potential: A framework for augmenting co-creation with generative AI," in *Proc. the International Conference on AI Research,* Academic Conferences and Publishing Limited, vol. 4, no. 1, pp. 183–193, 2024. doi: 10.34190/icair.4.1.3074

[3] N. Sahnir and H. Yatim, "Pengenalan teknologi Artificial Intelligence (AI) dalam meningkatkan pengalaman belajar seni di era digitalisasi pendidikan," in *Proc. Seminar Nasional Dies Natalis 62*, 2023, pp. 245–256. doi: 10.59562/semnasdies.v1i1.811

[4] M. I. Y. Suleiman and Z. A. Aziz, "Integrating AI in art education: Opportunities, challenges, and future directions," *International Journal of Innovative Science and Research Technology*, pp. 1224–1229, 2025. doi: 10.38124/ijisrt/25jul848

[5] X. Liu, "Exploration of art teaching mode in colleges and universities based on artificial intelligence," *Advances in Computer and Communication*, vol. 5, no. 1, 2024. doi: 10.26855/acc.2024.02.010
[6] D. Deepa, "Human AI–collaboration platform," *Indian Sci. J. Res. Eng. Manag*., vol. 9, no. 1, pp. 1–9, 2025. doi: 10.55041/ijsrem41085
[7] L. Dican, "Human-AI collaboration and its impact on decision-making," *Int. J. Multidiscipl. Res. Growth Eval*., vol. 2, no. 2, pp. 919–922, 2025. doi: 10.54660/.ijmrge.2025.6.2.919-922
[8] J. Chen, C. Ni, P. Lin, and R. Lin, "Designing the future: A case study on human-AI co-innovation," *Creative Educ*., vol. 15, no. 3, pp. 474–494, 2024. doi: 10.4236/ce.2024.153028
[9] Y. Wang, S. Shen, and B. Y. Lim, "RePrompt: Automatic prompt editing to refine AI-generative art towards precise expressions," in *Proc. Int. Conf. Hum. Factors Comput. Syst.*, 2023. doi: 10.1145/3544548.3581402
[10] N. Ahmad and S. Ruslan, "Crafting effective prompts: A guideline for successful image generation," in *Proc. 2024 14th International Conference on System Engineering and Technology (ICSET)*, 2024, pp. 84–89. doi: 10.1109/icset63729.2024.10775283
[11] M. Torricelli, M. Martino, A. Baronchelli, and L. M. Aiello, "The role of interface design on prompt-mediated creativity in generative AI," in *Proc. the 16th ACM Web Science Conference*, 2024, pp. 235–240. doi: 10.1145/3614419
[12] S. N. F. B. Buhari and A. J. Sihes, "Competency development in visual arts education: A systematic review on human capital and teaching effectiveness," *Int. J. Acad. Res. Bus. Soc. Sci*., vol. 15, no. 9, pp. 377–391, 2025. doi: 10.6007/ijarbss/v15-i9/26492
[13] J. Jagodzinski, *What Is Art Education*, New York, NY, USA: Palgrave Macmillan, 2017.
[14] R. A. Costa and R. Cooper, *Design for Education*, London, U.K.: Routledge, 2024.
[15] M. Desmond and M. Brachman, "Exploring prompt engineering practices in the enterprise," arXiv preprint, arXiv:2403.08950, 2024. doi: 10.48550/arxiv.2403.08950
[16] M. Nazari and G. Saadi, "Developing effective prompts to improve communication with ChatGPT: A formula for higher education stakeholders," *Discover Educ*., vol. 3, no. 1, 2024. doi: 10.1007/s44217-024-00122-w
[17] E. Lee, "Moving writing forward through peer-critique partners," *Georgia J. Literacy*, 2023. doi: 10.56887/galiteracy.124
[18] I. R. Ramadani, F. Firman, and R. Ahmad, "Basic concepts and curriculum theory in education," *J. Sch. Couns*., vol. 6, no. 1, pp. 9–21, 2021. doi: 10.23916/08741011
[19] W. Gong, "Analysis of the practical methods of middle school art teaching reform under the concept of 'Curriculum Ideology and Politics'," *Int. J. New Develop. Educ*., vol. 5, no. 15, pp. 149–152, 2023. doi: 10.25236/ijnde.2023.051524
[20] L. S. Ockerman and S. Bagui, "Critical reflection sessions: Teacher's perspectives during professional development," *Int. J. Changes Educ.*, 2024. doi: 10.47852/bonviewijce42023792
[21] J. Han *et al*., "Generative prompt tuning for relation classification," in *Proc. Conf. Empir. Methods Nat. Lang. Process (EMNLP)*, 2022. doi: 10.18653/v1/2022.findings-emnlp.231
[22] K. Zhou, J. Yang, C. C. Loy, and Z. Liu, "Learning to prompt for vision-language models," *Int. J. Comput. Vis*., vol. 130, no. 9, pp. 2337–2348, 2022. doi: 10.1007/s11263-022-01653-1
[23] J. Haase and S. Pokutta, "Human-AI co-creativity: Exploring synergies across levels of creative collaboration," arXiv preprint, arXiv:2411.12527, 2024. doi: 10.48550/arxiv.2411.12527
[24] J. Matthews, D. Fastnedge, and A. M. Nairn, "The future of advertising campaigns: The role of AI-generated images in advertising creative," *J. Promot. Manag.*, 2023. doi: 10.1386/jpm_00003_1
[25] D. Hamilton and L. Hansen, "An artful becoming: the case for a practice-led research approach to open educational practice research," *Teach. High. Educ*., 2024. doi: 10.1080/13562517.2024.2336159
[26] S. Srinivas, "From algorithms to aesthetics: A survey of AI in art," *Int. J. Sci. Res*., vol. 13, no. 7, pp. 1334–1339, 2024. doi: 10.21275/sr24720091412
[27] K. M. Romanov, "Development of students' creativity," *Educ. Stud*., no. 2, pp. 161–175, 2020. doi: 10.31862/2500-297X-2020-2-161-175

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