

Negotiating Human–AI Co-Creativity in Higher Art Education Through a Posthuman Pedagogical Perspective

Aqim A. Hukmi¹, Fera Ratyaningrum², Utari A. Shanti³, and Agung A. Subagio⁴

^{1,2,3,4}Universitas Negeri Surabaya, Indonesia

Corresponding author: aqimhukmi@unesa.ac.id

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This study aims to examine human–AI co-creativity in art education as a relational practice emerging through processes of exploration and creative decision-making. The study employed an Educational Design Inquiry approach, encompassing needs and phenomenon analysis through a Systematic Literature Review, the development of a learning design as a Pedagogical Proposition, and an Enactment phase implemented in a digital illustration learning context involving 30 Art Education students. Data were analyzed interpretively using posthuman pedagogy as the primary theoretical lens. The findings reveal that human–AI co-creativity in art education constitutes a relational pedagogical practice that extends beyond instructional approaches and product-oriented assessment, as AI mediates creative possibilities that influence students' interpretations and artistic decision-making. Through the learning design framed as a Pedagogical Proposition, the practices of Interaction & Creation, Negotiation Space, and process-oriented Pedagogical Goals enabled human–AI co-creativity to be experienced reflectively through dialogue, iteration, and situated negotiation among students, AI, and the learning context, with educators functioning as mediating agents. These findings affirm posthuman pedagogy in the enactment of human–AI co-creativity as an entanglement of human and non-human agency, relational creativity, and negotiated pedagogical design within AI-based art learning. In conclusion, posthuman pedagogy provides a relevant conceptual framework for designing AI-based art education that is reflective, relational, and oriented toward the negotiation of human–non-human agency.

Keywords: Negotiating, human–AI, co-creativity, posthuman pedagogical, art learning

1. Introduction

Rapid developments in generative artificial intelligence, including visual, musical, and text-based AI, have fundamentally transformed the landscape of education, including art education within creative learning contexts. The presence of these technologies not only expands possibilities for artistic exploration but also shifts the paradigm from art as an individual expression rooted in human subjectivity toward hybrid creative practices involving human-machine collaboration (Cetinic & She, 2022; Wingström et al., 2024). Within this context, AI is no longer positioned merely as a technical instrument or a supporting tool in creative processes; rather, it functions as a co-creator that actively shapes creative possibilities prior to the materialization of artworks through human artistic judgment (Davis et al., 2025; Haase & Pokutta, 2026). This transformation presents significant epistemological challenges for art education, particularly in reconsidering the concept of creativity, the distribution of agency in the creative process, and artistic authority that has traditionally been attributed exclusively to humans (Bai et al., 2025; Sun et al., 2025). Such conditions call for the development of more adaptive, reflective, and critical conceptual and pedagogical frameworks so that art learning can meaningfully respond to emerging creative realities in the AI era.

As AI becomes increasingly integrated as a co-creator in creative practice, art education enters a pedagogical tension that has not yet been fully articulated. Despite the exploratory opportunities offered, art learning remains strongly influenced by humanist and anthropocentric paradigms that position humans as the sole source of creativity, meaning, and artistic authority (Chiu et al., 2024; Vartiainen & Tedre, 2023). This condition generates tangible pedagogical concerns, particularly when educators confront anxieties regarding the loss of artistic authenticity, growing student dependence on technology, and the potential devaluation of manual skills and embodied creative processes (Jiang et al., 2025). Meanwhile, creative interaction between humans and AI in learning contexts often occurs without

adequate pedagogical guidance, either reflectively or ethically, causing the relationship to be understood pragmatically and instrumentally (Heaton, 2025; Khosravi et al., 2022). Consequently, negotiations of roles, agency, and creative responsibility between humans and AI frequently occur implicitly rather than as pedagogical processes consciously discussed and critically interpreted within art learning environments.

These pedagogical tensions open conceptual space for understanding human-AI co-creativity as a more adequate analytical lens. Human-AI co-creativity cannot be reduced to a mechanical division of labor between human creators and technological systems; instead, it should be understood as a process of co-constructing creative possibilities through repeated interaction, creative dialogue, and mutual responsiveness between humans and AI (Davis et al., 2025; Rezwana & Maher, 2022; Salma et al., 2025). Such relations generate dynamic creative processes in which ideas, aesthetic choices, and creative directions are not predetermined but develop situationally throughout the learning process (Kim et al., 2021; Serbanescu & Nack, 2023). Within art education, positions remain unstable because AI does not operate as an autonomous agent replacing human creators, while humans continue to play roles in interpretation and artistic decision-making (Hertzmänn, 2018; Karimi et al., 2019). Co-creativity therefore positions role negotiation at the core of pedagogical practice rather than as a static task distribution, forming new learning spaces that challenge conventional understandings of creativity, agency, and art learning processes.

Conditions of co-creativity characterized by negotiation of roles and agency require a theoretical framework capable of moving beyond conventional pedagogical perspectives. Posthuman pedagogy offers such an alternative by challenging the human-nonhuman dichotomy that has historically underpinned learning processes (Simmonds, 2025; Strom & Martin, 2022), including in art education. This perspective understands learning as a relational

process formed through the entanglement of humans, technologies, materials, discourses, and cultural contexts, so that knowledge is not produced solely by a human subject but emerges from complex interactions among multiple actors. The concept of distributed agency becomes central to understanding how creative roles are no longer monopolized by humans but shared among students, educators, AI systems, and the learning environment itself (Code, 2025; Fawns, 2022; Strom & Martin, 2022). Within this framework, artificial intelligence is positioned as a nonhuman pedagogical actor that actively shapes learning experiences, influences creative decision-making, and contributes to meaning-making in artistic practice (Dai et al., 2024; Molenaar, 2022). The relevance of posthuman pedagogy lies in its capacity to interpret human–AI co-creativity as a dynamic relational process, thereby opening new ways of understanding art learning that are more reflective, ethical, and responsive to the complexity of human–technology relations.

Despite the development of posthuman pedagogical theory, empirical and conceptual research in art education involving AI has not progressed at a comparable pace. Existing studies (Chiu et al., 2024; Evamillatul Qistiyah & Muhammad Sabandi, 2024; Habibi et al., 2023; Margono et al., 2024; Vartiainen & Tedre, 2023) tend to focus on the effectiveness of AI technologies in supporting learning, improving students' digital literacy, and technical aspects of using AI-based applications. Although valuable, such approaches still position AI primarily as a pedagogical tool rather than as part of the creative relations that shape learning processes themselves. Consequently, studies that explicitly frame human–AI co-creativity as a pedagogical practice remain limited, as do investigations employing posthuman pedagogy as a critical interpretive lens. Moreover, negotiations involving agency, control, and creative intention in art learning are rarely examined in depth, leaving relational dynamics between humans and AI analytically underexplored. This limitation is reinforced by the scarcity of empirical contexts grounded in actual art learning practices—such as

classroom activities, studio work, or AI-based creative projects—where human–machine co-creativity genuinely occurs.

Based on the identified research gap, this study is proposed to examine how human–AI co-creativity emerges as a pedagogical practice in higher art education, particularly concerning shifts in agency relations, creative authority, and the meaning of creativity resulting from AI involvement. Rather than operationalizing co-creativity as a fixed learning outcome, this study focuses on identifying the pedagogical needs and conceptual tensions underlying its emergence, developing a learning design as a pedagogical proposition, and interpreting how agency negotiation unfolds in AI-based art learning practices. In response to these concerns, the study addresses the following questions:

1. How do Needs & Phenomenon Analysis identify human–AI co-creativity as a pedagogical problematization in higher art education?
2. How does the Design-Oriented Inquiry stage develop a pedagogical proposition for human–AI co-creative learning in higher art education?
3. How do Enactment and Interpretive Analysis through posthuman pedagogy explain the negotiation of agency in human–AI co-creative practice in higher art education?

Based on these questions, the study focuses on three main dimensions, beginning with the identification of pedagogical needs and conceptual tensions underlying the emergence of human–AI co-creativity in higher art education, followed by the development of a learning design as a pedagogical proposition to facilitate human–AI co-creative practice, and concluding with the enactment and interpretation of human–AI co-creativity in art learning to understand how agency negotiation unfolds through the lens of posthuman pedagogy.

2. Method

This study employed Educational Design Inquiry (EDI) as the primary methodological framework to understand human–AI co-creativity as a pedagogical practice in art education. EDI was selected because it enables the integration of phenomenon analysis, learning design development, and the examination of enactment in practice, with the aim of generating pedagogical understanding grounded in authentic learning contexts (McKenney & Reeves, 2018). Within this framework, the research was conducted through interrelated stages, including needs and phenomenon analysis, design-oriented inquiry, and enactment or trial in practice (Reeves et al., 2011), all directed toward examining the dynamics of human–AI co-creativity in a contextual and reflective manner. The learning design was not treated as the final objective of the study but as a conceptual intervention intended to elicit, observe, and interpret pedagogical practices as they occurred (Cobb et al., 2003). All stages of EDI were analysed interpretively using posthuman pedagogy as the primary theoretical lens, allowing human–AI relations to be interpreted as a relational learning process involving distributed agency.

Needs and Phenomenon Analysis

The first stage, Needs & Phenomenon Analysis, aimed to identify pedagogical needs and conceptual phenomena related to human–AI co-creativity in art learning. A Systematic Literature Review (SLR) was employed as an analytical strategy to map current research discourse concerning the use of artificial intelligence in art education. Literature searches were conducted through major academic databases, including Scopus, Web of Science, and Google Scholar, enabling access to both international and national publications with high validity (Falagas et al., 2008; Mongeon & Paul-Hus, 2016). Google Scholar was used as a complementary source to capture grey literature and relevant local publications (Martín-Martín et al., 2018). The literature selection process followed stages of identification, screening, eligibility assessment, and inclusion, with primary criteria including

studies addressing AI integration in art education, human–AI co-creativity practices, pedagogical implications of AI-mediated creative processes, and human–technology relations in learning contexts. The SLR at this stage was not treated as a descriptive literature review but as an analytical approach for formulating pedagogical problems and conceptual needs that served as the basis for developing the learning design in the subsequent stage.

Design-Oriented Inquiry

The second stage, Design-Oriented Inquiry, focused on developing a learning design as a conceptual response to the pedagogical needs and issues identified previously. The design was developed as a pedagogical proposition (Sandoval, 2014) that facilitates human–AI co-creativity rather than a prescriptive instructional procedure. AI-based learning activities emphasized dialogic interaction between learners and AI systems, open exploration through prompts and AI outputs, and critical reflection on creative decisions. AI use was not intended to automatically produce final visual artefacts but to support conceptual exploration and alternative visual representations; AI outputs were positioned as creative stimuli and references interpreted by learners in making artistic decisions. Design components included process-oriented goals, non-hierarchical role arrangements among learners, educators, and AI, and reflective mechanisms addressing the negotiation of agency. Within the Design-Oriented Inquiry framework, the design was not positioned as a final solution or standardized model of AI-based art learning but as a pedagogical medium and epistemic tool for generating enactment practices that are relational, contextual, and open to interpretation.

Enactment / Trial in Practice

The third stage, Enactment / Trial in Practice, involved implementing the learning design in an authentic art learning context through a practice-based qualitative study approach. The primary focus was not on measuring the success or effectiveness of the design but on observing pedagogical dynamics emerging during the

practice of human–AI co-creativity (Barab & Squire, 2004). The design was implemented across three learning sessions, each involving 10 undergraduate students from the Art Education Study Program at Universitas Negeri Surabaya, resulting in a total of 30 participants. Participants were selected purposively based on criteria including active enrolment, completion of courses in instructional material development and basic teaching, basic digital literacy skills, and interest in AI-based learning technologies. Data were collected through observation of learning processes and learners' creative decisions during activities, as well as reflections on learning experiences, enabling in-depth understanding of how interaction, creative decision-making, and relationships among learners, educators, and AI systems were negotiated in art learning practice. In this stage, ChatGPT functioned as a conceptual dialogue partner to interpret and develop the meaning of learning themes, while Canva served as a medium for exploring composition and visual representation. In this enactment, visual artefacts were not treated as direct AI outputs but as learners' interpretations; therefore, observation focused on how learners interpreted, selected, and transformed these possibilities into artistic decisions.

Interpretive Analysis

As a deeper interpretive process, interpretive analysis was conducted to understand the meaning of learning practices and participant interactions within their context, so that the analysis did not merely describe events but interpreted the formation of learning experiences (Merriam & Tisdell, 2016). The framework of posthuman pedagogy was then applied to interpret enactment practices, particularly in understanding the distribution of agency between human and non-human actors in human–AI co-creativity. This approach understands creative decisions, artistic control, and creative intention not as belonging to a single actor but as outcomes of relational negotiation developing throughout the learning process. Through the lens of posthuman pedagogy, learning experiences were interpreted as emerging from the entanglement of learners, educators, AI systems, processes and

visual representations produced during learning activities, and the art learning context itself, preventing the reduction of learning to individual activity or mere technology use. Within this framework, AI was positioned as a non-human pedagogical actor that actively influenced directions of creative exploration, stimulated reflection, and shaped learning experiences without being assumed fully autonomous; its influence primarily occurred in meaning formation and creative decision-making rather than direct visual production. This approach enabled human–AI co-creativity to be understood as a relational pedagogical practice that generates educational values such as reflectivity, ethical awareness, and a rethinking of creativity, rather than merely the application of technology in art education.

3. Results and Discussion

Needs & Phenomenon Analysis: Human–AI Co-Creativity as a Pedagogical Problematization

The needs and phenomenon analysis within the Educational Design Inquiry (EDI) framework was conducted through a Systematic Literature Review (SLR) as an initial step to map emerging learning phenomena and identify pedagogical needs prior to the development of the learning design (Grant & Booth, 2009). At this stage, the SLR was not treated as a descriptive literature review but as an analytical approach to examine pedagogical problems, conceptual patterns, and epistemological tensions accompanying the involvement of artificial intelligence in art learning. Analytical attention was directed toward changes in learning relations resulting from the presence of AI in creative processes, which reconfigure interaction structures in learning and generate tensions concerning the distribution of agency, artistic control, and the meaning of creativity. These conditions position human–AI co-creativity as a dynamic and contextual negotiation of agency while also revealing the limitations of conventional pedagogical approaches that remain humanist-instrumental in orientation. Accordingly, the needs and phenomenon analysis through the SLR was

intended to formulate the need for a relational pedagogical design as a conceptual response to the dynamics of human–AI co-creativity, ensuring that the subsequent development of the learning design was grounded in reflective and epistemic considerations rather than a mere inventory of literature.

Table 1. Repositioning AI in Art Education as a Pedagogical Actor

Aspect	Phenomenon	Supporting references
AI beyond an instructional tool	AI is no longer positioned merely as a medium or technical support tool but actively participates in students’ ideation and creative exploration processes.	Vartiainen et al. (2023); Jiang (2025)
Influence on creative exploration	The presence of AI influences the direction of creative exploration by providing visual, textual, or conceptual possibilities that shape the pathways of artistic creation.	Vartiainen et al. (2023); Xu (2025)
Aesthetic decision-making	AI outputs and responses affect aesthetic decision-making, including the selection of form, visual style, and artistic composition.	Messer (2024); Heaton et al. (2024)
Changes in learning rhythm and logic	Real-time interaction with AI alters the rhythm and logic of learning processes, including the speed of exploration, iterative processes, and students’ creative reflection.	Bian et al. (2025); Xu (2025)
Distribution of agency in learning	Art learning processes demonstrate distributed agency between learners and AI systems, so creative control does not rest entirely with a single human actor.	Vartiainen et al. (2023); Jiang (2025)
AI as a pedagogical actor	Under certain conditions, AI functions as a non-human pedagogical actor that shapes learning experiences and the direction of creative processes rather than merely serving as a production tool.	Heaton et al. (2024); Messer (2024)

The involvement of artificial intelligence in art learning triggers an ontological shift in learning relations, from practices centred on the human subject toward relational and entangled learning processes between humans and technology. AI is no longer positioned merely as a medium or instructional support tool but emerges as a non-human actor participating in students’ ideation and creative exploration. Through repeated interaction, AI contributes to how artistic ideas emerge, develop, and acquire meaning, so that creative exploration cannot be understood solely as an individual activity (Jiang et al., 2025; Vartiainen et al., 2023). Moreover, the presence

of AI provides visual, textual, and conceptual possibilities that simultaneously influence the direction of creative exploration and aesthetic decision-making processes, resulting in artistic authority being distributed between students and AI systems rather than monopolized by the human subject (Heaton et al., 2024; Messer, 2024; Vartiainen et al., 2023; Xu, 2025). This shift marks a fundamental transformation in the structure of art learning relations, where creativity emerges as the result of relational entanglement between humans and technology rather than as a fully autonomous individual expression.

Furthermore, human–AI relations in art learning reshape the rhythm and logic of the learning process as a situated and continuously negotiated practice. Real-time interaction with AI generates intensive iterative patterns, accelerates exploration processes, and transforms how creative reflection is conducted, making learning experiences irreducible to a linear instructional sequence (Bian et al., 2025; Xu, 2025). This condition indicates the presence of distributed agency, in which creative decisions and learning directions emerge from relational entanglement among students, AI, and the learning context (Jiang et al., 2025; Vartiainen et al., 2023). From a

posthuman pedagogical perspective, AI can therefore be understood as a non-human pedagogical actor that contributes to constructing learning experiences and the meaning of art learning (Heaton et al., 2024; Messer, 2024). Overall, these findings demonstrate that AI-based art learning can no longer be interpreted through pedagogical approaches centred solely on human control and instruction but requires a relational pedagogical framework capable of understanding human–AI co-creativity as an entangled learning practice characterized by distributed agency.

Table 2. Co-Creativity as a Relational Process and Negotiation of Agency

Aspect	Phenomenon	Supporting References
Co-creativity as human–AI dialogue	Co-creativity occurs through repeated dialogue between humans and AI, where creative ideas develop through reciprocal responses rather than one-way commands.	Du et al. (2024); Rezwana & Maher (2023)
Iterative creative process	Co-creative practice is characterized by continuous cycles of iteration involving prompting, feedback, revision, and reinterpretation of AI outputs that shape the evolution of creative ideas.	Du et al. (2024); Wang et al. (2025)
Negotiation of creative decisions	Aesthetic and conceptual decisions in co-creative work emerge through negotiation between human preferences and AI system outputs rather than from a single dominant agent.	Vartiainen et al. (2025); Wang et al. (2025)
Distributed agency in co-creativity	Creative agency does not reside solely in humans but is distributed among participants, AI systems, and the interactional context framing the creative process.	Rezwana & Maher (2023); Vartiainen et al. (2025)
AI not a fully autonomous agent	AI contributes creatively but remains dependent on human framing, prompting, and interpretation, and therefore cannot be understood as a fully autonomous creative agent.	Guo et al. (2025); Rezwana & Maher (2023)
Situational and dynamic human–AI relations	Forms of collaboration and distribution of agency in co-creativity are situational and change according to task context, user experience, and AI system configuration.	Wang et al. (2025); Salma (2025)
Co-creativity as a relational practice	Co-creativity is understood as a relational practice formed through the entanglement of humans and	Rezwana & Maher (2023); Du et al. (2024)

technology rather than the sum of contributions
from two separate entities.

Co-creativity is understood as a human–AI dialogue occurring through repeated and reciprocal interaction rather than a one-way instructional mechanism. Through this dialogue, creative ideas develop progressively as a result of exchanges between humans and AI systems (Du et al., 2024; Rezwana & Maher, 2022). This dialogue is manifested in an iterative creative process characterized by continuous cycles of prompting, feedback, revision, and reinterpretation of AI outputs that shape the evolution of creative ideas over time (Du et al., 2024; Wang et al., 2025). Along this iterative process, creative decisions—both aesthetic and conceptual—are not produced by a single dominant agent but emerge through negotiation between human preferences and AI system outputs, so that creative directions and decisions evolve through ongoing deliberation within human–technology relations (Vartiainen et al., 2025; Wang et al., 2025). Ultimately, co-creativity marks a shift in the understanding of creativity from an individual activity toward a collaborative practice shaped by human–technology relations.

Such co-creative relations indicate that agency in co-creativity is distributed, where creative control does not reside entirely with humans but is shared among learners, AI systems, and the interactional context framing the creative process (Rezwana & Maher, 2022; Vartiainen et al., 2025). Nevertheless, AI cannot be understood as a fully autonomous agent, since its contribution remains dependent on problem framing, prompt design, and human interpretation of the generated outputs (Guo et al., 2025; Rezwana & Maher, 2022). This distribution of agency is situational and dynamic, changing according to task context, user experience, and the configuration of the AI system used, so that forms of human–AI collaboration are never fixed or universal (Salma et al., 2025; Wang et al., 2025). Accordingly, co-creativity is conceptually understood as a

relational practice formed through the entanglement of humans and technology rather than the sum of contributions from two separate entities (Du et al., 2024; Rezwana & Maher, 2022). This understanding aligns with posthuman pedagogy, which views learning as a relational process grounded in the entanglement of human and non-human agency (Le Grange & Du Preez, 2023), where co-creativity is interpreted not as the outcome of a single subject's control but as a learning practice negotiated situationally and dynamically.

Based on this relational understanding and the distributed nature of agency in co-creativity, humanist–instrumental pedagogical approaches become problematic because they position artificial intelligence merely as a technical tool rather than as a partner in students' creative exploration and decision-making. Such frameworks maintain a pedagogical relation centred on the human subject as the primary decision-maker and therefore struggle to interpret AI-based learning that actively shapes learning processes, directions, and experiences (Holmes et al., 2022; Knox, 2020). The absence of explicit pedagogical guidance for involving educators and learners collaboratively in learning design further limits the suitability of this approach for the situational and dynamic complexity of human–AI relations (Carvalho et al., 2022). Moreover, humanist–instrumental approaches provide little conceptual space for recognizing non-human agency in learning practice, causing the negotiation of agency—central to relational co-creativity—to be overlooked (Yue Yim, 2024). These conditions reinforce the relevance of posthuman pedagogy, which understands learning as an entanglement of human and non-human agency, positioning AI not as a neutral tool but as a constitutive element of pedagogical relations that must be addressed through relational learning design.

Table 3. Conceptual Need for a Relational Pedagogical Framework

Aspect	Need	Supporting References
Negotiation of human–AI agency	A pedagogical framework is required that explicitly facilitates the negotiation of agency between humans and AI in collaborative learning processes rather than assuming singular control by one actor.	Järvelä et al. (2023); Nguyen (2024)
Regulation and facilitation of the educator’s role	Repositioning the educator’s role is needed as a co-regulation facilitator and mediator of human–AI relations, rather than merely a user or supervisor of technology.	Järvelä et al. (2023); Nguyen (2024)
Ethical reflection on AI use	The absence of explicit pedagogical guidance necessitates learning designs that integrate ethical reflection as part of the learning process rather than as an additional rule outside classroom practice.	Ho (2025); Parker (2024)
Learner agency in co-creative practice	Task and activity designs are needed that enable learners to reflect on, maintain, and negotiate their agency while working with AI.	Aljabr (2024); Nguyen (2024)
Critical literacy toward AI	A relational pedagogical framework is necessary to develop critical literacy that helps learners and educators understand, evaluate, and respond to the role of AI reflectively.	Aljabr (2024); Lim & Darvin (2025)
Pedagogical propositions approach	A pedagogical approach based on pedagogical propositions—adaptive and contextual design principles—is required instead of standardized models that generalize AI-based learning practices.	Parker (2024); Ho (2025)

The conceptual need for a relational pedagogical framework arises from the absence of explicit pedagogical guidance for managing human–AI relations in collaborative learning. Such relations require the facilitation of human–AI agency negotiation, since learning processes can no longer be assumed to remain under exclusive human control but instead occur through the entanglement of decisions among humans, AI systems, and the learning context. This condition directly implies a repositioning of the educator’s role, from an instructional controller to a facilitator of co-regulation and a mediator of human–AI relations who guides learning processes without dominating creative decisions

(Järvelä et al., 2023; Nguyen et al., 2024). Furthermore, the lack of clear guidelines necessitates the integration of ethical reflection on AI use into learning design, so that ethical considerations are not treated as external rules but as inherent elements of students’ learning experiences (Ho & Lee, 2025; Parker et al., 2025). These needs highlight the importance of a relational pedagogical framework that not only regulates AI use but deliberately designs learning conditions facilitating agency negotiation, educator roles, and ethical reflection as integral components of human–AI learning practice.

The need for a relational pedagogical framework is also connected to maintaining learners’ agency

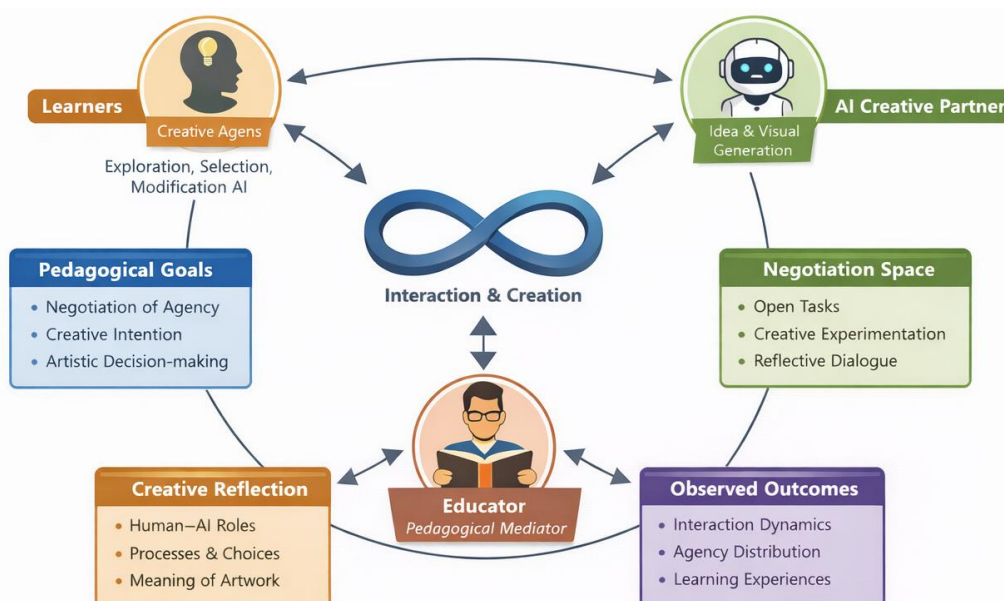
in co-creative practice, particularly through task and activity design that enables learners to reflect on, sustain, and negotiate their roles while working with AI (Aljabr & Al-Ahdal, 2024; Nguyen et al., 2024). Such efforts must be supported by the development of critical AI literacy so that educators and learners can understand, evaluate, and respond to the role of AI reflectively within the learning process (Aljabr & Al-Ahdal, 2024; Lim & Darvin, 2026). Collectively, these needs indicate that the required pedagogical approach is not a universal standardized model but pedagogical propositions in the form of adaptive and contextual learning design principles open to agency negotiation and ethical reflection in AI-based learning practices (Ho & Lee, 2025; Parker et al., 2025). Accordingly, learning design should be understood as a relational pedagogical intervention articulated as pedagogical propositions rather than a fixed instructional procedure, in order to respond to the contextual and evolving dynamics of human–AI co-creativity.

Design-Oriented Inquiry: Pedagogical Proposition for Human–AI Co-Creative Learning

Based on the findings from the Needs & Phenomenon Analysis stage, human–AI co-

creativity in art learning is understood as a relational, iterative, and distributed-agency learning practice in which AI no longer functions merely as an instructional tool but appears as a non-human actor shaping ideation processes, aesthetic decision-making, learning rhythms, and the meaning of creativity (Holmes et al., 2022; Salma et al., 2025; Zhang & Xu, 2025). This shift in learning relations generates pedagogical tensions related to agency negotiation, the repositioning of the educator's role, and the integration of ethical reflection that cannot be adequately addressed through humanist–instrumental pedagogical approaches. Literature analysis also indicates the absence of explicit pedagogical guidance for managing the situational and contextual dynamics of human–AI co-creativity, thereby requiring the development of a learning design that is neither prescriptive nor a standardized model (Carvalho et al., 2022; Yue Yim, 2024). In response to this need, the Design-Oriented Inquiry stage positions learning design as a pedagogical proposition (Sandoval, 2014), namely a relational pedagogical intervention intentionally designed to facilitate agency negotiation, ethical reflection, and human–AI co-creative practice, as represented in the conceptual learning design model.

Figure 1. Human–AI Co-Creative Learning Design as a Pedagogical Proposition



The learning design represented in the conceptual model positions learners as creative agents who actively participate in the creative process rather than passive users of AI systems. Learner agency is manifested through activities of exploring creative possibilities, selecting and evaluating AI outputs, and interpreting and processing AI-generated possibilities as part of conscious creative decision-making grounded in artistic intention (Kantosalo & Toivonen, 2021; Zeivots et al., 2025). Within this relation, AI is positioned as a creative partner contributing idea generation, visual variation, and conceptual possibilities that expand learners' creative exploration space. AI's contribution is not understood as fully autonomous agency, as it remains responsive to human prompts, framing, and interpretation (Ge & Shin, 2026; Holmes et al., 2022; Zhang & Xu, 2025). Accordingly, this design affirms that creative decisions remain within the human reflective domain, while AI functions as a partner enriching the co-creative process without replacing the role of creative decision-maker.

Building on the active involvement of learners and AI as co-creative agents, the learning design

presented in the conceptual model places Interaction & Creation as the core space of pedagogical enactment. In this space, learning occurs through iterative and dialogic human–AI interaction, where creative ideas develop gradually through cycles of exploration, feedback, revision, reinterpretation, and artistic decision-making (Davis et al., 2025; Rezwana & Maher, 2022). Each AI output is not treated as a final result but as a trigger for reflection and creative decision-making that requires evaluation, interpretation, and redirection by learners (Kantosalo & Toivonen, 2021). Consequently, the creative process is understood not as a sequence leading to a final product but as a relational practice evolving through the entanglement of human and AI contributions, with Interaction & Creation functioning as a pedagogical medium facilitating exploration, reflection, and negotiation of meaning throughout the learning experience. To ensure that this co-creative Interaction & Creation process occurs consciously and is pedagogically supported, the design also formulates Negotiation Space as an explicitly designed pedagogical condition.

Table 4. Negotiation Space Design as a Pedagogical Condition

Negotiation Aspect	Design Characteristics	Pedagogical Function
Relational pedagogical space	The learning space is intentionally designed to facilitate the negotiation of agency between humans and AI.	Prevents the dominance of a single agent and enables the entanglement of creative decision-making.
Open tasks	Tasks are non-prescriptive and allow multiple pathways of exploration and creative experimentation.	Provides interpretive freedom and encourages creative exploration.
Human–AI experimentation	Interaction with AI is positioned as an iterative and exploratory trial-and-error practice.	Enables learning through failure, revision, and discovery.
Continuous reflective dialogue	Reflection is integrated throughout the process rather than only at the end.	Helps learners become aware of their choices, the role of AI, and the meaning of creative decisions.

Negotiation Space is designed as a pedagogical condition that intentionally frames how human–AI co-creativity unfolds in learning. A relational pedagogical space enables the negotiation of

agency between humans and AI, so that the creative process is not dominated by a single agent but formed through the entanglement of creative decisions (Heaton et al., 2024; Vartiainen

& Tedre, 2023). The open-task structure allows learners to pursue multiple pathways of exploration and creative experimentation while encouraging personal interpretation of AI outputs. Human–AI experimentation is positioned as a legitimate trial-and-error practice, where failure, revision, and discovery are understood as integral parts of learning. Continuous reflective dialogue ensures that learners focus not only on outcomes but also become aware of their choices, the role of AI in creative decision-making, and the meaning of negotiated creative decisions throughout the learning experience (Dai & Lai, 2025; Lin & Tan, 2025). These pedagogical conditions are then guided by process-oriented learning objectives formulated explicitly as Pedagogical Goals serving as the orientation of the learning design.

Table 5. Pedagogical Goals as the Orientation of Learning Design

Goal Orientation	Pedagogical Focus	Conceptual Meaning
Process-oriented learning	Learning objectives emphasize the co-creative process rather than the final product	Positions learning as an experiential and reflective practice
Negotiation of agency	Learners are encouraged to recognize and negotiate their roles with AI	Develops relational awareness of human–AI relations
Creative intention	Learning encourages the formation of consciously articulated creative intentions	Affirms the human role as the creative decision-maker
Reflective artistic decision-making	Learners reflect on and take responsibility for their artistic choices	Connects creativity with reflection and meaning

Pedagogical Goals are formulated as learning design orientations that explicitly place the co-creative process at the centre of the learning experience rather than prioritizing the final artwork. The process orientation emphasizes learning as a reflective practice developing through learners’ active involvement in exploration and creative decision-making with AI. The focus on agency negotiation encourages learners to become aware of and negotiate their roles in human–AI relations, making relational awareness itself part of the learning objectives (Dai, 2025; Gravett et al., 2024). Furthermore, the development of creative intention encourages learners to articulate and sustain conscious artistic purposes, while reflective artistic decision-making requires learners to reflect upon and justify the creative choices made throughout the process (Dai & Lai, 2025; Vartiainen et al., 2023). Collectively, these objectives position creativity not merely as the ability to produce artworks but as a meaningful practice connected to reflection, agency, and the interpretation of learning experiences.

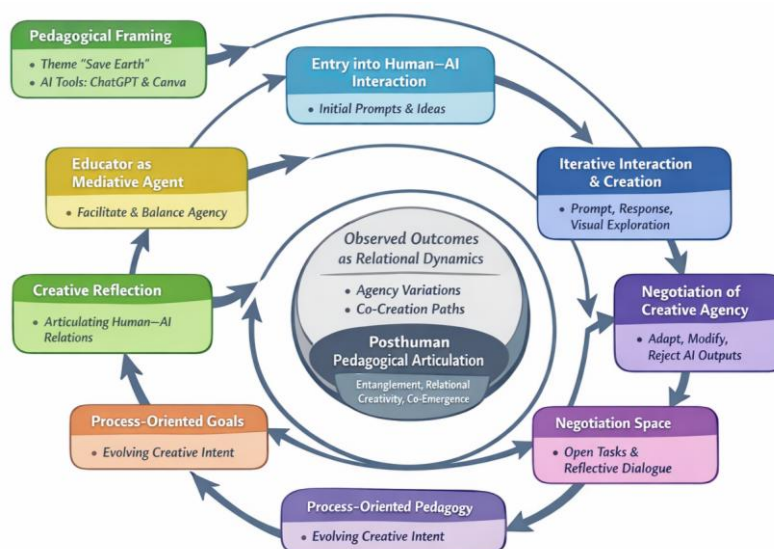
Based on these process-, reflection-, and agency-oriented learning goals, the educator’s role is positioned as a Pedagogical Mediator who facilitates interaction and pedagogical dialogue rather than controlling instruction. This mediating role is enacted through opening spaces for reflection, maintaining a balance of human–AI agency, and guiding pedagogical dialogue that helps learners become aware of their processes and creative choices without dictating artistic decisions (Creely & Carabott, 2025). This role is intertwined with creative reflection, which directs learners to examine the roles of humans and AI, reflect on processes and decisions taken, and interpret the artwork as a learning experience (Henriksen et al., 2016; Vartiainen et al., 2023). In line with this, observed outcomes are not understood merely as artefact-based instructional success but as observable dynamics of interaction and agency distribution throughout the process, including learning experiences, patterns of human–AI collaboration, and how learners interpret their co-creative practice.

Overall, Design as Pedagogical Intervention positions learning design not as a standardized model or prescriptive instructional procedure but as a pedagogical proposition intentionally created to address the complexity of human–AI co-creativity as a relational learning practice. By situating learners, AI, and educators as agents with different yet interconnected roles and forms of agency, the design frames learning as an enactment process occurring through iterative and dialogic Interaction & Creation, facilitated by Negotiation Space as a pedagogical condition enabling agency negotiation and continuous reflection. The orientation of Pedagogical Goals directs learning toward process, creative intention, and conscious artistic decision-making, while the educator's role as a pedagogical mediator and the practice of creative reflection ensure that learning experiences are interpreted reflectively and ethically. By understanding observed outcomes as dynamics of interaction and distributed agency, the design affirms AI-based art learning as a contextual, open, and ongoing practice, functioning not to control co-creative results but to create pedagogical conditions that allow human–AI co-creativity to develop meaningfully.

Enactment and Interpretive Analysis (Posthuman Pedagogy): Negotiation of Agency in Co-Creative Practice

The enactment stage is positioned as a pedagogical space in which the learning design functions as a pedagogical proposition lived in practice rather than an instructional procedure tested for effectiveness (Cobb et al., 2003). Through a practice-based qualitative study approach, this stage enables examination of how human–AI co-creativity unfolds situationally in art learning contexts, including the relational dynamics and agency negotiation accompanying it. Implementation consisted of three learning sessions involving 30 undergraduate students from the Art Education Study Program at Universitas Negeri Surabaya, engaging in exploration and development of digital illustration visual representations using ChatGPT as a co-ideation partner and Canva as a co-visual partner. Participants were selected purposively because they possessed basic digital literacy and pedagogical experience, enabling reflective engagement in co-creative practice and conscious negotiation of AI roles. Enactment was analysed interpretively using posthuman pedagogy as the primary lens, which views learning as an entanglement between human and non-human actors, focusing on relational dynamics rather than final artefacts.

Figure 2. Posthuman Pedagogical Enactment in Human–AI Co-Creativity



Based on learning evaluations across the three enactment sessions, Interaction & Creation emerged through direct engagement between learners and artificial intelligence as an integral component of learning rather than a linear stage merely realizing an initial plan. This process can be understood through frameworks of co-creativity (Davis et al., 2025; Karimi et al., 2019) and distributed agency (Glăveanu, 2014), which interpret creativity as arising from relations between humans and computational systems. Activities of exploring and developing digital illustration visual representations were framed by the conceptual theme *Save Earth*, serving as an initial generative constraint, then negotiated through the use of ChatGPT as a co-ideation partner and Canva as a co-visual partner. Co-creative practice unfolded iteratively through formulating and revising prompts in ChatGPT, evaluating generated responses, and translating visual ideas through Canva, so that AI outputs were not treated as final answers but as material for subsequent visual decisions. The *Save Earth* theme was interpreted diversely and did not produce uniform visual representations because AI outputs at different moments functioned as conceptual references, triggers for alternative exploration, or shifts in visual decision directions. This pattern indicates that creativity developed as a relational process emerging from repeated interaction, feedback, and reinterpretation between learners and AI systems in visual decision-making.

These relational interaction patterns also demonstrate that creative agency in enactment practice was neither stable nor permanently owned by a single actor but continuously negotiated through learners' interaction with AI while interpreting the *Save Earth* theme. This understanding aligns with socio-material practice perspectives, which view creative action as arising from connections among humans, technology, and representational artefacts rather than from an individual subject alone (Johri, 2022; Scott & Orlikowski, 2025). At certain moments, creative decisions temporarily shifted toward ChatGPT when conceptual responses or visual narratives suggested particular environmental perspectives;

however, these decisions were renegotiated when learners translated them into visual decisions through Canva exploration. Pedagogical tension emerged when ChatGPT outputs presented conceptually strong or easily visualized *Save Earth* representations that did not fully align with learners' initial creative intentions, forcing choices to follow, modify, or reject AI-suggested directions. Awareness of this dynamic became evident when learners began to reflect on the roles of ChatGPT and Canva not as meaning-determining authorities but as creative partners whose contributions required critical consideration. Accordingly, agency in human–AI co-creative practice appeared as situationally negotiated through the relation among learners, the *Save Earth* theme, and AI, depending on task context, creative intention, and interaction dynamics rather than as a fixed attribute of either humans or AI systems.

Co-creative dynamics were significantly shaped by the role of Negotiation Space, designed as a pedagogical condition facilitating agency negotiation between learners and AI in creative decision-making. This perspective aligns with relational pedagogy, which views learning design not as behaviour control but as configuring conditions enabling action and meaning to emerge through human–technology interaction (Holmes et al., 2022; Sperling et al., 2024). Open-task characteristics allowed creative ambiguity and exploratory courage, enabling learners to pursue diverse creative decision paths despite working within the same *Save Earth* design framework. ChatGPT functioned as a co-ideation partner continuously negotiated through prompt dialogue and conceptual responses, while Canva acted as a co-visual partner mediating translation, testing, and reinforcement of visual decisions. Reflective dialogue integrated throughout the process served as a reframing mechanism helping learners reconsider creative choices and reflect on how ChatGPT and Canva influenced decision directions. Variations in co-creative pathways demonstrate that learning design did not determine outcomes but created contextual conditions for agency negotiation; diversity in practice and results therefore indicated not design

inconsistency but an actively lived relational pedagogical space.

Based on reflections after each enactment session, the orientation of pedagogical goals was not manifested as measurable achievement indicators but as a process orientation during learning. This aligns with process-oriented education perspectives that position learning objectives as directions of experience rather than fixed targets, where meaning emerges through learners' engagement with learning situations (Biesta, 2021). Learners demonstrated varying awareness of agency negotiation in interactions with ChatGPT and Canva, with some explicitly reflecting on changes in creative intention resulting from conceptual dialogue with ChatGPT and visually mediated decisions through Canva. In several cases, initial creative intentions were questioned and reformulated as co-creative processes unfolded, indicating that learning objectives evolved through human–AI relations, consistent with AI-in-education studies viewing intelligent systems as cognitive partners influencing learners' thinking and decision-making (Latif et al., 2026; Amin et al., 2025; Zhang & Aslan, 2021). Learners' interpretations of artistic decisions made with ChatGPT and Canva reflected a shift in understanding creativity from an individual activity to a relational practice involving reflective, ethical, and contextual considerations as integral learning experiences.

Consistent with the learning orientation emphasizing reflection and agency negotiation, the educator's role in enactment did not manifest as directing artistic decisions but as a mediating agent framing pedagogical conditions in which human–AI co-creativity occurred (Creely & Carabott, 2025; Järvelä et al., 2023; Nguyen et al., 2024). This role was enacted through formulating the learning theme as a starting point for co-creative exploration and selecting AI systems—ChatGPT as co-ideation partner and Canva as co-visual partner—as part of learning condition configuration rather than control over creation processes. Subsequent educator interventions were selective, opening reflective space, helping learners recognize agency dynamics in AI interaction, and maintaining creative uncertainty as a productive pedagogical condition. At certain moments, deliberate non-intervention functioned as a pedagogical strategy allowing learners to assume full creative responsibility. These findings indicate that pedagogical agency lies not in instructional control over process or outcome but in the educator's sensitivity in managing relations, interaction rhythms, and learning conditions contextually (Creely & Carabott, 2025; Hong et al., 2025). Such pedagogical conditions enable the emergence of creative reflection as an epistemic practice, in which learners produce posthuman meaning through articulating human–AI relations within co-creative processes.

Table 6. Human–AI Co-Creative Reflection as the Production of Posthuman Meaning

Reflection Aspect	Analytical Description	Practice Indicators
Reflection as an epistemic practice	Reflection is positioned as a process of knowledge formation about co-creativity rather than merely self-evaluation or assessment of the artwork.	Learners reflect on interaction processes, decision-making, and creative dynamics.
Articulation of human–AI relations	Reflection is used to recognize and articulate the position of AI within the creative process.	Learners explain the roles of ChatGPT and Canva in idea development and visual representation.
Non-hierarchical relational language	A shift emerges from instrumental language toward dialogical relational language.	AI is positioned as a creative partner rather than merely a tool.

Awareness of distributed agency	Creativity is understood as arising from the entanglement of human and non-human agency.	Reflections refer to negotiation, tension, and role distribution.
Reinterpretation of creativity	Creativity is interpreted as a relational practice rather than an autonomous individual expression.	Creativity assessment focuses on process rather than only the product.
Posthuman awareness in learning	Reflection demonstrates recognition of technology's role in shaping learning experiences.	Learners relate creative decisions to the human–AI–context relationship.

Creative reflection in human–AI co-creative practice functions as an epistemic practice that enables learners to construct knowledge about the creative process they experience, rather than merely evaluating themselves or judging the quality of the final artwork. This aligns with the view of reflection as an epistemic practice—an activity that helps learners understand how knowledge and decisions are formed through learning experiences, not only as evaluative metacognitive activity (Atenas et al., 2025; Wei et al., 2025). Through reflection, learners become aware of and articulate their relationships with ChatGPT and Canva, reflected in a shift of language from instrumental relations toward dialogical and non-hierarchical relations in which AI is positioned as a creative partner. Reflection also reveals awareness of distributed agency, as creativity is understood as emerging from the entanglement of human intentions and the contributions of non-human actors negotiated throughout the creative process, as discussed in AI-in-education research showing that interaction with intelligent systems shapes learners' attention, reasoning, and decision-making (Guo et al., 2025; Mouta et al., 2025). The reinterpretation of creativity as a relational practice is evident in learners' focus on decision-making processes and interaction dynamics rather than solely on the final product. Overall, reflective accounts indicate the emergence of posthuman awareness in learning, where technology is recognized as a constitutive element shaping learning experiences and co-creative practice in AI-based art education.

This reflective understanding is directly intertwined with how the study interprets observed outcomes as relational dynamics rather than product quality. Such an approach aligns with design-for-learning and socio-material learning frameworks, which view learning outcomes as traces of activity arising from learners' interactions with tasks and artefacts rather than the direct realization of instructional goals (Gachago et al., 2024). Observed outcomes are understood as traces of pedagogical enactment throughout the human–AI co-creative process, including the distribution of agency between learners and ChatGPT–Canva, divergent creative exploration pathways, and situationally evolving learning experiences. Variations in decisions and visual representations are not treated as deviations but as indicators that the learning design functions as a relational intervention opening space for negotiation, reflection, and contextual creative decision-making. These variations demonstrate how creative intentions change through repeated interaction with AI, consistent with AI-in-education studies showing that intelligent systems provide feedback and scaffolding shaping learners' reasoning and learning actions (Farhood et al., 2025; Latif et al., 2026). Consequently, observed outcomes are interpreted as pedagogical dynamics revealing how human–AI co-creativity is negotiated and reflectively understood, while also demonstrating the negotiation of posthuman pedagogical principles in AI-based art learning practice.

Table 7. Principles of Posthuman Pedagogy in the Enactment of Human–AI Co-Creativity

Posthuman Pedagogy Principle	Manifestation in Learning Enactment	Pedagogical Implication
Learning as the entanglement of human and non-human agency	Learners' interaction with AI shapes learning processes relationally and situationally	Learning is understood as relational rather than solely a human-centered activity
Creativity as a relational practice	Ideas, aesthetic decisions, and creative direction emerge through dialogue, iteration, and negotiation between human and AI	Creativity is not reduced to individual expression but viewed as a co-creative process
Distributed and negotiated agency	Creative decisions shift and are negotiated between learners and AI	Agency is understood as dynamic rather than a fixed attribute of one actor
Pedagogical design as a condition of enactment	Learning design opens a Negotiation Space without determining final outcomes	Design functions as an enabling condition rather than an instrument of instructional control
Reflection as an epistemic practice	Creative reflection is used to interpret human–AI relations and learning processes	Pedagogical knowledge is produced through reflection rather than product evaluation
Co-creativity as a pedagogical practice	Human–AI co-creativity is positioned as a reflective learning experience	AI is understood as a non-human pedagogical actor rather than merely a supporting technology

Posthuman pedagogy in this enactment is articulated through the entanglement of human and non-human agency shaping learning processes relationally and situationally, consistent with posthuman perspectives that view learning as emerging from human relationships with technology and material artefacts rather than purely individual cognitive activity (Keune, 2024; Rosiek et al., 2024). Learners' interaction with AI produces creativity as a relational practice in which ideas, aesthetic decisions, and creative directions evolve through ongoing dialogue, iteration, and negotiation. Agency in this context is not fixed within a single actor but distributed and negotiated throughout the learning process, consistent with AI-in-education research demonstrating that intelligent systems provide scaffolding and feedback influencing learners' reasoning and decisions (Farhood et al., 2025;

Latif et al., 2026). Pedagogical design functions as a condition of enactment that opens a Negotiation Space without controlling final outcomes, enabling contextual variation in co-creative practice (Holmes et al., 2022). Creative reflection operates as an epistemic practice producing pedagogical knowledge through interpreting human–AI relations rather than evaluating products alone (Atenas et al., 2025). Altogether, these dynamics affirm human–AI co-creativity as a reflective pedagogical practice in which AI functions as a non-human pedagogical actor actively shaping learning experiences.

4. Conclusion

This study concludes that human–AI co-creativity in art education constitutes a relational pedagogical practice occurring through processes of exploration and creative decision-making, and therefore cannot be adequately understood

through conventional instructional approaches or product-based evaluation alone. The needs and phenomenon analysis indicates that the presence of AI shifts art learning relations toward a dynamic distribution of agency, requiring a pedagogical framework capable of facilitating negotiation of roles, creative authority, and the meaning of creativity. Through learning design as a pedagogical proposition, the practices of Interaction & Creation, Negotiation Space, and process-oriented Pedagogical Goals enabled human–AI co-creativity to be experienced reflectively during enactment. Enactment findings demonstrate that creativity emerges as a relational practice developing through dialogue, iteration, and situated negotiation among learners, AI, and the learning context, with the educator acting as a mediating agent who frames learning conditions without controlling learners’ artistic decisions. Creative reflection functions as an epistemic practice that produces posthuman meaning, while Observed Outcomes are understood as relational dynamics recording variations in co-creative pathways and distributions of agency rather than measures of success based on the quality of artworks or visual artefacts. Overall, the findings affirm that posthuman pedagogy in the enactment of human–AI co-creativity is articulated through the entanglement of human and non-human agency, creativity as a relational practice, and pedagogical design as an enabling condition positioning AI as a mediator of creative possibilities and humans as artistic decision-makers in art learning in the era of artificial intelligence.

The implications of this study position posthuman pedagogy as a lens for designing AI-based art learning focused on negotiating agency and human–AI creative relations, while also providing a conceptual foundation for developing reflective, relational, and ethical art curricula in response to AI involvement. Theoretically, the study reconceptualizes human–AI co-creativity in art education not as collaborative artefact production but as a relational pedagogical practice occurring through interpretation, dialogue, and AI-mediated artistic

decision-making. The findings extend the framework of posthuman pedagogy by showing that agency in learning is not owned by a single subject but is situationally negotiated through the entanglement of learners, educators, AI systems, and task contexts, with AI functioning as a mediator of creative possibilities shaping learning experiences. Practically, the study offers an Educational Design Inquiry–based learning design framework that operationalizes posthuman pedagogical principles through enactment conditions such as Interaction & Creation, Negotiation Space, sustained creative reflection, and the educator’s role as a relational mediator. This framework provides conceptual and pedagogical guidance for art educators in designing AI-based activities oriented not merely toward visual outcomes but toward developing agency awareness, critical technological literacy, and reflective artistic decision-making in learning practice.

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Confirm originality of work

The authors declare that this manuscript is original, has not been published previously, and is not under consideration for publication by any other journal. The work is free from plagiarism, and all sources and contributions of others have been appropriately acknowledged in accordance with academic and publication ethics.

Data availability statement

The datasets generated and analyzed during the current study are not publicly available due to ethical considerations and the protection of participant confidentiality but are available from the corresponding author upon reasonable request.

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