

Article

Developing Cognitive Imagination through Narrative Visualization in Pre-Service Primary School Teacher Education

Ok-Hee Jeong 

Art Education Department, Jeonju National University of Education, Jeonju 55101, Republic of Korea;
ohjeong@jnue.kr

Received: 30 June 2026; **Revised:** 22 July 2026; **Accepted:** 10 August 2026; **Published:** 15 September 2026

Abstract: This study explores how cognitive imagination is developed through narrative visualization in pre-service primary teacher education. Situated in the course Drawing Materials and Expression, the study examined five pre-service primary teachers who constructed self-narratives and transformed them into multimodal visual stories. A multimodal qualitative case study design was employed, drawing on students' narrative visualization works, embedded written texts, visual sequences, material expression, observation notes, and interview data. The analysis focused on how participants reorganized lived experience, transformed emotions into sensory and symbolic forms, adopted alternative perspectives, and connected artistic expression to future pedagogical practice. Four major findings emerged. First, participants reconstructed personal experiences into relational narratives of belonging, vulnerability, self-acceptance, and return. Second, they visualized inner emotions through color, texture, symbol, scale, space, and page sequence, which supported metacognitive awareness and emotional regulation. Third, the use of objects, animals, fictional characters, and imagined worlds enabled participants to view experience from alternative perspectives and construct possible worlds. Fourth, participants developed pedagogical imagination by considering how narrative visualization could support children's emotional understanding, empathy, self-expression, and creative confidence in elementary art education. The study concludes that narrative visualization is not merely an art-making activity but a cognitive and pedagogical process through which pre-service teachers reinterpret experience, regulate emotion, imagine other perspectives, and coordinate multiple expressive modes. These findings suggest that narrative visualization can serve as a meaningful approach for developing reflective, multimodal, relational, and pedagogical imagination in primary teacher education.

Keywords: Cognitive Imagination; Narrative Visualization; Pre-Service Primary Teachers; Visual Thinking; Art Education; Qualitative Case Study

1. Introduction

Imagination has increasingly been discussed in teacher education not as a merely fanciful or decorative capacity, but as a way of reorganizing experience, constructing possible meanings, and preparing teachers to respond to uncertain classroom situations. In educational contexts, imagination enables learners and teachers to connect experience with future possibility, to interpret situations from multiple perspectives, and to transform existing knowledge into new forms of understanding [1]. Recent studies on pre-service teachers have extended this view by examining imagination in relation to scientific reasoning, moral judgment, creativity, and curriculum reconstruction [2,3]. However, research on creativity and pre-service teachers remains conceptually dispersed, suggesting the need for more focused studies on how imaginative thinking is formed through specific pedagogical practices [4].

This issue is particularly important in primary teacher education. Pre-service primary teachers are expected to support children's expressive development, emotional understanding, visual literacy, and creative meaning-making across subject areas. Yet many teacher education programs still tend to treat art primarily as technique, classroom activity, or completed product rather than as a process through which experience and thought are actively reconstructed. Recent research on art-based pre-service teacher education has shown that visual journaling, drawing, and visual autoethnographic practices can support reflexivity, teacher identity formation, and the development of teaching philosophies [5,6].

Despite the growing interest in imagination, creativity, visual literacy, and arts-based teacher education, relatively little attention has been given to how pre-service primary teachers' self-narratives are transformed into multimodal visual narratives and how this transformation reveals cognitive imagination. Fewer studies have analyzed completed narrative visualization works together with interview reflections to identify how cognitive imagination operates across narrative, visual, material, emotional, and pedagogical dimensions.

In this study, narrative visualization is proposed as a distinctive pedagogical practice for developing cognitive imagination in pre-service primary teachers. Narrative visualization refers to the process of constructing a self-narrative and transforming it into a visual story through image, written language, color, texture, material expression, spatial composition, and sequence. Its uniqueness lies in the combination of three elements: self-narrative, visual-material transformation, and pedagogical reflection. Through this process, participants do not simply illustrate a story that has already been formed in language. Instead, they reorganize experience through multimodal composition, allowing meaning to emerge through the interaction of verbal, visual, spatial, material, and sequential modes.

This study draws first on narrative understandings of experience. Narrative inquiry views experience as something organized through temporality, sociality, place, and meaning-making [7]. From this perspective, narrative is not merely a means of reporting experience but a cognitive form through which people select events, connect them causally, and reconfigure their significance [8]. Second, this study draws on visual thinking and multimodal meaning-making. Visual thinking theory emphasizes that images are not secondary illustrations of verbal thought; rather, visual form participates directly in perception, reasoning, and interpretation [9]. Recent work on children's visual narrative compositions also shows that line, color, framing, visual perspective, layout, and image-text relations are significant semiotic resources for meaning-making [10]. In teacher education, visual literacy research similarly emphasizes the need for future teachers to understand how visual forms organize knowledge, emotion, and communication [11]. Third, the study is grounded in a qualitative understanding of experience. Dewey's concept of art as experience foregrounds the continuity between lived experience and artistic form [12]. Eisner and Efland further argue that art education develops forms of cognition that are embodied, perceptual, interpretive, and imaginative [13,14]. In this sense, narrative visualization can be understood as a process through which pre-service teachers think through image, story, material, and relation.

In this study, cognitive imagination is understood as the capacity to reorganize lived or imagined experience, transform invisible emotions and thoughts into perceptible forms, adopt perspectives other than one's own, and construct possible situations beyond immediate reality. Cognitive imagination is therefore not evaluated in terms of artistic originality or technical skill, but examined through the ways that participants selected, sequenced, transformed, and recontextualized experiential and symbolic elements within their multimodal visual narratives.

This study addresses that gap by analyzing narrative visualization works of five pre-service primary teachers in the course Drawing Materials and Expression. The participants constructed self-narratives and transformed them into visual story forms using images, written texts, color, texture, symbolic objects, spatial composition, and sequential arrangement. By examining these works through a multimodal qualitative case study, this research explores how cognitive imagination emerges as a process of narrative reconstruction, symbolic and sensory transformation, perspective-taking, possible-world construction, and pedagogical meaning-making.

The study is guided by the following research questions:

1. How do pre-service primary school teachers construct self-narratives through narrative visualization?
2. What dimensions of cognitive imagination are revealed in their multimodal visual narratives?
3. What educational value does narrative visualization have for pre-service primary teacher education and elementary art education?

By addressing these questions, this study clarifies narrative visualization as a multimodal pedagogical process through which pre-service teachers reinterpret experience, externalize emotion, imagine alternative perspectives, and consider how art can support children's meaning-making.

2. Materials and Methods

2.1. Methodological Orientation and Analytical Framework

This study was grounded in a multimodal qualitative approach to examine how pre-service primary teachers transformed self-narratives into visual stories. The analytical framework was informed by narrative inquiry, visual thinking, multimodal meaning-making, and arts-based teacher education. Narrative inquiry provided a way to understand how participants organized lived experience through temporality, relationality, and meaning-making [7]. Visual thinking supported the interpretation of images as active forms of perception and reasoning rather than as secondary illustrations of verbal thought [9]. Multimodal theory guided the analysis of how written language, image, color, materiality, space, and sequence interacted to produce meaning [15].

Four provisional analytical dimensions were established as sensitizing concepts: narrative reconstruction, symbolic and sensory transformation, perspective-taking and possible-world construction, and pedagogical meaning-making.

These dimensions functioned as sensitizing concepts rather than predetermined coding categories. They guided the initial reading of data, but the final themes were developed through repeated comparison across the five cases and through inductive engagement with the artworks, written texts and interview data. Recent studies on visual inquiry and art-based pre-service teacher education also supported the view that visual works can reveal reflective, affective, and semiotic meaning-making processes [16,17]. The analysis of image-text relations and visual design elements was further informed by recent research on visual narrative composition and pre-service teachers' visual literacy [10,11].

2.2. Research Design

This study employed a multimodal qualitative case study design. A qualitative case study was appropriate because the research focused on a bounded educational context: one studio-based art education course, five consenting participants, and the narrative visualization works produced within that course. Student artworks were treated not as supplementary illustrations, but as primary qualitative data that embodied narrative, emotional, symbolic, material, and pedagogical meanings. This position is consistent with recent research showing that visual journaling, drawing, and visual autoethnographic practices in teacher education can support reflexivity, self-understanding, and the development of teaching philosophies [5,6,16]. A recent collaborative self-study on drawings as pedagogical tools also supports the use of visual production as a way of examining learning, reflection, and pedagogical meaning-making in teacher education [18,19].

2.3. Research Context and Participants

The research was conducted in the course Drawing Materials and Expression, offered to pre-service primary teachers at Jeonju National University of Education. The course was designed to help students explore artistic materials, visual expression, and the educational meaning of art-making. Within this course, students created narrative visualization works based on their own experiences, memories, emotions, relationships, or imagined situations.

Among the students enrolled in the course, five students who voluntarily agreed to participate in the study were selected as research participants. The selection criteria were as follows: first, the student completed a narrative visualization work; second, the work included both visual and narrative components; third, the student provided consent for the work and related written materials to be used as research data. Participation in the research was voluntary and unrelated to course grading. Students who did not participate in the research received the same educational experience and were not disadvantaged in any way.

To protect participants' identities, all names were replaced with participant codes such as P1, P2, P3, P4, and P5. Any identifiable personal information contained in the visual works and written texts, or interview transcripts was removed or anonymized during the analysis and writing process of manuscript preparation.

2.4. Narrative Visualization Task

The central learning activity was a self-narrative-based visualization project. Students were first invited to recall a personal experience, emotional memory, imagined situation, or meaningful relational episode. They then developed the selected experience into a story structure and transformed it into a sequence of visual scenes.

The task encouraged students to explore how a narrative could be expressed through artistic materials and visual devices such as character, setting, color, line, texture, composition, viewpoint, metaphor, symbol, rhythm, and page sequence. Through this process, students were expected to move beyond literal illustration and experiment with how emotions, memories, relationships, and imagined meanings could be made visible through artistic form.

In this task, narrative visualization functioned as both an art-making activity and an inquiry process. It allowed participants to interpret and reconfigure their experiences through the interaction of story, image, material expression, and reflection. This approach is closely related to visual narrative inquiry and arts-based teacher education, in which visual production becomes a way of exploring identity, experience, and pedagogical understanding [5,19].

2.5. Data Sources and Units of Analysis

The data consisted of five completed narrative visualization works and related materials: (1) written narratives embedded in the works; (2) visual sequences, including page composition and scene development; (3) material and expressive features such as color, texture, brushwork, line, and spatial arrangement; (4) semi-structured interview transcripts; and (5) researcher observation notes and analytic memos.

The unit of analysis was not limited to individual images or written sentences. Each work was analyzed as a multimodal ensemble in which visual images, written language, material expression, spatial composition, and sequential organization interacted to construct meaning. This view is consistent with multimodal research that treats meaning as distributed across multiple semiotic modes rather than located in language alone [15,20].

2.6. Multimodal Coding Process

To clarify the interaction between textual and visual modes, the study used mode-specific and cross-modal coding. Mode-specific coding examined the written story, title, dialogue, visual image, character, symbol, color, texture, spatial arrangement, and page sequence. Cross-modal coding then examined how these elements reinforced, extended, or contrasted with one another. For example, non-human narrators, red color, fire imagery, masks, scale, blank space, and page sequence were interpreted in relation to written narratives and interview explanations, rather than as isolated visual symbols. This coding process responded to the research focus on cognitive imagination. **Table 1** presents the focus and analytical objectives of the coding by linguistic, visual, color and material, spatial, sequential, and interview reflection modes, and finally shows the focus and analytical objectives of cross-mode coding.

Table 1. Multimodal coding matrix.

Coding Layer	Focus of Coding	Analytical Purpose
Verbal mode	Written story, title, embedded text, dialogue, sound words	To identify explicit narrative structure, causality, voice, and emotional naming
Visual mode	Image, character, object, symbol, composition	To identify how experience and emotion were made visible
Color and material mode	Color, texture, medium, brushwork, surface quality	To identify sensory and affective transformation
Spatial mode	Layout, distance, scale, blank space, positioning	To identify relational meaning and perspective
Sequential mode	Page order, scene transition, rhythm, repetition	To identify temporal and narrative development
Interview-reflective mode	Participant explanation, intention, self-reflection, pedagogical reflection	To compare researcher interpretation with participants' meaning-making
Cross-modal relation	Interaction among modes	To identify how multimodal interaction generated cognitive imagination

2.7. Data Analysis Procedures

Data analysis proceeded through five iterative steps. First, each work was reviewed holistically to identify its narrative structure, emotional movement, visual atmosphere, and turning points. Second, mode-specific coding was conducted for verbal, visual, material, spatial, sequential, and interview-reflective elements. Third, cross-modal

coding examined how written language, image, color, material expression, spatial arrangement, and sequence interacted. Fourth, the codes were compared with the four provisional analytical dimensions in **Table 2**. Finally, cross-case thematic analysis was conducted across the five works and interviews, following an iterative process of coding, theme development, review, and refinement [21,22]. The analysis therefore moved from individual narrative interpretation to multimodal coding, cross-modal relational analysis, and finally to cross-case thematic interpretation. Interview data were used to support, extend, or revise interpretations of the visual works. The interviews provided participants’ reflections on their narrative choices, emotional experiences, material decisions, audience awareness, AI use, and perceived educational value.

Table 2. Theory-informed provisional analytical dimensions for multimodal analysis.

Provisional Analytical Dimension	Cognitive Operation	Multimodal Observable Elements	Analytical Question
Narrative reconstruction	Selection, sequencing, and causal organization of experience	Event sequence, scene transition, written text, page arrangement	How was experience reorganized into a narrative structure?
Symbolic and sensory transformation	Visualization of abstract meanings	Color, line, texture, material, symbol, metaphor	How were emotions and thoughts transformed into sensory forms?
Perspective-taking and possible-world construction	Construction of other perspectives and alternative situations	Narrator, character, viewpoint, space, fictional world	How were perspectives or possible worlds beyond the immediate self-constructed?
Reflective and pedagogical meaning-making	Consideration of readers and coordination of expressive modes	Image-text relationship, blank space, repetition, page rhythm	For whom and how were multiple modes coordinated?

2.8. Trustworthiness and Researcher Reflexivity

Trustworthiness was enhanced through data triangulation, analytic memos, an audit trail, thick description, and researcher reflexivity. Visual works, embedded written narratives, interview data, observation notes, and analytic memos were compared throughout the analysis. Because the researcher was also the course instructor, the participants’ interview responses may have been shaped by perceived power relations or by a desire to present their work in ways that seemed appropriate within the course context. To address this issue, interview statements were not treated as neutral or complete accounts of experience; rather, they were interpreted in relation to the artworks, embedded written narratives, observation notes, and analytic memos. The analysis therefore remained attentive to possible social desirability and instructor-related influence in participants’ reflections. Rather than claiming statistical generalizability, this study aimed to provide a credible and contextually grounded interpretation of cognitive imagination in one teacher education setting [23,24].

2.9. Ethical Considerations

The study was approved by the Institutional Review Board of Jeonju National University of Education (Approval No. 2026-24, Date 11th June 2026). Informed consent was obtained from all participants. Participation was voluntary, and students were informed that their decision to participate or not participate would have no effect on their grades, course evaluation, or relationship with the instructor.

All data were anonymized before analysis. Student names were replaced with participant codes such as P1, P2, P3, P4, and P5, and any identifiable information was removed. Because the study used students’ visual artworks and interviews, additional permission for the use of artwork images and interview excerpts in academic publication was obtained where necessary. The collected data were stored securely and used only for the purposes approved by the IRB. In addition, potentially identifying details in participants’ personal narratives, such as specific timelines or contextual markers, were generalized where necessary to reduce the risk of deductive identification.

3. Results

The analysis identified four connected patterns in the five narrative visualization works. These patterns were not treated as isolated categories. Rather, they showed how cognitive imagination moved across narrative, image, material expression, emotional reflection, and pedagogical interpretation. The five works differed in subject matter and visual style, but all of them showed that participants did more than illustrate stories. They reorganized personal concerns, emotional memories, imagined situations, and pedagogical questions through multimodal visual form.

The findings are presented in four themes: (1) reconstructing self-narratives through relational meaning-

making; (2) visualizing inner emotions as a process of metacognition and emotional regulation; (3) adopting alternative perspectives and constructing possible worlds; and (4) developing pedagogical imagination through multimodal expression.

3.1. Reconstructing Self-Narratives through Relational Meaning-Making

The first theme concerns the way participants turned personal experiences and relational questions into narrative structures. In these works, experience was not presented as a simple memory or personal confession. It was selected, displaced, sequenced, and reorganized through characters, settings, conflicts, movement, and resolution. This process was especially visible in P1's *My Place* and P2's *Because It Is Me*.

P1's *My Place* tells the story of a yellow ball that leaves a child, enjoys freedom, meets other beings, becomes lonely, and eventually realizes that its place is beside its friend. At first glance, the work appears to be a simple story of an object's journey. However, the repeated yellow ball, the changing marine backgrounds, and the soft transitions between scenes gradually transform the meaning of "place." Place is no longer only a physical location. It becomes a relational condition in which the protagonist feels connected, recognized, and settled.

The visual structure of the work supports this movement. The yellow ball remains small but visually stable across scenes, functioning as an anchor for the reader's attention. Around it, the sea changes in tone and density. The early scenes suggest openness and movement, while later scenes create a more dispersed and lonelier atmosphere through watery diffusion, empty space, and the ball's separation from other figures. The use of soft color and spreading effects gives the story a dreamlike quality. This quality is important because the work does not explain loneliness directly. Instead, loneliness is made visible through distance, openness, and the smallness of the ball within the surrounding space (see **Figure 1**).

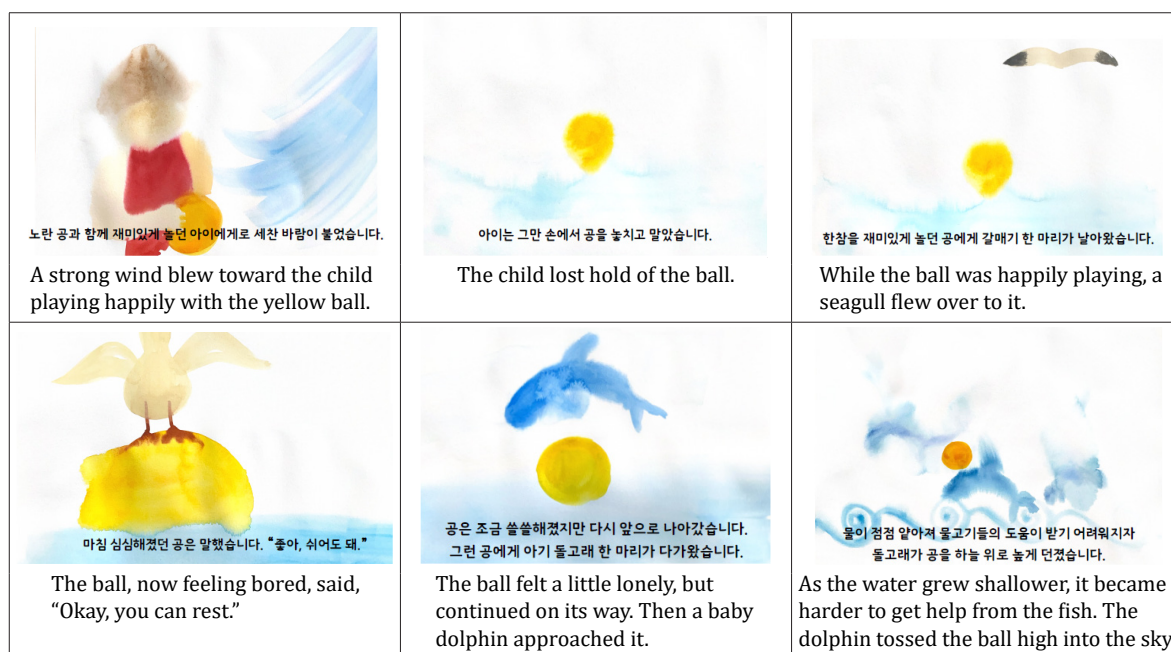


Figure 1. P1's artwork, *My Place*.

Note: To preserve the integrity of the student's original artwork, the original Korean text has been retained in the figure; English translations are provided below the corresponding panels.

"At first, I wanted to create a story about a ball traveling alone, but as I developed the scenes, I came to realize that the feeling of being connected to someone else is more important than the freedom of being alone." (P1)

P1's interview clarified that the story was connected to a personal question about where the participant wanted to be and with whom. The participant also explained that the image of a floating object moving away at the beach

became the starting point of the work. By imagining whether the object would choose to remain beside its friend if it had agency, P1 changed an ordinary memory into a narrative situation. In this sense, cognitive imagination appeared not as fantasy detached from experience, but as a way of giving agency, emotion, and relational meaning to an object.

P1 also considered how readers might experience the work visually and emotionally, suggesting that the artwork involved not only self-expression but also an awareness of communicative meaning. P2's *Because It Is Me* also reconstructs experience through narrative movement. The work begins with the pressure of being seen and develops through embarrassment, self-consciousness, concealment, failure, encounter, and self-acceptance. The experience of blushing is not treated as a single bodily reaction. It becomes a story of looking, hiding, being exposed, meeting another person, and finally accepting the self.

The visual choices in P2's work intensify this narrative movement. The eye at the beginning functions as more than a symbol of external attention. It positions the protagonist within the discomfort of being watched. Red tones, circular fields, and flame-like images expand across the page, turning embarrassment into heat, pressure, and bodily intensity. The mask operates in two ways: as a narrative device for hiding the face and as a visual metaphor for the attempt to control vulnerability. As the story develops, the repeated red imagery changes in meaning. At first, redness signals shame and fear. By the end, it becomes part of the self that can be recognized rather than erased. The narrative ending, "Because it is me," gives the earlier scenes a new meaning. The work does not deny embarrassment, nor does it solve the problem by removing redness. Instead, it reorganizes the meaning of blushing from a defect to an accepted part of the self. This finding shows how narrative visualization can turn a vulnerable bodily experience into a visual story of recognition and self-acceptance.

Although the work focused on the participant's experience of blushing, it did not present the experience as a fixed personal weakness. Instead, it was reconstructed as a story of looking, hiding, encountering, and accepting. The narrative structure allowed the participant to move from self-conscious discomfort to a more accepting relation with the self. In this sense, self-narrative became a means of reconfiguring the meaning of personal vulnerability.

Taken together, P1 and P2's works show that narrative visualization supported the reconstruction of self-experience. Personal memories and emotions were not reproduced directly. They were reshaped through characters, objects, symbolic images, colors, and sequences. This aligns with the view that visual narrative composition can organize meaning through line, color, framing, layout, and image-text relations [10].

3.2. Visualizing Inner Emotions as Metacognition and Emotional Regulation

The second theme concerns the visualization of inner emotions. Across the works, participants used color, texture, scale, spatial arrangement, symbolic objects, written phrases, and page sequence to make emotions visible. The interviews showed that this process was not only expressive. It also helped participants recognize, name, distance, and reinterpret their emotions.

P2's *Because It Is Me* most clearly demonstrates this theme. The work is based on the participant's recurring experience of physical self-consciousness and blushing in public-speaking situations. The opening image of an eye and the repeated scenes of redness and fire visually express the pressure of being seen. Blushing is not described only as a bodily reaction; it is transformed into expanding red color, heat, flame, visual exposure, and the desire to hide. The mask in the story represents both a concrete object and a symbolic strategy for concealing vulnerability (see Figure 2).

"The feeling of blushing can be simply described as 'embarrassment' in words, but in the illustration, I wanted to express it as if a fire were growing. While drawing, I realized that the emotion encompassed not only embarrassment but also fear and a sense of suffocation." (P2)

P2's interview indicated that drawing the feeling helped the participant understand the situation more clearly. By moving the emotion into a story and image, the participant could observe how the emotion worked, how it affected the body, and how it might be accepted. Here, visualization became a form of metacognition. The participant did not simply express an already known feeling. The feeling became more understandable through the process of visualizing it.



Figure 2. P2's artwork, Because It Is Me.

Note: To preserve the integrity of the student's original artwork, the original Korean text has been retained in the figure; English translations are provided below the corresponding panels.

P4's *Untitled* also shows how emotion can be made visible through multimodal means. The work uses a frog character, abrupt scene changes, sound words, empty space, and strong visual contrasts. Onomatopoeic and mimetic expressions such as "SPLASH!!," "ZOOM! ZOOM!" "STRIDE, STRIDE..." "SHIVER, SHIVER..." "BANG!," and "TRUDGE, TRUDGE..." and "HA-HA-HO-HO" shape the atmosphere and movement of the images. They create rhythm, speed, shock, and emotional tension. The sound words and images express a sequence of emotional shifts, from joy and movement to fear, crying, and shock. The spatial composition of the frog scenes is especially important. The expansion of white space, the miniaturization of figures, and the direct depiction of a gun intensify the sense of threat and helplessness. The small figure of the frog appears vulnerable in relation to a larger surrounding environment. Written language does not merely serve to describe the images but functions as a visual element that generates speed, sound, and emotional tension (see **Figure 3**).

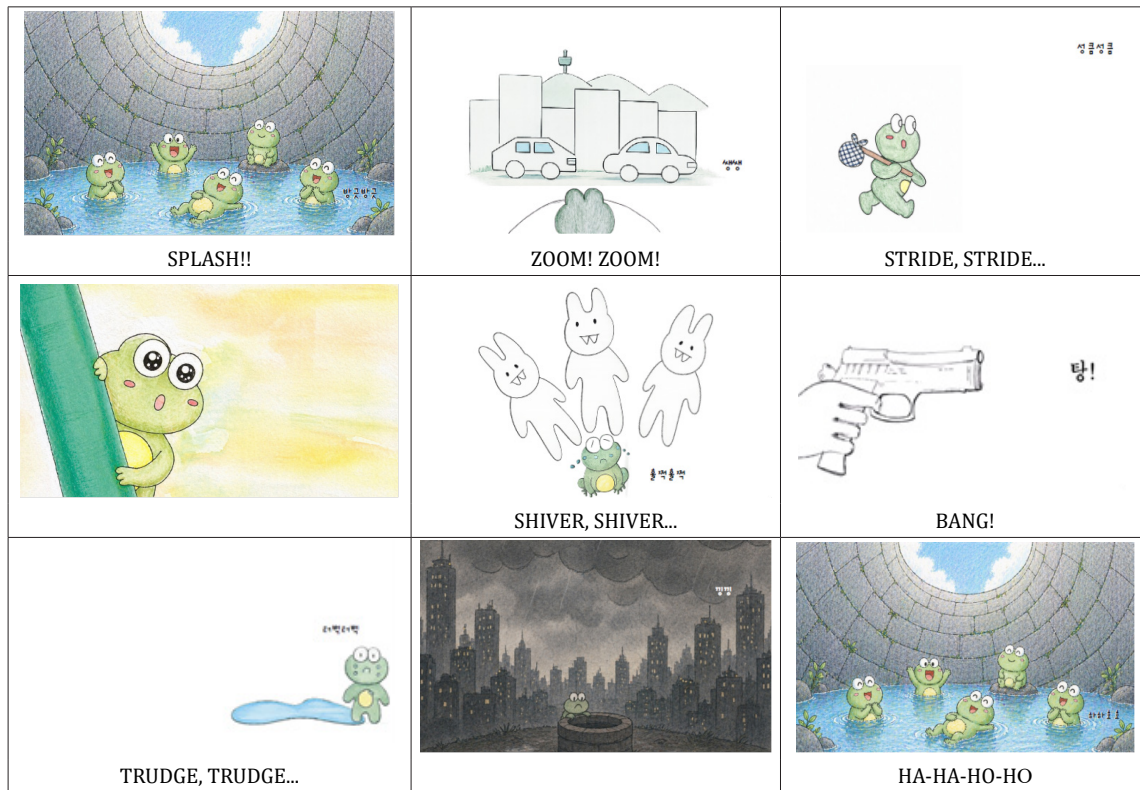


Figure 3. P4's artwork, *Untitled*.

Note: To preserve the integrity of the student's original artwork, the original Korean text has been retained in the figure; English translations are provided below the corresponding panels.

"It felt daunting to tell my story exactly as it was, but by making a frog the protagonist, I was able to view it from a bit of a distance. As I drew the frog to look small, the fear I had felt became even more vivid." (P4)

P4's interview suggested that visual expression allowed the participant to approach difficult memories indirectly. P4 described the preparation process as emotionally difficult because it recalled painful past experiences and a state of mental exhaustion. The participant noted that visual expression was more effective than language in interpreting emotions and giving meaning to feelings that were not fully recognized. Although P4 experienced discomfort in revealing the self, the visualizing process enabled the participant to identify, externalize, and reinterpret difficult emotions. By using a frog rather than directly representing the self, P4 created a mediated distance from painful experience. This distance did not weaken the emotion. Rather, it allowed the fear and vulnerability to become visible in another form.

Together, P2 and P4's accounts show that cognitive imagination includes a metacognitive dimension. Through multimodal visualization, the participants became aware of their emotional states, interpreted them from a distance, and transformed them into shareable symbolic forms. In this process, visual expression became a medium for both understanding and regulating the self.

P5's *What a Relief!* presents emotional change through shifts in material and atmosphere. The work moves across watercolor washes, delicate line work, monochromatic scenes, and abstract color fields. These changes in medium and surface quality mark changes in feeling about abundance, labor, disaster, chaos, survival, and relief. In one dark scene, a bright yellow center against a dark background can be interpreted as symbolizing life or an escape route discovered amidst danger (see **Figure 4**).

Across these examples, color, texture, blank space, scale, and material quality functioned as tools for thinking. They did not simply decorate the narratives. They helped participants explore emotions that were not easy to explain in ordinary language. This is consistent with a multimodal view of meaning-making, in which verbal, visual, material, spatial, and sequential modes interact to produce meaning [15]. It also extends recent work on digital and

visual composing, which emphasizes that meaning emerges through the coordination of multiple semiotic resources rather than through words alone [20].

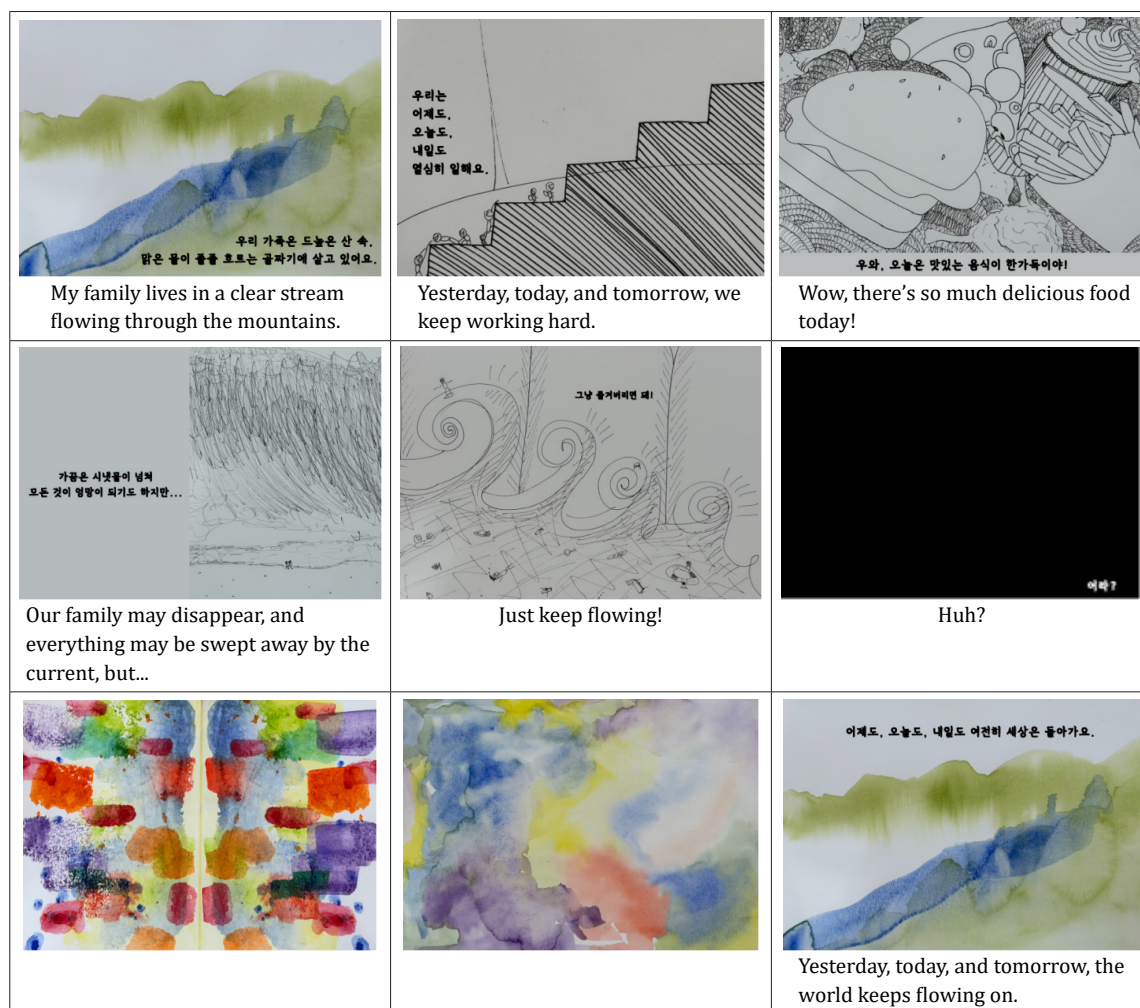


Figure 4. Parts of P5's artwork, *What a Relief!*

Note: To preserve the integrity of the student's original artwork, the original Korean text has been retained in the figure; English translations are provided below the corresponding panels.

3.3. Adopting Alternative Perspectives and Constructing Possible Worlds

The third theme concerns the use of alternative perspectives. Several works used objects, animals, fictional speakers, or imagined worlds as narrative mediators. These choices allowed participants to approach personal or relational experiences indirectly and to imagine situations beyond the immediate self.

In P1's *My Place*, the yellow ball is not a passive object. It becomes a subject that desires freedom, experiences loneliness, and recognizes the value of returning to a friend. This personification makes the story accessible to readers while also creating distance from the participant's own experience. The ball's small size and repeated appearance make it easy to follow, but its emotional journey gives the object a human-like interiority. Through this object perspective, the question of belonging can be explored without being presented as direct autobiography (see Figure 1).

P4's *Untitled* works in a similar but darker way. The frog moves through the spaces of human society, experiencing joy, curiosity, threat, sadness, and eventual recovery. It experiences movement, curiosity, threat, sadness, and recovery. Because the frog is smaller than the surrounding world, the scale of space changes. The city, the figures, and the threatening object feel larger and more forceful. The animal perspective therefore reorganizes

emotional experience through bodily scale. Fear is not simply stated, but it is felt through smallness, distance, and spatial imbalance (see **Figure 3**).

“I simply found myself using the metaphorical symbol of a frog, and it struck me that it bore a resemblance to my state of mind. I hadn’t intended from the outset to express my state of mind; it was just that, one by one, things I didn’t want to remember resurfaced, and I gained a new understanding of my emotions—realizing, ‘Ah, so this is how I am’. Seeing my colleagues empathize with the story without me having to explain it made me realize that I didn’t need to put it into words or tell the story.” (P4)

P4’s interview added an important layer to this interpretation. The participant connected the work to difficult past experiences related to teaching, parental complaints, institutional pressure, and trauma. However, the artwork does not present these experiences as documentary description. Instead, they are reframed through the frog’s movement, the rhythm of sound words, and the instability of the visual scenes.

P3’s *Votre Nuit* contributes to this theme through possible-world construction. The work imagines the night routine of a being living on Kepler-186f, relocating familiar actions and objects—such as tying one’s hair, walking, petals, lemons, telescopes, and lights—into an unfamiliar planetary setting. The result is a world that feels both ordinary and strange. Here, imagination does not mean escaping reality entirely; rather, it involves recombining familiar elements under alternative conditions (see **Figure 5**).

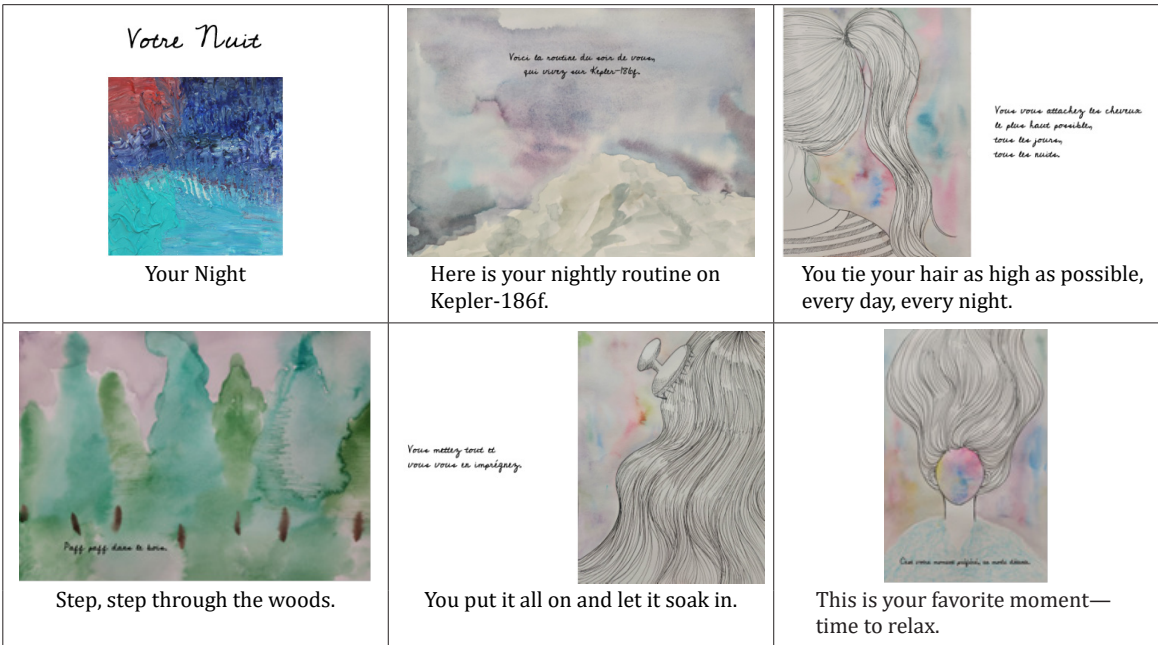


Figure 5. Parts of P3’s artwork, *Votre Nuit*.

Note: To preserve the integrity of the student’s original artwork, the original French text has been retained in the figure; English translations are provided below the corresponding panels.

Across these cases, objects, animals, and imagined worlds enabled participants to explore belonging, vulnerability, fear, and routine from positions other than the direct autobiographical self. This is meaningful for primary teacher education because future teachers need to help children understand emotions, characters, and situations from multiple viewpoints [11].

3.4. Developing Pedagogical Imagination through Multimodal Expression

The fourth theme concerns the movement from personal expression to pedagogical imagination. In the interviews, participants considered how narrative visualization might support children’s emotional understanding, empathy, self-acceptance, and confidence in art classrooms. P1 connected *My Place* to children’s concerns about friendship and belonging, suggesting that color, atmosphere, and visual feeling could communicate emotions more

effectively than direct explanation. In this case, pedagogical imagination emerged from an awareness of how a story might be received by readers and how visual expression could support emotional communication.

P4 expanded this theme by discussing AI-assisted visualization. The participant used AI to help realize story-board ideas and to maintain a visual style. This use of AI was not described as a replacement for story-making or interpretation. Rather, it functioned as a tool that helped the participant move from narrative intention to visual form (see **Figure 3**). P4 also reflected that AI might reduce children's anxiety about drawing skill and allow them to focus more on story, feeling, and meaning.

"Even though I knew that visual expression is more effective than language for interpreting emotions, I was still unsure about how to actually understand and communicate with children's emotions. Since children often feel uncomfortable or resistant to revealing themselves, I think we can try an approach that encourages them to naturally visualize emotions they may not even be aware of, rather than intentionally telling them what to express." (P4)

"The process of visualizing my own story from an emotional perspective to give it meaning, and then turning the countless thoughts and imaginings within it into a narrative, enabled metacognition about myself and helped me organize my many thoughts. I also felt that, rather than creating grand artworks, this narrative visualization of my own experiences could serve as a driving force to guide my own growth in my future relationships with students." (P5)

These reflections indicate that cognitive imagination developed through the project was not limited to personal introspection. It extended toward pedagogical imagination: the ability to imagine how artistic processes can support children's meaning-making. Visual production also functioned as a pedagogical tool. Recent research on drawings in pre-service teacher education supports the idea that visual making can help future teachers examine learning, reflection, and classroom practice [19]. In the present study, narrative visualization similarly helped participants think about how art might create a space where children can express difficult emotions indirectly, safely, and creatively.

4. Discussion

This study examined how cognitive imagination was manifested through the multimodal narrative visualization works of five pre-service primary school teachers. The findings showed that cognitive imagination was not expressed simply as originality, fantasy, or the production of unusual images. Rather, it appeared through the participants' efforts to reorganize experience, externalize emotion, shift perspectives, and imagine educational meanings through multiple modes. These findings suggest that narrative visualization can function not only as an expressive art activity but also as a mode of thinking through which experience is reorganized, distanced, interpreted, and communicated.

4.1. Cognitive Imagination as Multimodal Reconstruction of Experience

The first major implication concerns the role of narrative visualization in reconstructing experience. In works such as *My Place* and *Because It Is Me*, the participants did not present personal experiences as fixed memories. Instead, they reorganized experience through departure, conflict, emotional change, encounter, and resolution. This finding supports the idea that narrative is not merely a way of reporting experience, but a way of shaping and reinterpreting it [7,8].

P1's work, *My Place*, is especially important in this respect. The yellow ball's movement from separation and freedom to loneliness and relational return transforms the idea of 'place' from a physical location into a relational condition. The ball first appears to seek freedom, but the story gradually changes the meaning of freedom by placing it beside loneliness, separation, and the desire to return. In this process, the participant's personal concern about belonging becomes visible through a simple object and a sequence of sea scenes. P2's work *Because It Is Me* also demonstrates narrative reconstruction, but in a more embodied form. The experience of blushing is organized into a sequence of concealment, failure, recognition, and self-acceptance. This suggests that narrative visualization may therefore serve as a preparatory space in which pre-service teachers learn to transform private experience into

shareable and pedagogically meaningful form.

The second implication concerns multimodal transformation. Across the works, meanings changed as participants moved across written language, image, color, materiality, spatial arrangement, and sequence. The finding indicates that cognitive imagination was manifested through the transformation of invisible feelings and abstract ideas into visual, spatial, material, and linguistic forms. Their meanings changed as they moved across modes.

In P2's work, *Because It Is Me*, embarrassment was rendered through expanding red fields, flames, the eye, and the mask. In P4's frog narrative, emotion and movement were constructed through onomatopoeia, character scale, empty space, and abrupt changes in scene. In P5's *What a Relief!* changes in watercolor, line drawing, monochrome imagery, and abstract color fields produced shifts in atmosphere and emotional intensity. This supports visual thinking and multimodal theory, which understand images and other semiotic resources as active means of perception, reasoning, and meaning-making [9,15]. The study extends recent discussions of visual narrative composition and visual literacy by showing how multimodal visual narratives can reveal cognitive imagination in pre-service primary teacher education [10,11].

The third implication concerns perspective-taking. By using objects, animals, and imagined worlds as narrative mediators, participants approached personal or relational experiences indirectly. The yellow ball in P1's artwork, the frog in P4's artwork, and the imagined planetary subject in P3's *Votre Nuit* each created a position from which experience could be re-seen. This process is not only a matter of fictional imagination. It involves a cognitive and relational shift. Perspective-taking became a compositional act of choosing a narrator, scaling a character, arranging space, and guiding the reader's movement through the story. For primary teacher education, this is meaningful because teachers often help children understand situations from viewpoints other than their own.

4.2. Pedagogical and Methodological Implications

The fourth implication concerns pedagogical imagination. The participants did not understand narrative visualization only as a personal art-making task. In the interviews, they connected their works to children's emotional understanding, friendship, self-acceptance, empathy, and the pressure children may feel in art-making. This movement from self-expression to pedagogical reflection is central to the educational value of the project.

In P1's *My Place*, written text clarified the causal and emotional progression of the story, while the repeated yellow ball and changing marine space maintained visual continuity. P1 considered how a story about belonging could be meaningful for children who experience concerns about friendship. P2 designed *Because It Is Me* with primary students in mind, hoping that children might accept their own vulnerabilities or complexes more gently. P4 reflected on how visualizing emotions could help children express feelings that they may not yet be able to explain directly. These reflections show that narrative visualization helped participants imagine how art education might support children's meaning-making, rather than simply teach children how to produce visually successful artworks.

Recent research in arts-based teacher education supports this point. Visual journaling and visual autoethnographic practices can support pre-service teachers' reflexivity, self-understanding, and teaching philosophies [5,6]. Research on drawings as pedagogical tools also suggests that visual production can help pre-service teachers examine learning, reflection, and classroom practice [19]. The present study contributes to this body of work by showing that narrative visualization connects reflective self-understanding with future-oriented pedagogical imagination.

Methodologically, the study contributes by treating student artworks as multimodal qualitative data rather than as illustrations of interview findings. By analyzing image, written text, material quality, spatial arrangement, page sequence, and participant reflection together, the study avoided reducing the works either to visual symbolism alone or to verbal explanation alone. This approach strengthens the transparency of multimodal qualitative analysis [21,22].

4.3. AI-Assisted Visualization as a Mediating Resource

P4's use of AI-assisted visualization adds a contemporary dimension to the discussion. In this study, AI was not treated as the source of imagination or as a substitute for artistic thinking. Rather, it functioned as a mediating resource that helped the participant translate storyboard intentions into visual form. This distinction is important. The educational value of AI-assisted visualization lies not in the automatic production of polished images, but in how the learner selects, revises, interprets, and connects generated images with narrative intention and emotional

meaning. Recent studies on generative AI and art education similarly emphasize the need for teacher mediation, critical reflection, and attention to learners' agency [25]. Kim et al.'s study of AI-assisted teaching material design in early childhood art education is also relevant here because it highlights pre-service teachers' design process and critical mediation in AI-supported pedagogical production [26]. These studies suggest that AI-assisted visualization should be understood as one possible material or mediating tool within a broader ecology of narrative visualization, not as a replacement for embodied, emotional, or pedagogical imagination.

4.4. Limitations and Directions for Further Research

Several limitations should be acknowledged. First, the study involved only five participants from one course at a single university of education, so the findings are not intended for statistical generalization. Second, the researcher was also the course instructor, which provided rich contextual understanding but also required reflexive attention to possible interpretive bias. Third, the study focused mainly on completed artworks and follow-up interviews, so it did not fully capture every moment of the art-making process. Future research may expand the participant group, include process journals or longitudinal portfolios, compare analogue, digital, and AI-assisted narrative visualization, and examine how pre-service teachers apply narrative visualization activities in actual elementary classrooms. Fourth, AI-assisted visualization appeared only in one participant's case. Therefore, the study cannot provide a comparative analysis of analogue, digital, and AI-assisted forms of narrative visualization across participants. The AI-related finding should be understood as an illustrative case that suggests a future research direction, rather than as evidence of the general effects of AI-assisted visualization in pre-service teacher education.

Although this study did not apply digital twin technology, recent work on generative-AI-driven human digital twins further suggests that generative AI may support the construction, simulation, and interpretation of human-centered digital representations [27,28]. In addition, discussions of cognitive digital twin systems and 'smart copilot' models suggest that future digital environments may move beyond data mirroring toward more interactive and interpretive forms of support [29]. In art education, however, such technologies should be approached cautiously. Future research may examine whether AI-supported visual portfolios, reflective interviews, and longitudinal learning records can help trace changes in pre-service teachers' multimodal imagination over time, while preserving students' interpretive agency, privacy, and ownership of their visual narratives.

5. Conclusions

This study examined how cognitive imagination emerged through narrative visualization in pre-service primary teacher education. By analyzing five students' artworks, written narratives, visual sequences, material expression, and interview data, the study showed that cognitive imagination appeared as a multimodal process of transforming experience, emotion, perspective, and pedagogical meaning.

The findings indicate four interrelated dimensions of cognitive imagination. First, narrative imagination was manifested as participants selected, sequenced, and reorganized personal experiences into meaningful story structures. Second, symbolic and sensory imagination was revealed as participants transformed invisible emotions into visual and material forms, such as color, line, texture, spatial composition, metaphor, and page rhythm. Third, perspective-taking imagination emerged through the use of objects, animals, fictional characters, and imagined worlds. Fourth, pedagogical imagination appeared when participants connected their narrative visualization experiences to primary education.

The study contributes conceptually by clarifying cognitive imagination as a multimodal process rather than a purely internal mental capacity. It contributes methodologically by showing how student artworks can be analyzed as multimodal qualitative data. For pre-service primary teacher education, narrative visualization offers a way to move beyond technique-centered art education toward reflective, relational, and pedagogical practice.

Funding

This work received no external funding.

Institutional Review Board Statement

The study was approved by the Institutional Review Board of Jeonju National University of Education (protocol code 2026-24; approval date: 11 June 2026).

Informed Consent Statement

Informed written consent was obtained from all subjects involved in the study.

Data Availability Statement

The data are not publicly available because they are subject to ethical restrictions. Aggregated data may be made available by the corresponding author upon reasonable request and subject to institutional approval.

Acknowledgments

The author wishes to thank the participants who kindly agreed to participate in this research.

Conflicts of Interest

The author declares no conflict of interest.

AI Use Statement

During the preparation of this manuscript, the author used ChatGPT (OpenAI) solely for language refinement. No AI tools were used for data analysis, interpretation, or generation of scientific content. All outputs were critically reviewed and edited by the author. The author takes full responsibility for the integrity and accuracy of the work.

References

1. Egan, K.; Judson, G. *Imagination and the Engaged Learner: Cognitive Tools for the Classroom*; Teachers College Press: New York, NY, USA, 2016.
2. Jeong, H.; Ryu, S. Pre-service teachers' scientific imagination in model-based exploration using complex data. *J. Learner-Centered Curriculum Instruction* **2023**, *23*, 171–187. [\[CrossRef\]](#) (in Korean)
3. Kang, M.-S. A qualitative study on moral imagination education as perceived by prospective teachers. *J. Educ. Community Res. Pract.* **2025**, *7*, 1–25. [\[CrossRef\]](#) (in Korean)
4. Muñoz-Salinas, Y.; Caro-Zúñiga, D.; Jeria, I. Creativity and preservice teachers: A literature review of an underexplored field (2014–2024). *Educ. Sci.* **2025**, *15*, 395. [\[CrossRef\]](#)
5. Chien, T.F. Crafting visual autoethnography to develop preservice art teachers' reflexivity and teaching philosophies. *Int. J. Educ. Through Art* **2023**, *19*, 361–380. [\[CrossRef\]](#)
6. Kulinski, A.R. Using visual journaling in preservice teacher education and arts-based research: Discovering connections and building practice. *Int. J. Educ. Through Art* **2024**, *20*, 427–454. [\[CrossRef\]](#)
7. Clandinin, D.J.; Connelly, F.M. *Narrative Inquiry: Experience and Story in Qualitative Research*; Jossey-Bass: San Francisco, CA, USA, 2000.
8. Bruner, J.S. *Actual Minds, Possible Worlds*; Harvard University Press: Cambridge, MA, USA, 1986.
9. Arnheim, R. *Visual Thinking*; University of California Press: Berkeley, CA, USA, 1969.
10. Pantaleo, S. The meaning-making in kindergarten children's visual narrative compositions. *J. Early Childhood Literacy* **2025**, *25*, 336–366. [\[CrossRef\]](#)
11. Guo, D.; Rich, E.E.; Coleman, J.M. Secondary pre-service teachers' visual literacy: Instructional strategies in social studies. *J. Visual Literacy* **2024**, *43*, 308–325. [\[CrossRef\]](#)
12. Dewey, J. *Art as Experience*; Minton, Balch & Company: New York, NY, USA, 1934.
13. Eisner, E.W. *The Arts and the Creation of Mind*; Yale University Press: New Haven, CT, USA, 2002.
14. Efland, A.D. *Art and Cognition: Integrating the Visual Arts in the Curriculum*; Teachers College Press: New York, NY, USA, 2002.
15. Kress, G.; van Leeuwen, T. *Reading Images: The Grammar of Visual Design*, 3rd ed.; Routledge: London, UK, 2021. [\[CrossRef\]](#)
16. Heaton, R.; Kuan, S.C.L. A visual inquiry: Artist-teacher perceptions of art education provision in Singapore. *Stud. Art Educ.* **2022**, *63*, 115–133. [\[CrossRef\]](#)

17. McCormick, K.I.; Willcox, L. Artful learning: Early childhood pre-service teachers and art integration. *J. Early Childhood Teacher Educ.* **2025**, *46*, 300–322. [\[CrossRef\]](#)
18. Harrison, H.; Birks, M.; Franklin, R.; et al. Case study research: Foundations and methodological orientations. *Forum Qual. Soc. Res.* **2017**, *18*, 19. [\[CrossRef\]](#)
19. Gal, A. Collaborative self-study with pre-service teachers to improve the use of drawings as a pedagogical tool. *Stud. Teach. Educ.* **2023**, *19*, 271–288. [\[CrossRef\]](#)
20. Zhang, E.D.; Yu, S. Conceptualizing digital multimodal composing competence in L2 classroom: A qualitative inquiry. *Comput. Assist. Lang. Learn.* **2025**, *38*, 262–290. [\[CrossRef\]](#)
21. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* **2006**, *3*, 77–101. [\[CrossRef\]](#)
22. Byrne, D. A worked example of Braun and Clarke’s approach to reflexive thematic analysis. *Qual. Quant.* **2022**, *56*, 1391–1412. [\[CrossRef\]](#)
23. Korstjens, I.; Moser, A. Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *Eur. J. Gen. Pract.* **2018**, *24*, 120–124. [\[CrossRef\]](#)
24. Nowell, L.S.; Norris, J.M.; White, D.E.; et al. Thematic analysis: Striving to meet the trustworthiness criteria. *Int. J. Qual. Methods* **2017**, *16*, 1–13. [\[CrossRef\]](#)
25. Vartiainen, H.; Tedre, M.; Jormanainen, I. Co-creating digital art with generative AI in K-9 education: Socio-material insights. *Int. J. Educ. Through Art* **2023**, *19*, 405–423. [\[CrossRef\]](#)
26. Kim, M.H.; Lee, H.; Chun, J.; et al. Designing AI-assisted video teaching materials in early childhood art education: A PjBL case study on pre-service teachers’ design and critical mediation. *J. Curriculum Instruction* **2025**, *29*, 442–456. [\[CrossRef\]](#)
27. Chen, J.; Yi, C.; Okegbile, S.D.; et al. Networking architecture and key supporting technologies for human digital twin in personalized healthcare: A comprehensive survey. *IEEE Commun. Surv. Tutorials* **2024**, *26*, 706–746. [\[CrossRef\]](#)
28. Chen, J.; Shi, Y.; Yi, C.; et al. Generative-AI-driven human digital twin in IoT healthcare: A comprehensive survey. *IEEE Internet Things J.* **2024**, *11*, 34749–34773. [\[CrossRef\]](#)
29. Zhu, F.; Chen, J.; Wen, J.; et al. From data mirror to smart copilot: A survey on NextG semantic communication for propelling digital twin world into cognitive stage. *IEEE Commun. Surv. Tutorials* **2026**, *28*, 4915–4947. [\[CrossRef\]](#)



Copyright © 2026 by the author(s). Published by UK Scientific Publishing Limited. This is an open access article under the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Publisher’s Note: The views, opinions, and information presented in all publications are the sole responsibility of the respective authors and contributors, and do not necessarily reflect the views of UK Scientific Publishing Limited and/or its editors. UK Scientific Publishing Limited and/or its editors hereby disclaim any liability for any harm or damage to individuals or property arising from the implementation of ideas, methods, instructions, or products mentioned in the content.