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An Examination of Artificial Intelligence as A Teaching Agent in Basic Drawing Education

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ABSTRACT

The rapid development in artificial intelligence technologies carries the potential to transform traditional teaching methods in many fields, including visual arts education. The rapidly advancing dynamic nature of artificial intelligence technologies and their variability depending on prompts necessitate the immediate determination and documentation of the roles of these tools in education. This research aims to examine the extent to which artificial intelligence can fulfill "teacher" roles, specifically focusing on technical demonstration and educational feedback, in basic drawing applications. In the study, where qualitative research methods were adopted, data were evaluated using descriptive analysis supported by literature review and a pedagogically focused visual document analysis technique. Within the scope of the research, an art teacher role was defined for the artificial intelligence tool, and it was asked to generate five different reference visuals in accordance with the basic drawing education curriculum. The obtained visuals were analyzed by a field expert in the context of proportion, perspective, anatomy knowledge, and pedagogical clarity. Additionally, an analysis of the feedback provided by artificial intelligence on three faulty drawings was conducted. The findings were handled with a holistic approach based on criteria of technical knowledge transfer, conceptual explanation, error identification, sequencing of correction steps, and pedagogical clarity. Consequently, the study reveals that artificial intelligence should be evaluated as an auxiliary material source used under expert supervision, rather than assuming a teacher role alone in basic art education.

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1. Introduction

Art education is more than just a field that develops an individual's aesthetic sensitivity (Dewey, 1938; Vygotsky, 1978); it is a multidimensional learning domain that shapes skills in perception, interpretation, problem-solving, and creative expression. This multidimensional structure of art education demonstrates that learning is not limited to the acquisition of technical skills; rather, it is shaped by processes of experience, interaction, and production (Brooks & Brooks, 1999). Indeed, according to Dewey, learning is a dynamic process that occurs through the individual's interaction with and experience of their environment (Dewey, 1897; 1938). In this context, art

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education should be viewed as a learning domain where the student connects with real life, actively participates in the production process, and constructs meaning through experience.

This approach requires not only that the student acquire technical knowledge but also that they internalize this knowledge through experience. Consequently, the learning process in art education should be approached as a structure that gains meaning through the individual's active participation and production, rather than through passive knowledge transfer.

Fundamental drawing practices, which form the foundation of the visual arts, represent a critical pedagogical process in which students experience and internalize plastic elements such as light and shadow, proportion, balance, and rhythm. Basic drawing education incorporates a learning structure based on practice, process, and feedback. In this learning interaction, the teacher is not merely a figure who transmits technique, but rather a central guide who assists the student's visual perception, helps them recognize their mistakes, and structures the learning process. This approach aligns with the concept of the guiding teacher emphasized by constructivist learning theory, positioning the teacher not as a mere transmitter of knowledge but as a facilitator who directs the learning process (Vygotsky, 1978; Brooks & Brooks, 1999).

In art education using traditional methods, the teacher's role is shaped through instructional functions such as observation, one-on-one feedback, step-by-step guidance, and modeling. In contemporary educational settings, the increasing number of students, limited class time, and the growing prominence of individual differences raise questions about the sustainability of these teaching functions. On the other hand, the high degree of technology integration in contemporary educational environments is directing educators and students toward such interaction today.

It is evident that recent digital technological advancements have influenced educational environments, particularly through the inclusion of new actors in teaching processes. One of the most notable of these actors is undoubtedly artificial intelligence and its facilitative role. An example of this is as follows: According to Özbek and Karahan (2025: 73), artificial intelligence offers the ability to "instantly transform any environment into a workshop through virtual environments," thereby providing students with the opportunity to engage in active practice even outside of school. In this context, the primary focus of this study is not on whether artificial intelligence can completely replace the teacher, but rather on which of the teacher's pedagogical, cognitive, and guidance functions it can fulfill and to what extent.

The teacher, who is the central and official element of knowledge transfer processes, is losing their status as the sole authority on knowledge in the digital world and evolving into the role of a guide who manages the learning process. This situation necessitates a re-examination of educational paradigms and an investigation into the role of artificial intelligence in education. Among the elements that facilitate learning—specifically the processes of thinking, knowledge production, and information processing—it seems unlikely that these will remain static amidst these dynamics.

The existence of technological devices that are directly involved in production and thinking processes and significantly simplify daily life largely validates Alan Turing's predictions that machines could exhibit human-like cognitive functions (Turing, 1950). Artificial intelligence can be described as a comprehensive system of large-scale networks that generate outputs

through machine-based artificial neural networks created and operated by algorithms. “Artificial intelligence seeks to enable computers to do what minds can do” (Boden, 2016: 1). This has transformed into a new medium and an experienced element through which human mental activities can receive feedback and establish connections via a new model of communication.

The integration of artificial intelligence tools into our daily lives is a significant reality of today (Boden, 2016; Holmes et al.,2019). This technological advancement, which inevitably brings about change and acts as a driving force, has already become a common sight in many areas of life. At the same time, it is a subject frequently studied academically in both social and natural sciences fields, such as culture, tourism, health, and education.

From an educational perspective, artificial intelligence appears capable of altering the dynamics of research processes and individual curiosity regarding rapid information transfer. Furthermore, the fact that everyone has at least some degree of access to these technologies is another factor influencing their use. On the other hand, the ease of accessing information resulting from this accessibility may foster a greater desire to learn among users. By helping to overcome certain material and emotional barriers to education that existed in the past—when these technologies were not yet widespread—artificial intelligence also tends to create new learning opportunities.

Artificial intelligence can assume the role of a teacher because certain aspects of teaching behavior in art education rely on systematic processes such as recognizing the learner’s work, identifying errors, providing constructive feedback, and defining and explaining technical steps. These systematic processes are tasks carried out within specific criteria. It is known that immediate and formative feedback provided during the learning process deepens learning by increasing the student’s awareness of errors. In this regard, the feedback provided by artificial intelligence can be linked to the formative assessment approach (Hattie & Timperley, 2007). AI models possess the capacity to analyze elements such as proportion, compositional arrangement, form-space relationships, and light-shadow distribution in drawings. This enables them to perform, to a certain extent, the functions that teachers frequently carry out in classroom settings—such as providing technical guidance, identifying areas of incomplete or incorrect drawings, and offering constructive suggestions. Furthermore, by understanding the student’s current level and presenting drawing methods appropriate to that level, the AI brings itself closer to the teacher’s role as a guide. Rather than completely replacing human-specific qualities such as pedagogical intuition, sensory awareness, and in-class interaction, this study clearly demonstrates that the AI serves as an auxiliary assessment tool that “reduces the teacher’s technical workload.” While AI-based systems are strong in terms of technical accuracy and speed, they can only partially address human-specific teaching qualities such as pedagogical intuition, contextual sensitivity, and emotional feedback (Holmes, 2019). Additionally, studies in the literature related to this topic are discussed in detail in the following section.

On the other hand, failing to note that this technology is highly dynamic and rapidly evolving would leave the discussion incomplete. Another important point is that the prompt used in artificial intelligence directly influences the resulting output. Given all these variables, the

findings examined in this study within the context of artificial intelligence may not always demonstrate consistency in producing a fixed result. Given the findings, the significance of this study lies in documenting the current state of the artificial intelligence model—which is currently under development and was used in this research—from the perspective of its role in teaching, and in paving the way for future studies.

1.1. Research Problem Statement

Art education is a practical process traditionally based on the master-apprentice relationship, requiring immediate visual observation, correction, and one-on-one interaction. In particular, foundational art and drawing education relies heavily on the formative feedback the instructor provides on student work to develop technical skills such as perspective, proportion, light and shadow, and composition.

However, today, the development of generative artificial intelligence technologies—particularly the emergence of multimodal models (capable of processing both text and visuals)—has created a new paradigm in education. The shift of artificial intelligence from merely being a tool that provides information to assuming the role of a virtual instructor capable of analyzing, interpreting, and guiding visual data holds the potential to transform the nature of art education.

While the effects of AI on art production are frequently discussed in the literature, research on AI's capacity to act as a "teaching agent"—analyzing student work, identifying errors, and providing pedagogically sound guidance—remains very limited. In this context, the extent to which artificial intelligence can assume the role of a teacher in basic drawing education without a physical studio environment, as well as the technical accuracy and pedagogical quality of the feedback it provides, emerges as a significant problem that needs to be addressed (Hattie & Timperley, 2007). In this context, the main research question of the article is as follows: What is the pedagogical adequacy and accuracy of the visual and technical feedback provided by a multimodal artificial intelligence model when it assumes the role of a teacher in the basic art education process?

The sub-research questions are framed as follows: To what extent can artificial intelligence accurately identify errors in drawings based on fundamental drawing principles (perspective, light and shadow, etc.)? Is the language of the criticism and suggestions provided by artificial intelligence to the student supportive of learning motivation and didactic in nature? Can artificial intelligence suggest applicable, concrete, and level-appropriate practical methods for correcting the errors it identifies? When compared to the human factor (intuition, emotional intelligence, mastery of materials) in basic art education, what are the structural limitations of AI-supported education?

1.2. The Active Use of Artificial Intelligence in Education

In previous studies, the use of artificial intelligence applications has been shown to support students' creative processes while also bringing certain pedagogical risks. For example, Tong and colleagues (2023), presented a study based on a teaching experiment conducted with first-year college students regarding the integration of generative AI tools into studio courses,

revealing that while 100% of the students used AI-generated images to add texture to their drawings, there were significant discrepancies between instructors' and students' perceptions regarding how much of the generated output was actually the students' own work. Parallel to this, the study highlights the delicate balance between the risk of AI use in foundational art education diminishing manual skills and its potential to enhance creativity.

On the other hand, Sari and Kurniawan (2024) note that AI transforms rather than disrupts traditional methods in visual arts education. As an example, Fastabend and colleagues (2024) found that students' primary expectation of AI is speed. 42.9% of the students participating in this study indicated that the system's most critical feature is providing immediate feedback on errors. When viewed from the perspective of the student's focus and the speed of the educational process, the relationship between these elements appears supportive.

Another significant contribution offered by artificial intelligence technologies is the potential to expand students' creative thinking processes. Generative AI tools create a new pedagogical space by offering students the opportunity to go beyond technical limitations, thereby prioritizing conceptual thinking over technical skills (Sari & Kurniawan, 2024). In this regard, AI is not merely a technical tool; it also provides a learning environment that triggers creative processes.

However, while AI-supported visual production processes offer significant advantages in terms of speed and variety, the outputs they generate often contain limitations regarding artistic depth, originality, and expressive power. It is observed that visuals generated by artificial intelligence often fail to adequately reflect human-specific artistic qualities such as emotional expression and intuitive approach (Zlateva, 2025).

Conversely, AI-powered digital tools can enhance students' awareness of composition, form, and visual arrangement by providing more objective and data-driven evaluations of artworks. This situation fosters a framework that not only develops the student's ability to evaluate their own work but also redefines the teacher's role as a guide (Sari & Kurniawan, 2024).

Yunfei Liao (2025) has noted that in engineering department drawing courses, artificial intelligence offers a framework for educational reform that fundamentally transforms traditional teaching methods. In this sense, artificial intelligence, as an element capable of transforming vocational education curricula, appears to hold the potential to unlock such possibilities.

Artificial intelligence technologies are used not only in higher education but also in entry-level educational processes, such as teaching basic shapes. Baki and colleagues (2023) positioned artificial intelligence as a "demonstration tool" in the robotic system they developed to help children acquire basic drawing skills, and demonstrated that the system could serve as an educational assistant in evaluating drawing accuracy.

According to Tekin (2018), artificial intelligence occupies a subject position in the field of art. Gölgelioğlu (2023), however, discusses a fundamental limitation of artificial intelligences such as Midjourney and GPT. For example, he notes that when asked to create a landscape drawing or a poem, the AI provides estimated interpretations based on the commands. Karabulut (2021),

on the other hand, states that the widespread adoption of AI indicates that the field of visual design is also undergoing a technological transformation.

2. Method

The study adopted a qualitative research approach (Creswell, 2014). This study was conducted to examine the extent to which AI can fulfill teaching roles in basic drawing applications. Data obtained through a literature review were analyzed using descriptive analysis methods in the theoretical sections of the study. In the analysis of the visual examples forming the basis of the research, a technical visual document analysis method was employed with a pedagogical approach.

2.1. Artificial Intelligence Model and Study Materials

In this study, Gemini, a large language model developed by Google, was used as a virtual drawing instructor. In line with the study's objective, two sample groups were created. The first sample group consists of five drawings generated using topic-focused custom prompts produced by Google's Nano Banana Pro (version 3.1) model. The second group consists of three examples intentionally drawn incorrectly by the researchers to examine the explanatory, guiding, and technical advisory aspects of the AI's teaching role, and interpreted by Google Gemini 3 Pro. This limitation and classification were selected based on fundamental topics in drawing education.

2.2. Artificial Intelligence Prompt Structure

In order to standardize the instructional role assigned to artificial intelligence during the research process, structured prompts were prepared by the researchers. These prompts were designed to simulate the pedagogical behaviors of a basic drawing instructor, including technical explanation, visual demonstration, step-by-step guidance, error detection, and corrective feedback.

The prompts used in the study were created according to the instructional objectives of each drawing topic (Tong et al., 2023). The artificial intelligence model was explicitly instructed to behave like an experienced art teacher and to produce educationally structured outputs.

Examples of the prompts used in the research are presented below:

- Proportion Drawing Prompt:

"Act as an academic basic drawing instructor. Produce a beginner-level proportion drawing demonstrating classical human body ratios. Include pedagogical notes explaining head-body proportion relationships, eye placement, anatomical balance, and proportional construction."

- Anatomy Drawing Prompt:

"Act as a figure drawing teacher. Create an anatomy teaching sheet for beginner art students. Demonstrate skeletal structure, muscle masses, and volumetric simplification progressively from simple forms to more complex anatomical structures."

- Perspective Drawing Prompt:

"Create a one-point perspective interior drawing lesson suitable for beginner-level art students. Clearly indicate the horizon line, vanishing point, spatial construction, and perspective relationships. Include short instructional explanations similar to classroom demonstrations."

- Light and Shadow Prompt:

"Generate a pedagogical shading lesson explaining tonal transitions, cast shadows, light direction, and volumetric shading through geometric forms and still life objects. Present the instruction progressively from simple forms to more complex structures."

- Faulty Drawing Evaluation Prompt:

"Act as an experienced art teacher. Analyze the uploaded student drawing and identify technical problems related to anatomy, perspective, proportion, shading, composition, and spatial relationships. Explain the causes of the mistakes and provide corrective suggestions using a pedagogically supportive language."

The prompts were intentionally structured to assign a direct instructional role to the artificial intelligence model and to evaluate the extent to which artificial intelligence could imitate pedagogical teaching behaviors in basic drawing education.

2.3. Evaluation Criteria

In this section, an educational evaluation process was also conducted by analyzing the feedback provided by the AI on the drawings. These AI-generated responses were further evaluated by a researcher who is a subject matter expert in terms of pedagogical accuracy. All evaluations were conducted on the examples to examine the level of assumption of teaching roles, focusing on the stages of technical knowledge transfer, conceptual explanation, guidance creation, error identification , and correction, as well as through pedagogical clarity criteria.

2.4. Data analysis

The collected data were analyzed through descriptive analysis and pedagogically oriented visual document analysis. The AI-generated instructional drawings and feedback responses were comparatively examined according to technical accuracy, pedagogical clarity, conceptual explanation, error detection, corrective guidance, and visual consistency criteria. The analysis process focused on evaluating the extent to which artificial intelligence could imitate instructional behaviors traditionally performed by art teachers in basic drawing education.

3. Results

This section discusses the samples from the two groups included in the study and their findings. The first group consists of five visuals generated from selected topic-focused custom prompts created using Nano Banana Pro (3.1.). These were treated as still life studies to examine the key

elements of foundational drawing: proportion, anatomy, perspective, light and shadow, and overall composition.

The second group consists of three examples intentionally drawn incorrectly by the researchers to examine the explanatory, guiding, and technical advisory aspects of AI's teaching role, which were then interpreted by Google Gemini 3 Pro.



Figure 1. A drawing on the topic of proportions generated by Gemini Nano Banana 3.1. Creation date: 12/17/2025

Figure 1 shows the classical academic proportions of the human body. The division used in this proportioning method—1 head for the head, 2 heads for the chest, 4 heads for the waist, and 8 heads for the feet—has been correctly applied. This demonstrates that AI can grasp the fundamental knowledge of proportions in art pedagogy. The drawing is simple, clear, and prepared with a schematic logic similar to that of a teacher's drawing; it clearly shows that the eyes are positioned exactly at the center of the face and that the base of the nose is placed at a specific level. The red lines used for guiding notes mimic the pedagogical approach the teacher employs during in-class drawing demonstrations.

Since the ear in the portrait begins at the starting point of the eye area rather than at the eyebrow level, this creates a slight shift in the ear's position. This indicates that, despite knowing the principles of proportion, AI was unable to achieve geometric accuracy in practice. Although the proportions are specified in the notes, the reasons for them are not explained. For example: Why are the eyes centered? Why is the body 8 head heights tall? What is the difference between realistic and idealized drawing? The conceptual framework a teacher should provide is missing. This is an element that distances the AI from the qualities of the teaching role and limits its capabilities.

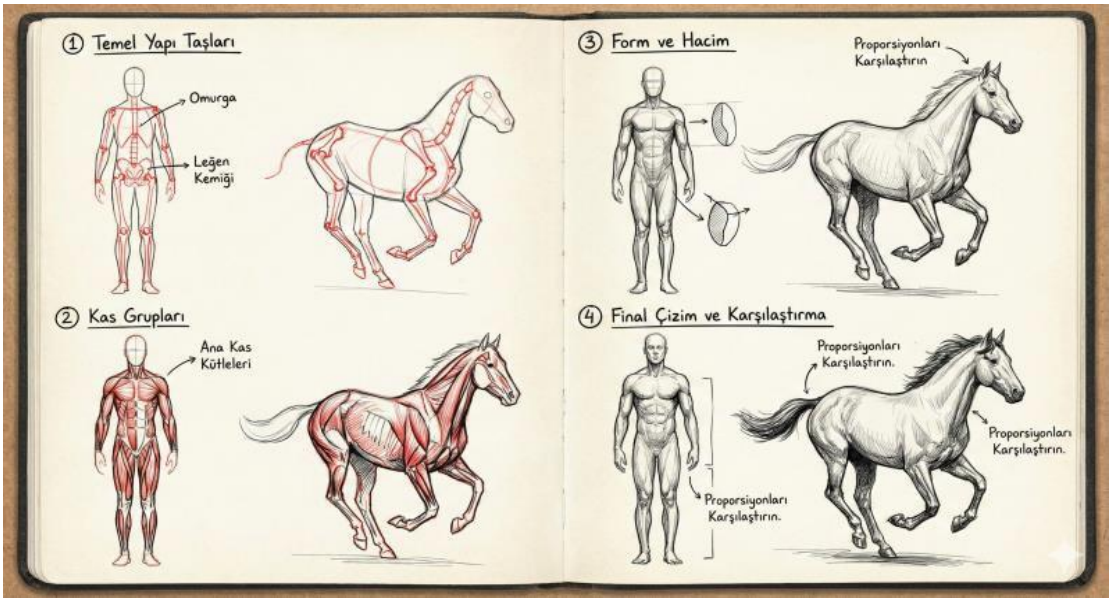


Figure 2. Anatomy drawing generated by Gemini Nano Banana 3.1. Creation date: 12/17/2025

In Figure 2, which presents a comprehensive instructional diagram, the anatomical drawing clearly illustrates the skeletal structure, muscle depiction, and volume creation. It is designed in accordance with the "step-by-step analysis" method commonly seen in art education. This enables it to possess the qualities necessary to visually convey a drawing teacher's conceptual explanations.

In the first section, both human and horse anatomy are presented using a simple schematic. Connection lines are used for the spine, pelvis, and major joints. This helps students learn the stages of anatomy without getting confused while studying proportions.

In the second stage, the muscular structures of both the horse and the human are shown through general forms without delving into muscle details. Drawing the horse's muscular structure is particularly challenging for students. This simple representation of muscle masses fulfills the intended function expected of the teacher's drawing.

The third section presents volumetric representations. The depiction of cylindrical and spherical volumes drawn from different angles is intended to establish a connection with geometric principles. This is a widely used teaching strategy for reinforcing three-dimensional perception.

In the final section, drawings of human and horse figures are presented side by side, and proportional relationships are demonstrated through comparison. When viewed as a whole in Figure 2, it is evident that the fundamental components of basic art education are addressed within a structured framework, exemplifying a teacher's instructional style. Key features of this structure include the clear breakdown of complex anatomy into understandable parts, the consideration of specific learning objectives at each stage, the systematic progression of drawings, and the provision of examples to students through brief notes and guidance. In this context, an examination of the drawings reveals a striking example of artificial intelligence's capacity to assume the role of a teacher. This particular study goes beyond merely presenting a

visual drawing to establish an instructional framework ; it conveys analyses of proportion, figure, volume, and form within a pedagogical structure.

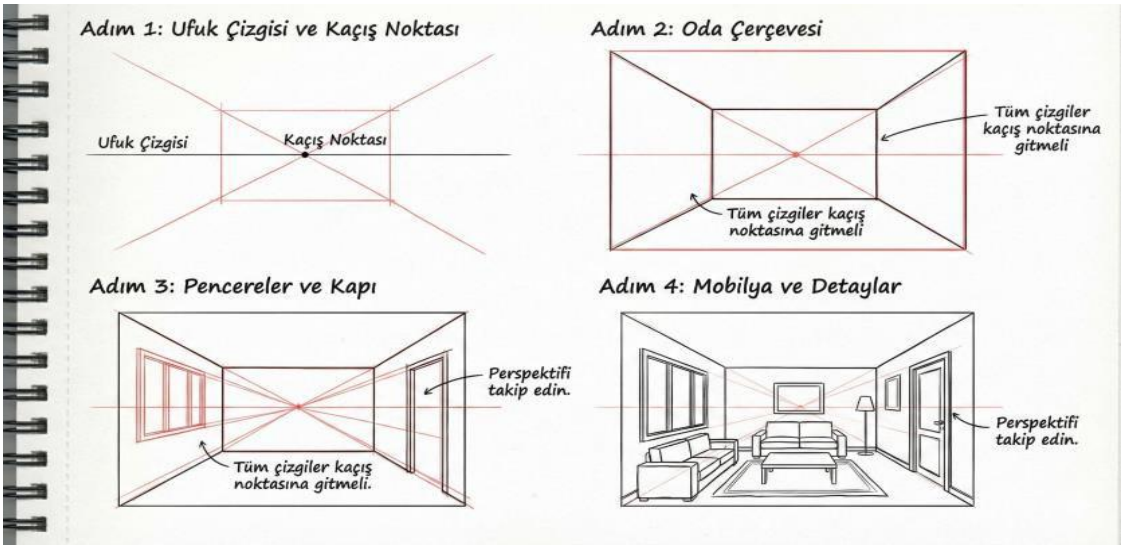


Figure 3. Perspective drawing generated by Gemini Nano Banana 3.1. Creation date: 12/17/2025

The perspective lesson shown in Figure 3 is presented in the form of a teaching diagram for one-point interior perspective, a method frequently used in basic art education. The steps are organized in a clear and understandable manner to ensure every student can grasp the spatial composition. In this regard, the drawing visualizes a lesson that a teacher would explain step-by-step on a blackboard.

In the first step, the horizon line and vanishing point were established; all perspective relationships were explained based on these fundamental concepts. The opposite wall was drawn as a rectangle, and lines were drawn from the vanishing point on the horizon line to its corners. In this way, the room's layout was defined by the ceiling, floor, and side walls. In the next step, doors and windows were added to the side walls. A key point here is that all non-horizontal and non-vertical lines are directed toward the vanishing point. The statement in Step 3, "all lines must lead to the vanishing point," carries pedagogical coherence by reminding students of the guidance the teacher repeatedly emphasizes in perspective lessons. The depiction of these elements and their connection to the vanishing point serves as both a control mechanism and a practical guide for the student. In Step 4, furniture and decorative elements are drawn, demonstrating that such objects and all interior elements must be placed within the same system. The "from simple to complex" principle is presented to students who may struggle with the drawing. The "from simple to complex" principle, frequently used in

basic drawing education, aims to reduce the student's cognitive load by structuring concepts in a step-by-step manner (Gagne, 2005). By presenting the steps of perspective instruction in a structured manner, it is evident that AI supports rule-based teaching processes, particularly in the technical aspects.

In the final stage, room furniture and decorative elements were drawn. This section demonstrates that perspective rules are not limited to architectural elements alone; rather, objects, furniture, wall objects, and all other interior elements must be placed within the same

system. The instruction “Follow the perspective” reflects the general guidance teachers frequently provide to their students. Additionally, the clarity of the drawings provides the explanatory quality expected of a teacher’s work. A structure progressing from simple to complex has been established to facilitate instruction.

- The fundamental concepts the student will first grasp (horizon line–vanishing point),
- followed by the main framework of the space,
- Then the addition of architectural details,
- In the final stage, the placement of all objects within the room in a perspective appropriate manner.

By clearly presenting the structured steps of perspective instruction, this demonstrates AI’s capacity to support rule-based teaching processes, particularly in technical subjects.

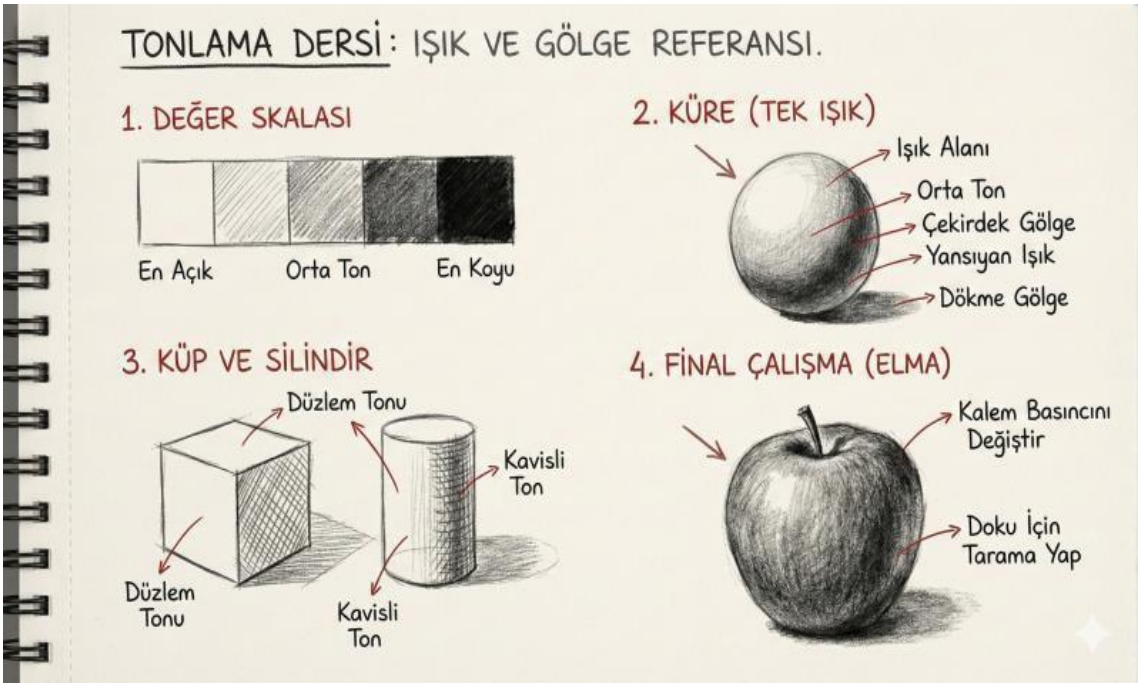


Figure 4. A drawing on shading created with Gemini Nano Banana 3.1. Creation date: 12/17/2025

Figure 4 presents a systematic four-step instructional framework for light, shadow, and shading to the student. The drawing conveys a lesson structure guided step-by-step by an instructor.

The first section displays a simple scale of light, medium, and dark tones. The gradual presentation of tonal transitions is a sound choice for accurately conveying value information.

In the second and third stages, the direction of light and shadow is indicated on specific object structures. A guide drawing has been created to help students understand the three-dimensional effect in these structures, where they often make mistakes. Analyzing tones through basic shapes is crucial for the student to perceive form correctly. Flat tonal transitions on the cube and curved tonal transitions on the cylinder have been emphasized. These two forms enable the student to distinguish the logic of shading.

In the fourth and final stage, the tonal values on the scale were applied using an apple drawing. Instructions on the apple form, such as “vary pencil pressure” and “hachure for texture,” resemble a teacher guiding students. This demonstrates that the material serves as a instructional resource that guides the process.

When viewed as a whole, Figure 4 represents a typical reflection of the “from simple to complex” principle, featuring the representation of tonal values, light relationships on a sphere, flat and curved surfaces, and a realistic application on the apple. In this regard, it serves as a strong example demonstrating a high level of instructional competence, particularly in the transfer of technical skills, in addressing the question of to what extent artificial intelligence can fulfill the teacher’s functions.

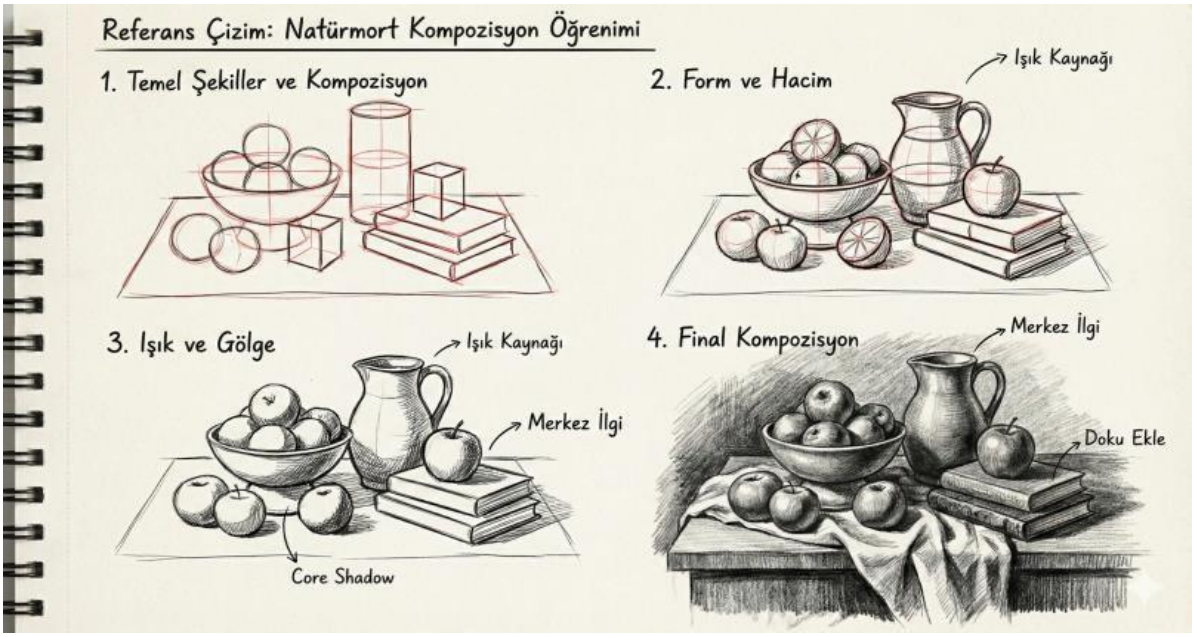


Figure 5. Still life drawing generated using Gemini Nano Banana 3.1. Creation date: 12/17/2025

Figure 5 presents an instructional framework that organizes the fundamental stages of the still life composition into four phases, allowing the student to follow both form and light-shadow relationships step by step. In this regard, the drawing consistently reflects the classical “from simple to complex” approach used in art education.

In the first stage, geometric forms such as spheres, cylinders, and prisms—which form the foundation of this still life composition—are depicted with simple lines. While arranging the composition, the relationships between the objects are clearly defined; this serves as an appropriate starting point for the student to understand compositional balance.

In the second stage, realistic forms are built upon the geometric framework. This serves as a pedagogical step that facilitates the student’s transition from abstract shapes to natural objects. The indication of the light source supports the accurate establishment of a sense of volume.

The third stage focuses on light-and-shadow analysis, which is the most critical stage. The demonstration of concepts such as the center of interest, core shadow, and cast shadows aligns with the guidance the teacher will provide. This stage is crucial for the student’s understanding of depth and the effect of realism.

In the final stage, all objects have been outlined, surface textures have been added, and the composition is presented as a whole.

Figure 5 successfully reflects the educational workflow used in still life instruction, systematically simplifying the processes of composition, volume creation, and understanding light-shadow relationships for the student. This demonstrates that AI-generated outputs provide a structural guidance similar to the teacher's drawing stages, particularly in technical subjects requiring step-by-step learning.

3.1. Artificial Intelligence Feedback and Analysis Regarding Images

The drawings in this section (Figures 6, 7, and 8) were designed to best represent the technical shortcomings that might be encountered in a real teaching environment and were drawn by the authors for the purpose of researching the subject. The primary objective was to reflect the common issues students face in basic drawing education, such as perspective errors, inconsistencies in proportions, imbalance in light and shadow, composition placement problems, anatomical flaws, shading errors, and deficiencies in line composition. The AI was asked to interpret these drawings like an art teacher and provide suggestions for improvement; its responses are presented below each figure. The analysis of the AI's feedback for each figure has been examined from the perspective of visual arts education.

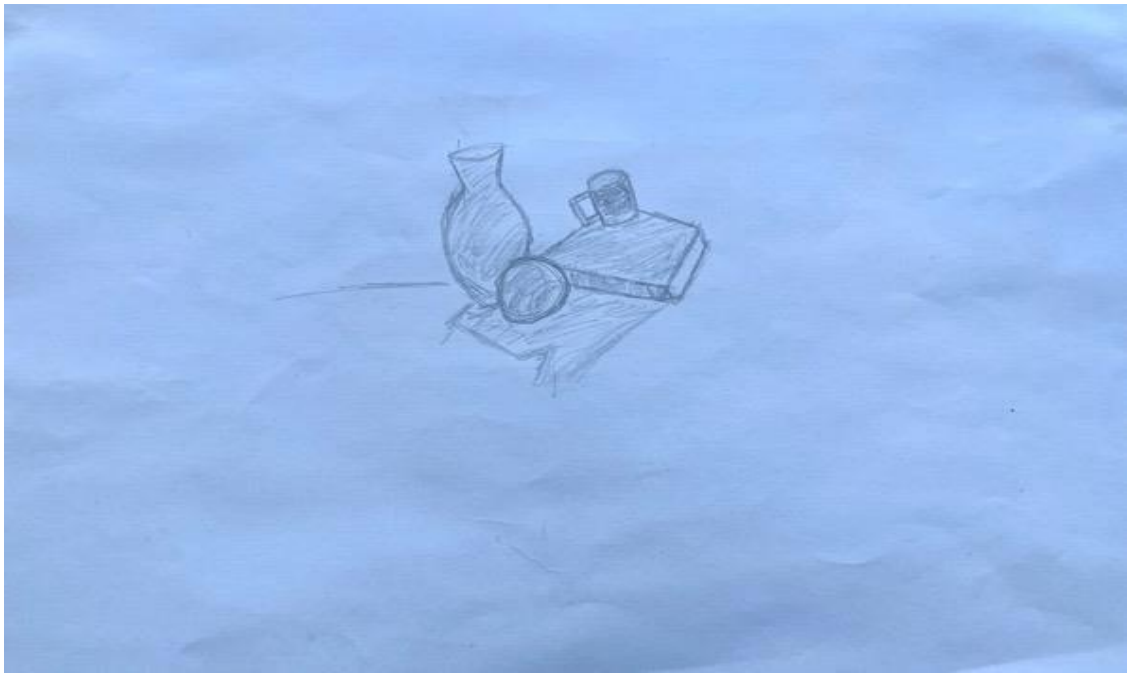


Figure 6. Still life drawing.

The feedback provided by Gemini for Figure 6 (dated December 17, 2025) is as follows:

- Life (Vase, Glass, and Magnifying Glass): You've tried to bring the objects together to create a composition, which is very good. It's nice that you're trying to understand how the objects are positioned relative to each other.

- Strength: The way you've placed the objects on the paper (the composition) is balanced.

Details like the magnifying glass's handle resting on the book show that you're trying to create a sense of depth.

- Area for Improvement (Ellipses): Let's pay attention to the openings of the vase and the cup. Right now, the tips are sharp, drawn just like an "almond" or an "eye."
- Tip: The openings of cylindrical objects (like glasses and vases) appear as ellipses (flattened circles) in perspective. Their edges are never sharp; they always curve smoothly.
- Line Quality: The lines are slightly broken (we sometimes call this a "feathered line"). Don't be afraid to draw single, confident lines. Even if they're wrong, long lines better convey the flow of the form.

The Gemini app, which we asked to evaluate the incorrectly drawn still life composition in Figure 6, provides feedback that supports the drawing. However, it remains limited and superficial in explaining the drawing's flaws and shortcomings. The failure to justify formal errors is an indication that the feedback is incomplete. For example, the objects were drawn too small, which resulted in a large empty space on the paper. The Gemini app did not provide feedback on this error, which teachers frequently encounter in student drawings. Describing the composition as "balanced" is highly debatable. The center of gravity of the objects is shifting to the left, and the distance between the vase and the book makes the composition unclear. The student's object placement lacks the maturity to create a sense of balance. The observation that "the mouths of the vase and the glass are drawn pointy" is correct, but it does not technically explain why this is incorrect. They merely glossed over the issue with the hint: "The openings of cylindrical objects appear as ellipses in perspective; their edges are not sharp but always rounded."

However, art teachers demonstrate these concepts—such as the tilt of the ellipse relative to the perspective plane, the relationship between the major and minor axes, the flattening of the ellipse based on the viewing angle, and the relationship between the upper and lower ellipses—through drawing, which helps students understand the structures of objects. Since these elements are not specified, factors that would contribute to the development of the drawing are missing. The student also makes mistakes in identifying the objects. It is clear that the object on the book is a coffee cup, not a magnifying glass. The contact between the cup and the book is problematic compared to the relationship between the vase and the table. The book is drawn on a plane where it would fall, yet no specific feedback is provided regarding this. Gemini has failed to notice this fundamental error. In particular, the shading is inconsistent, directionless, and incoherent. Light and shadow are the most important elements in defining both form and space. Gemini's evaluation has overlooked this issue. Yet, in the still life painting Gemini produced, light and shadow are clearly expressed. In the researcher's drawing, the objects lack cast shadows. The direction of the light source is unclear. This prevents the drawing from achieving a sense of volume. This deficiency is a flaw from an educational perspective.

It described the line quality as "fuzzy lines" and advised against "drawing long lines." While

this suggestion is correct, it constitutes a general recommendation without establishing a cause-and-effect relationship. It would be more explanatory for the student if it were noted that the uncertainty of the lines might stem from the ambiguity of form, that the object contours are drawn with the same thickness, and that the line pressure does not vary in the volumetric areas. The proportions of the objects in the drawing are incorrect. The vase appears smaller than the glass. The edges of the book do not conform to perspective. Gemini has overlooked these significant errors, focusing only on formal and superficial observations.



Figure 7. Anatomy drawing.

The feedback provided by Gemini for Figure 7 (dated 12/17/2025) is as follows:

- Figure (Person Sitting in a Chair): Figure drawing is difficult, but you've made a good start in capturing the proportions. You've managed to convey that "relaxed" posture of the model onto the paper.
- Strength: Movement and posture are very clear. You've grounded the action of crossing one leg over the other and the positioning of the arms on a anatomically sound foundation.
- Area for Improvement (Proportions and Feet): Is the head perhaps a bit small in

proportion to the body? Generally, shoulder width is about twice the width of the head—you can use that as a reference.

- The feet are currently in "block" form (which is a great method at this sketching stage!), but before getting into shoe details, we could focus a bit more on how the ankle connects to the leg.

- Study Lines: The hatching on the arms and legs seems to be done to explore the form rather than light and shadow. These “study lines” are very valuable—you don’t need to erase them; you can simply add darker (accent) lines on top to define the main contours.

In its analysis of the given figure drawing, Gemini uses positive and motivating language. This is the language used by virtually all AI applications. However, an art teacher would explain the key points a student should pay attention to. In particular, the fundamental components of drawing—such as posture, proportions, spatial relationships, and anatomical consistency—are demonstrated in detail. In contrast, Gemini has not sufficiently explained these components. This indicates that the AI tends to interpret the drawing superficially. Gemini mentions the figure’s relaxed posture and the clarity of the pose. However, this is not the case, as evidenced by the inconsistency between the figure’s torso and the pelvic line. While the torso faces forward, the lower body is angled to the right. There is a lack of balance in the relationship between the figure’s weight and the chair. Although the upper body appears to be leaning back, the shoulder width and arm positioning do not support this. The way the left arm rests on the chair is anatomically incomplete, with an undefined and flawed form. Gemini only mentioned the smallness of the head but overlooked the obvious flaws. The legs are disproportionate to the torso, the feet have lost volume, the portrait is indistinct, the excessively long structure of the left arm creates an elastic appearance, the right foot appears to be in the air, and there are fundamental errors such as the relationship between the figure and the space. These flaws should have been addressed in the evaluation. Furthermore, Gemini interpreted the hatching in the drawing as a study line, whereas the hatching was applied haphazardly, lacks direction, and does not follow the form—aspects that were not evaluated.

It has not addressed fundamental errors such as the misalignment of the facial axis, the distortion of the eye-mouth lines, and the chin ratio, and the anatomical structure of the hands has been drawn incorrectly. Failing to address such shortcomings is evidence that the AI’s ability to select details is limited.

It demonstrates that while artificial intelligence can partially mimic the comprehensive and multi-layered analysis method used by the instructor in figure drawing, its capacity for selecting details and making holistic evaluations is not yet sufficiently developed.

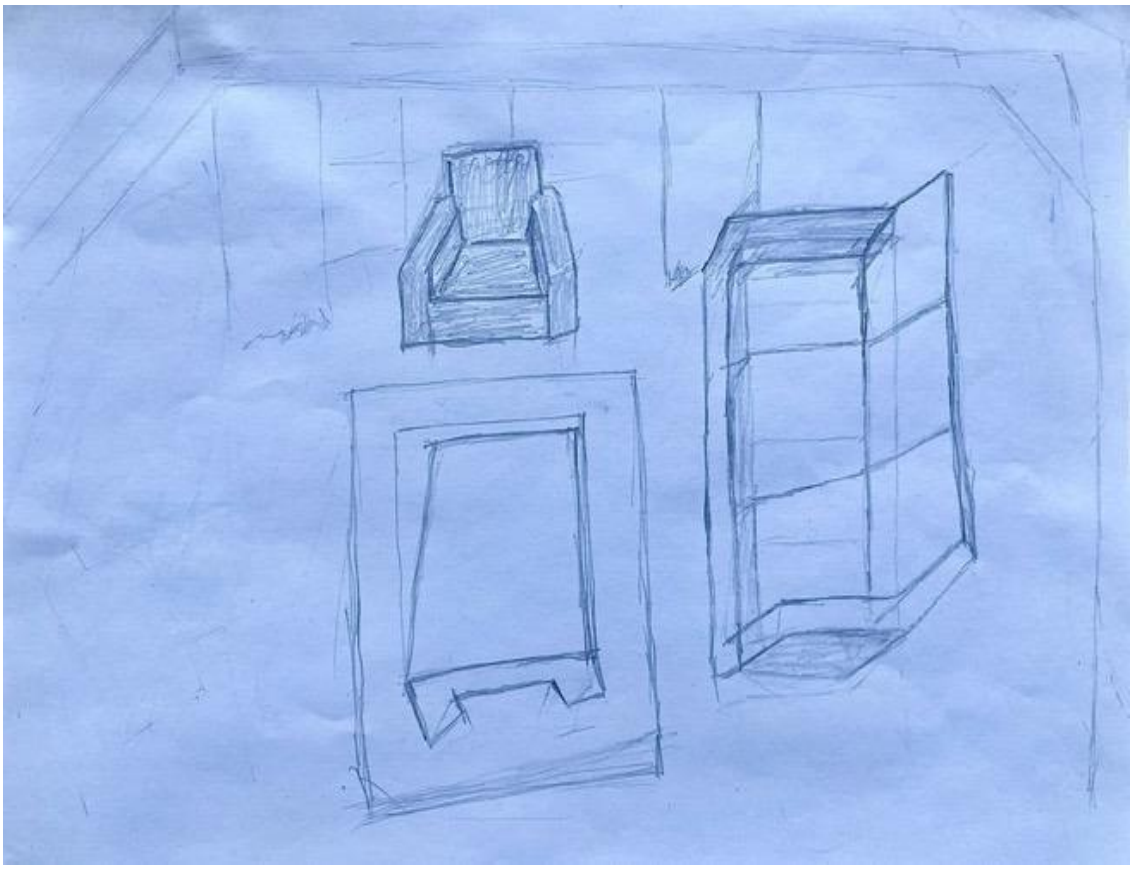


Figure 8. Perspective drawing.

The feedback provided by Gemini for Figure 8 (dated December 17, 2025) is as follows:

- Space and Perspective (Indoor Scene): Spatial drawing is based entirely on mathematical logic. Here, I see a room, a rug, a sofa, and a cabinet. Your attempt to convey depth is very nice.
- Strength: You've drawn the objects by considering the space they occupy on the floor. You've correctly captured that vertical lines (such as the sides of the cabinet) should be parallel to the edge of the paper.
- Area for Improvement (Vanishing Point): The most important rule in perspective is that parallel lines (such as the side edges of the rug or the top and bottom edges of the cabinet) converge at a single point on the horizon.
- Right now, the cabinet's lines seem to be going in one direction, while the rug's lines are going in another. This can make the objects look as if they're floating in a weightless environment.
- Suggestion: Try drawing an imaginary Horizon Line at the back of the paper and extending all the depth lines to a single point on that line (the Vanishing Point).

Finally, Gemini offered the following general comment on your drawings:

‘My Overall Assessment: Your coordination between what you see and what you draw is quite good for a beginner. What you need right now is a bit more technical knowledge (such as the logic of ellipses and one-point perspective) and plenty of practice. In your next drawing, which do you think would help you improve more: using smoother lines, or mastering the rules of perspective?’

In this regard, while Gemini’s mention of the mathematical logic in the spatial drawing for Figure 8 is positive, Gemini overlooks the fact that this mathematical logic is riddled with obvious drawing errors. Although it acknowledges some errors to some extent, it has not demonstrated the correct way to draw flaws such as cabinet lines or carpet lines. It has merely brushed them off with a suggestion. Where exactly should the horizon line and vanishing point be located? At the junctions of the ceiling and walls, the intersection lines diverge in different directions, failing to support the concept of a single horizon line.

The square-rectangular sections in the back of the room do not converge toward the same vanishing point. A teacher would point out this error first. While the rug, coffee table, and the chair on the side are shown from a top-down view, the chair facing the viewer is depicted from the front. This also causes ambiguity in the perspective. The drawing appears to have multiple vanishing points, yet if the interior scene were drawn with a single vanishing point, all lines should converge toward that single point.

In addition to demonstrating the correct drawing in practice, a teacher would address the following points in the drawing:

- The rug appears disproportionately large compared to the chair.
- The sofa is positioned too far forward and appears too large relative to the back wall of the room.
- The cabinet on the right was drawn with a different sense of scale relative to the sofa, resulting in inconsistent spatial depth.
- Which surface faces the viewer,
- Which surface is converging in perspective,
- How the three-dimensional volume of objects is perceived.

Gemini has completely overlooked all these points. The feedback consists mostly of superficial comments, and the essential components of perspective drawing—such as the vanishing point system, spatial integrity, scale and proportion, object-ground relationships, and perspective consistency—have not been sufficiently examined. This situation reveals that artificial intelligence can only partially replicate the teacher’s ability to perceive details, read space as a whole, and detect technical errors in perspective analysis.

Overall, this study provided an opportunity to evaluate, within a controlled research environment, how drawing-based errors can be addressed from an instructional perspective

and how various dimensions of teaching roles can be examined; it also facilitated a systematic analysis of the explanation, guidance, and technical instruction processes used in basic art education.

The prepared drawings were evaluated using an approach similar to the teaching process; each error in the drawing was explained, points requiring correction were identified, and technical recommendations for improvement were presented. During the evaluation phase, functions corresponding to teaching roles—such as the use of explanatory instructional language, the ability to provide step-by-step guidance, presenting a conceptual framework, performing technical verification, and developing alternative solutions—were taken into account . Thus, each drawing was treated as an independent data source for examining the different dimensions of teaching roles.

The findings of the first research question pertain to the five reference drawings generated by artificial intelligence. These drawings demonstrated structural accuracy in the areas of proportion, perspective, anatomy, still life, and shading as requested. The drawings were frequently presented according to the "from simple to complex" principle. The depiction of anatomy with a simple structure, the systematic construction of perspective, and the transition from geometric elements to still life drawing demonstrate that the AI is quite successful in modeling technical processes. However, in its role as an instructor, it exhibited a more limited performance in establishing cause-and-effect relationships and providing conceptual and pedagogical justifications.

The findings for the second research question include feedback on three erroneous drawings created by the researcher. Although the AI correctly identified technical issues, the feedback was generally superficial, brief, and lacking in pedagogical depth.

4. Discussion

One study emphasizes that artificial intelligence directs the teacher toward personalized guidance, stating, "Artificial intelligence does not replace human teaching but enhances the teacher's ability to provide personalized, knowledge-based, and creativity-focused guidance" (Kataria et al., 2025, p. 399).

The findings of this study reveal that, within the context of basic art education, artificial intelligence can assume teaching roles to a limited and context-dependent extent; however, this role does not encompass the holistic pedagogical structure. In particular, it was observed that artificial intelligence demonstrates a high degree of consistency in technical knowledge transfer, step-by-step visual instruction, and rule-based teaching processes. This aligns with Alan Turing's approach, which argues that the capacity of artificial intelligence to mimic cognitive processes should be evaluated through behavioral outputs.

The reference drawings examined in the study, ranging from Figure 1 to Figure 5, demonstrate that artificial intelligence can create instructional schemes progressing from simple to complex in areas such as proportion, perspective, anatomy, and shading. This finding parallels Robert Gagné's (2005) instructional theory, which states that learning is more effective when presented

in a structured and sequential manner. Indeed, the fact that visuals generated by artificial intelligence offer a systematic structure similar to a teacher's in-class demonstrations suggests that these tools could serve as powerful supplementary materials, particularly in demonstration-based instruction.

However, the analysis of feedback provided for incorrect drawings (Figures 6, 7, and 8) clearly demonstrates that artificial intelligence has significant limitations in assuming the role of a teacher. In most cases, AI was able to identify technical errors superficially; however, it fell short in explaining the causes of these errors, highlighting their impact on the integrity of the drawing, and offering alternative solutions. This finding aligns with the work of John Hattie and Helen Timperley (2007), who explain the impact of feedback on learning through the concept of "effective feedback"; it supports the notion that effective feedback is not merely about pointing out errors but about structuring the learning process.

In particular, the findings shown in Figures 6, 7, and 8 reveal that artificial intelligence remains limited in pedagogical intuition, contextual assessment, and holistic reading skills (Holmes et al., 2019; Zlateva, 2025). This result directly aligns with the view, emphasized by Wayne Holmes (2019) in his discussion of AI's role in education, that "human-specific teaching qualities cannot be fully simulated." Indeed, this study also found that while artificial intelligence is strong in terms of technical accuracy and speed, it performs teaching functions—such as helping students make sense of the drawing process, contextualizing errors, and deepening the learning experience—only to a limited extent.

Studies in the literature also support these findings. For example, Tong et al. (2023) note that while AI is actively used in the production process, it creates uncertainties regarding learning ownership; Sari and Kurniawan (2024) state that AI transforms pedagogical processes but cannot fully replace them. Similarly, Aneliya Zlateva (2025) has demonstrated that while AI-generated works are technically robust, they are perceived as limited in terms of artistic depth and expressive power. The findings of this study also support these works, showing that AI is strong in technical production but limited in pedagogical depth.

The research also reveals that a key factor in AI's ability to assume a teaching role is its dependence on the prompt process and the variability of its outputs. This indicates that AI functions as a system that varies based on user guidance rather than providing a fixed teaching standard. Therefore, AI should not be viewed as a teacher in the traditional sense but rather as a tool that gains meaning under the guidance of a teacher.

Overall, this study reveals that artificial intelligence occupies a dual role in basic art education:

- A powerful auxiliary tool for the transmission of technical knowledge, visual demonstration, and rule-based instruction,
- A limited system in terms of pedagogical intuition, contextual interpretation, and artistic guidance.

In this context, the role of artificial intelligence in education should not be positioned as an actor replacing the teacher; rather, it should be situated as a complementary teaching tool that supports the teacher's pedagogical functions, particularly by alleviating their technical workload.

Chen and colleagues (2022) presented a concrete application example of using artificial intelligence as an assistant in color perception and education. The supportive role of artificial intelligence can also be examined through the results of this study, specifically regarding color—one of the key topics in foundational art. In the study conducted by Hu and Li (2025), it is possible to observe the direct impact of AI tools and scripts on the development of artistic skills.

It should also be noted that creativity is another factor that can fuel the educational and production processes in the visual arts. The study conducted by Aru (2005) on how artificial intelligence triggers the internal processes of creativity is significant for its explanation at the cognitive level.

On the other hand, this also creates a need for a guide or facilitator who can manage digital visual culture and guide students within this new ecosystem. Additionally, it is clear that, within the digital visual culture environment and as a result of current conditions, artificial intelligence requires a new form of digital visual literacy by altering students' visual perceptions and modes of production. It has been established that, given the current conditions, art teachers must possess digital pedagogical competencies not only in traditional techniques but also in defining the ethical and aesthetic boundaries of AI tools within the artistic process (Bedir Erişti & Freedman, 2024).

5. Conclusion

This study was conducted to assess the extent to which artificial intelligence can assume the role of a teacher in basic art applications; both reference drawings generated by artificial intelligence and the feedback provided on incorrect drawings were analyzed comprehensively. In this context, one of the two primary tasks assigned to artificial intelligence is to create reference drawings like a teacher. The second task was to examine the erroneous drawings created by the researcher, identify and explain the errors, and provide suggestions for improvement—again, acting like a teacher. The analysis of these data was structured based on pedagogical approaches and technical drawing principles used in art education.

The findings of this study enable an evaluation of the AI's teaching role in basic art education from technical, pedagogical, and conceptual perspectives. The feedback provided on the five reference drawings generated by the AI and the researcher's three flawed drawings offered various indicators regarding the extent to which the AI could fulfill its teaching functions.

In Figure 1, the human figure generated by the AI has been correctly applied in terms of academic proportions. While the proportional relationships between the head, torso, legs, and feet are largely accurate, a deviation in proportions relative to the eye-to-head line was observed in the placement of the ears. This indicates that while the AI possesses knowledge of proportions, it has limitations in applying this knowledge with geometric precision.

In Figure 2, the AI presented a drawing consistent with academic drawing principles; skeletal and muscular masses were structured in a stepwise manner, and a part-to-whole approach was

adopted. The findings indicate that the AI possesses the capacity to provide visual guidance similar to that of a teacher's drawing.

In the drawing shown in Figure 3, where the AI generated a one-point perspective, the horizon line and vanishing point are clearly depicted. This demonstrates that the rule-based structure of the perspective, with all depth directed toward the vanishing point, is accurately conveyed. This finding indicates that the AI possesses a systematic and structured approach to visual representation.

In the image shown in Figure 4, the AI clearly demonstrates light-shadow and shading in geometric forms. The transition from simple forms to a three-dimensional object indicates that it can provide a pedagogical structure in shading instruction.

In the drawing shown in Figure 5, the composition is seen to progress through a stage that begins with geometric forms and extends to light-shadow and texture. The composition layout, volume, and shading processes are presented in a sequential manner, forming a schema consistent with the principle of moving from simple to complex.

In Figure 6, which is an example of a still life drawing, errors and omissions were identified in the feedback provided by the AI. However, the most significant point in this example is the inadequacy of the AI's feedback regarding the erroneous parts of the drawing. The findings indicate that while the AI adopted a constructive approach toward the flawed drawing, it remained limited in terms of pedagogical justification and conceptual understanding.

In the drawing in Figure 7, which contains serious errors in anatomy and shading, the AI was observed to evaluate the figure's posture positively. This data serves as evidence that the AI's ability to interpret anatomical details in figure drawing is insufficient.

In Figure 8, a drawing with numerous perspective errors, it was observed that while the AI addressed the vanishing point, it could not analyze in detail the fundamental errors creating the impression of multiple vanishing points in the space. The feedback provided for Figure 8 clearly demonstrates that the AI lacks the ability to interpret spatial integrity in the drawing.

The findings indicate that the AI demonstrates a high level of proficiency in terms of technical accuracy, rule-based explanations, and the creation of step-by-step visual models. In particular, the progressive content it provides in the areas of proportion, perspective, shading, and anatomy aligns significantly with the instructional strategies used in basic art education. The findings reveal that AI demonstrated consistency in rule-based and technically demanding stages. However, it exhibited a more limited and superficial performance in terms of conceptual understanding and providing pedagogical justifications. When all findings are examined, it is evident that while artificial intelligence is successful in rule-based, technical, and step-by-step instruction in basic art education, it falls short in establishing cause-and-effect relationships, providing conceptual justifications, demonstrating pedagogical intuition, and conducting holistic evaluations.

In general, in light of these findings, it is currently observed that artificial intelligence occupies a dual position in art education: first, as a strong instructional support in technical matters, and

second, as a limited tool in terms of pedagogical intuition, affective guidance, and contextualization.

Within this framework, the central conclusion of the discussion is that artificial intelligence should be viewed not as an actor capable of replacing the teacher, but rather as an auxiliary material used under the teacher's guidance. In particular, the accuracy and speed it offers in rule-based technical drawing serve to support the teaching process; however, findings indicate that it cannot replace the teacher in explaining why a drawing should be done in a certain way, transforming the student's way of thinking, or developing their artistic perception.

Furthermore, considering that the role of artificial intelligence in teaching is not limited to technical explanations, one of the findings of the study is that artificial intelligence demonstrates limited performance in pedagogical functions such as establishing a conceptual framework, providing an art-historical context, making intuitive comments on the student's cognitive process, and transforming errors into learning opportunities. AI's feedback primarily relies on brief explanations centered on error-correction; in this regard, it does not fully address the teacher's role in guidance and intuition.

The role expected of artificial intelligence is not merely to identify errors, but also to justify, explain, and incorporate corrective steps into the process. The goal is to establish a framework that guides the student's developmental process. In this regard, the assessments conducted by AI in its role as a teacher are expected to include and articulate the following key points:

- Providing feedback on perspective-related issues such as the horizon line, vanishing points, volumetric errors, light-shadow transitions, and composition placement, and specifying the steps to correct these errors.
- Regarding anatomy: providing feedback on errors in proportions, movement, and shading, and offering steps to correct these errors.
- Regarding still life drawing: identifying and evaluating drawing errors such as composition placement, balance, light and shadow, shading, and shape distortion, and demonstrating the correct drawing step by step.

These classifications provide an analytical framework aimed at explaining in which areas instructional competence is met and in which areas it remains limited.

When considered in light of Alan Turing's evaluation criteria for cognitive functions, previously mentioned in the article's introduction, all the findings support the idea that artificial intelligence assists the teacher, particularly in terms of knowledge transfer, rule explanation, and technical verification. However, it is understood that AI can only perform human-specific functions such as value transmission, pedagogical intuition, contextual sensitivity, and creative guidance to a limited extent.

Consequently, it seems more appropriate to evaluate artificial intelligence in basic art education as a tool that lightens the teacher's workload, accelerates the teaching process, and

provides students with an additional technical resource. In this regard, it is anticipated that artificial intelligence will strengthen its role in art education in the coming years through updates and more advanced models. For now, it should be positioned as a supplementary teaching material used under the guidance of a specialist teacher.

5.1. Recommendations

Based on the findings of this study, the following recommendations have been developed regarding the use of artificial intelligence in basic art education.

It is recommended that artificial intelligence be positioned not as a substitute for the teacher, but as a supportive tool that aids the teaching process. Research findings indicate that artificial intelligence demonstrates high proficiency in technical knowledge transfer, step-by-step visual modeling, and rule-based teaching processes; however, it can only partially address teacher-specific qualities such as pedagogical intuition, contextual sensitivity, and affective feedback. Therefore, it appears more appropriate to evaluate artificial intelligence as a supplementary teaching material used under the teacher's pedagogical guidance.

It is recommended that the use of artificial intelligence in basic art education be limited primarily to technical and rule-based topics. The findings reveal that artificial intelligence produces successful results in areas where rules can be clearly defined, such as proportion, perspective, shading, and anatomy. In contrast, teacher intervention is deemed essential in situations requiring an understanding of the figure's relationship with space, weight balance, the intuitive structuring of composition, and conceptual justification. Accordingly, artificial intelligence should be used in the teaching process primarily to support technical topics.

It is recommended that feedback from artificial intelligence be filtered through a pedagogical lens by the teacher before being presented to the student. It was observed that the AI feedback provided for the erroneous drawings examined in the study was largely based on superficial and brief explanations; it did not sufficiently address the causes of the errors or the rationale for corrections. This situation indicates that feedback from AI should not be conveyed directly but rather interpreted under the teacher's guidance before being communicated to the student.

In AI-supported art education, it is recommended to strengthen pedagogical frameworks aimed at establishing cause-and-effect relationships. Research findings reveal that while artificial intelligence can answer the question "how to draw?", it falls short in explaining "why it is drawn this way". Therefore, in AI-supported teaching processes, the teacher must particularly emphasize conceptual explanations, the art historical context, and the rationale behind technical choices.

It is recommended that AI-assisted art instruction be structured in a way that does not overshadow the student's manual dexterity and linear development. The research suggests that AI-generated images can serve as a strong reference for students; however, the overuse of these references may negatively impact the student's individual search for a personal style and hand-eye coordination. Therefore, AI should be used not as a direct copying tool, but for the purposes of analysis, interpretation, and comparison.

It is recommended that AI-supported teaching applications be addressed in teacher training programs. The findings of this study indicate that it is important for art teachers to understand AI within its pedagogical boundaries. Providing pre-service teachers with training that enables them to distinguish the strengths and limitations of AI-supported teaching tools will support the conscious use of these technologies.

This study was conducted within the context of elementary art education. It is anticipated that AI may yield different pedagogical outcomes at the elementary, secondary, and higher education levels. Therefore, future research could comparatively examine the effects of AI-supported instruction according to the learners' educational level. Additionally, future studies could also examine the effects of artificial intelligence on different age groups and learning levels in a comparative manner.

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Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

Author contributions

Efraim Bayır: Conceptualization, Visual Production, Drawing Analysis, Data Interpretation, Manuscript Drafting.
Büşra Meydan: Methodology Design, Literature Review, Theoretical Framework Construction, Academic Revision, Final Manuscript Editing.

Ethical considerations

Since the data has not been collected from human(s) within the research, it is not subject to ethics committee approval.

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