

**APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) TO ENHANCE THE
EFFECTIVENESS OF TEACHING ART EDUCATION FOR PRIMARY EDUCATION
STUDENTS AT HAI PHONG UNIVERSITY**

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ABSTRACT

In the context of educational digital transformation and the growing prevalence of artificial intelligence (AI) tools, integrating AI into Art Education within teacher-training institutions has become an essential trend. This study investigates and implements AI applications to enhance the effectiveness of teaching the Art Education course for Primary Education students at Hai Phong University. The research methods include a student needs survey, an analysis of AI tools supporting visual creation and product assessment, a teaching experiment conducted with control and experimental groups, and in-depth interviews with lecturers and students. The results demonstrate that AI integration improves students' ability to visualize ideas, strengthens creative skills, expands visual reference resources, and enhances the quality of artistic products. The discussion highlights advantages such as increased interactivity and personalized learning support, while also addressing limitations related to digital competency and technological dependence. The study concludes that AI contributes to innovating teaching processes, boosting student engagement, and fostering professional competencies for future primary school teachers.

Keywords: Artificial intelligence; enhancement; Art Education teaching; Primary Education; teacher training.

1. INTRODUCTION

In the context of Vietnam's national digital transformation being strongly promoted by the Government, higher education is facing an urgent demand for comprehensive innovation to adapt to technological trends and enhance training quality. Official documents such as Decision No. 749/QĐ-TTg approving the *National Digital Transformation Program* [11] and Decision No. 131/QĐ-BGDĐT issuing the *Digital Transformation Program of the Education Sector for the period 2022–2025* [4] emphasize the application of Artificial Intelligence (AI) in teaching and learning, the development of digital learning resources, and the personalization of education. In particular, the *Digital Transformation Index for Higher Education Institutions* (Decision No. 4740/QĐ-BGDĐT, 2022) clearly defines the requirement to integrate AI technologies into teaching activities [5].

For teacher-training institutions, especially those in the field of Primary Education, the application of AI in Art Education contributes to renewing teaching methods, enhancing visualization, and fostering students' creativity. However, in practice, there remain limitations regarding digital learning materials, technological competencies, and opportunities for personalized instruction.

Grounded in the theoretical framework of AI-based pedagogy and the application of artificial intelligence in Art Education, this paper analyzes the current situation of teaching Art to Primary Education students at Hai Phong University. It then proposes several solutions aimed at improving the quality of Art Education instruction, promoting students' creativity and autonomy, and strengthening the use of technology in lesson design, digital learning material development, and artistic product evaluation. These efforts ultimately contribute to innovating teaching methods and meeting the requirements of digital transformation in primary teacher education today.

2. CONTENT

2.1. Research on the Application of Artificial Intelligence in Teaching

In recent years, the application of Artificial Intelligence (AI) in education, particularly in Art Education, has become a global trend attracting growing academic interest. International studies by Amini (2025) [1] and Blair (2025) [2] affirm that generative AI assists learners in conceptualizing ideas, visualizing images, fostering creative thinking, and improving the quality of artistic products. Moreover, AI contributes to transforming pedagogical approaches by enabling personalized learning and enhancing interaction between learners and technology.

In Vietnam, key policy documents such as Decision No. 749/QĐ-TTg (2020), Decision No. 131/QĐ-BGDĐT (2022) [11], and Decision No. 4740/QĐ-BGDĐT (2022) [5] have identified the integration of AI as a central component of the education sector's digital transformation. Domestic research, including studies by Dinh Thi My Hanh & Tran Van Hung (2021) [7] and Doan Hong Nhung et al. (2024) [8], emphasizes that AI offers numerous opportunities for pedagogical innovation while presenting challenges related to digital literacy and ethical technology use.

Notably, the article by Viet Nam – Cuba Primary School (2025) [3] demonstrates the practical feasibility of incorporating AI into Art Education, showing how it increases students' engagement and creativity. However, research on the integration of AI in teacher education, particularly within Primary Education programs at local universities, remains limited. Therefore, continued investigation and implementation of AI in teaching Art to Primary Education students are essential to fill both theoretical and practical gaps in this field.

2.2. Artificial Intelligence and AI Tools in Higher Education

2.2.1. Artificial Intelligence

Artificial Intelligence (AI) refers to the intelligence created by humans through software and machines, in contrast to the natural intelligence of humans and other living beings. It is a branch of computer science that studies how to enable computers to think and act like humans.

According to John McCarthy (2007), AI is “the science and engineering of making intelligent machines, especially intelligent computer programs that can understand human intelligence without being limited to biologically observable methods.” Common examples of AI applications include self-driving cars, virtual assistants such as *Gemini* and *Character.AI*, translation software, and virtual opponents in digital games [6].

Similarly, Stuart Russell and Peter Norvig (2021) define AI as “the art of creating machines capable of performing functions that require human intelligence, such as reasoning, decision-making, and problem-solving” [10].

In summary, AI can be understood as the “thinking ability” of machines, where systems are programmed to simulate human reasoning and learning processes in order to solve problems of varying

complexity. In other words, AI represents a human-created form of intelligence that enables machines to reason, make decisions, communicate in natural language, and continuously learn, adapt, and improve through experience and data. Through these capabilities, AI gradually demonstrates human-like cognitive characteristics, enhancing work efficiency and supporting humans across multiple domains of life and education.

2.2.2. Some Artificial Intelligence Tools in Higher Education

In contemporary higher education, Artificial Intelligence (AI) plays an increasingly vital role through various tools that enhance both teaching and learning effectiveness. Several prominent and widely used AI tools include Gemini, Learnt.AI, and Character.AI. According to Doan Hong Nhung et al. (2024) [8], these tools represent typical examples of how AI is being integrated into higher education to support lecturers and students.

Gemini, an intelligent chatbot developed by Google based on the LaMDA language model, enables natural and interactive communication with users. It can answer questions, provide information across diverse fields, and assist lecturers and students in research, learning activities, and lesson preparation.

Learnt.AI is an online platform that supports lecturers in designing lessons, generating questions, exercises, and automated assessments. This application helps save time, improves lecture quality, and suggests instructional activities aligned with specific learning objectives, contributing to a more efficient and creative teaching process.

Character.AI allows users to create and converse with virtual characters of their own design. In teaching, it helps simulate learning scenarios, create flexible communication environments, and foster engagement and interaction among learners.

Overall, AI tools are contributing to the innovation of higher education models, making teaching and learning more dynamic, personalized, and effective. Although still in its early stages, AI is expected to continue advancing, creating significant breakthroughs in the future of higher education.

2.3. Advantages and Challenges in Applying AI to Art Education for Primary Education Students at Hai Phong University

2.3.1. Advantages

At Hai Phong University, the implementation of AI in teaching specialized subjects—particularly in Art Education—has been strongly promoted within the broader context of educational digital transformation.

First, regarding policies supporting digital transformation, the university has been following the orientations outlined in the *Education Sector Digital Transformation Program* under Decision No. 131/QĐ-BGDĐT (2022) [4]. This policy serves as an essential foundation for the university to gradually integrate digital technologies, including AI, into teaching activities, academic management, and the development of digital learning resources. It provides favorable conditions for both lecturers and students to access and apply modern technologies in teaching and learning.

Second, in terms of diverse and accessible AI tools, students in the Primary Education program have begun utilizing platforms such as DALL·E, Canva AI, Midjourney, and Stable Diffusion to sketch ideas, simulate artistic styles, and create visual illustrations for lessons. The

use of these AI tools makes Art Education lessons more intuitive and engaging while encouraging students to express their individual creativity.

Third, AI contributes to enhancing creativity and pedagogical competence. Through the use of AI in lesson design, visual learning materials, and classroom simulations, students at Hai Phong University have opportunities to strengthen their instructional design skills, integrate technology into teaching, and meet the requirements of primary education in the era of digital transformation.

2.3.2. Challenges

Several challenges have been identified in the implementation of AI in Art Education for students at Hai Phong University:

Limited digital competence: A portion of students still lack proficiency in using digital tools, particularly advanced AI platforms, which hinders the uniform application of AI across classes and reduces the effectiveness of learning activities.

Dependence on technological infrastructure: The university's infrastructure—including internet connectivity, learning equipment, computer labs, and user access to AI tools—is sometimes insufficient or inconsistently available among classes, affecting both the learning process and students' practical experiences.

Risks associated with generative content: AI-generated images or materials may occasionally be inaccurate, pedagogically inappropriate, or culturally unsuitable. This requires lecturers to monitor outputs carefully and guide students toward responsible and ethical AI use in education.

Lack of standardized teaching materials and models: Currently, there are few official documents or teaching frameworks on integrating AI into Art Education at teacher-training institutions, including Hai Phong University. The absence of standardized materials and procedures makes it difficult for lecturers to design lessons effectively and to evaluate the pedagogical outcomes of AI-based instruction.

2.4. Proposals for Applying AI in Art Education for Primary Education Students at Hai Phong University

2.4.1. Using Generative AI to Support the Formation and Development of Creative Ideas

Generative AI, with tools such as DALL·E, Midjourney, Stable Diffusion, and Canva AI, has become an essential resource in Art Education due to its ability to generate images directly from text descriptions. The application of these tools enables students to visualize ideas quickly, experiment with various artistic styles, and flexibly explore composition and color. This is particularly beneficial for students who are unsure how to begin or lack visual references to stimulate creative thinking.

The purpose of this approach is to help students overcome initial barriers in the creative process, expand their imagination, and develop visual thinking skills. With AI support, students can access a wide range of artistic expressions, providing a solid foundation for diverse and in-depth art practice. Numerous classroom examples have demonstrated the effectiveness of this method.

For instance, when students describe “a watercolor-style seascape for a Grade 4 lesson,” DALL·E can instantly generate multiple versions of watercolor paintings with different tones, compositions, and styles. Students may then select one version to analyze its composition and color before developing it into a complete hand-drawn artwork. Similarly, in an assignment such

as “Designing a fairy-tale character,” students may enter a prompt like “Thach Sanh character in 2D animation style, bright colors.” The AI tool generates several character variations—with differences in costume, expression, and supporting details—allowing students to choose, modify, or stylize them creatively.

To implement this method effectively, instructors should guide students on how to write accurate prompts suited to the lesson objectives and artistic styles. Teachers can organize group activities where each team generates five to ten AI-based images, then presents and analyzes their aesthetic value. The AI-generated images may serve multiple purposes: as teaching illustrations, visual references for students, or as inspiration for hand-drawn artworks with personal creative touches.

The use of generative AI offers several practical benefits. It expands students’ idea banks, exposes them to diverse artistic styles, and enhances creative autonomy. Additionally, AI significantly reduces the time spent searching for visual references, allowing more time for hands-on practice—an essential element in developing both artistic and pedagogical competencies for Primary Education students.

2.4.2. Applying AI in Developing Visual Learning Materials and Designing Art Lessons

The application of Artificial Intelligence (AI) in developing instructional materials has become an essential requirement in teaching Art Education to Primary Education students. AI can assist in generating a diverse range of educational resources, including illustrations, instructional videos, color palettes, composition templates, and activity sheets. These tools provide students with abundant, high-quality resources for lesson design, addressing the need for visualization in primary-level instruction while enhancing the liveliness and appeal of Art lessons.

The aim of this approach is to enhance visual learning, making artistic content more accessible to primary students while helping pre-service teachers develop instructional material design skills—a crucial competence for future educators. Modern AI tools offer numerous advantages. For example, Canva AI enables students to create color analysis charts, artistic posters, or PowerPoint lesson templates within minutes. Microsoft Copilot or ChatGPT can suggest introductory activities such as a “color recognition game with animated images for eight-year-old learners,” helping students design age-appropriate and interactive lessons. Meanwhile, RunwayML assists in generating short videos that simulate the process of painting a landscape, enabling learners to observe each step easily.

During implementation, instructors may require students to design an Art lesson in which at least 30% of the learning materials are AI-generated or AI-assisted. Upon completion, students present their products and explain how AI was applied in each phase—idea generation, material design, illustration creation, and assessment preparation. This process allows lecturers to monitor the extent of AI integration while helping students understand the distinct functions of each tool in lesson design.

This approach provides several practical benefits. AI enhances the quality of teaching materials, creates more engaging and visually rich lessons for primary students, and helps pre-service teachers better prepare for teaching practicum. Regular use of AI increases confidence in classroom management and strengthens pedagogical competence in the digital transformation era, making Art lessons more dynamic and better aligned with young learners’ cognitive characteristics and the ongoing innovation in teacher education.

2.4.3. Using AI as a Tool for Feedback and Evaluation in Art Education

The application of Artificial Intelligence (AI) in providing feedback and evaluating students' art products enhances the objectivity, timeliness, and personalization of the learning process for Primary Education majors. Given that Art evaluation often involves subjective judgment, AI offers significant advantages by systematically analyzing composition, color, lighting, contrast, artistic style, and other technical elements. As a result, students not only receive rapid feedback but also gain a deeper understanding of the strengths and weaknesses of their own work.

For instance, using ChatGPT Vision, students can upload images of their drawings and receive detailed feedback such as *"the horizon line is placed too high," "the color scheme lacks harmony,"* or *"increase contrast to emphasize focal points."* Similarly, PaintJudge AI provides evaluations based on specific criteria such as creativity, technique, and composition, helping students improve their artwork according to clear standards.

During class activities, lecturers can assign students to submit group artworks and use AI to analyze each product. Students then compare AI-generated feedback with peer and instructor evaluations. This three-layered feedback process promotes objectivity and helps students develop critical assessment skills—an essential competence for future primary school teachers who regularly evaluate pupils' creative works.

Thus, AI not only serves as a supportive assessment tool but also becomes a medium through which students refine their analytical abilities, enhance artistic quality, and strengthen professional competence in teaching Art.

2.4.4. Integrating AI into Microteaching Activities

Integrating AI into microteaching activities provides a safe, flexible, and effective training environment for Primary Education students at Hai Phong University before they enter real classroom practice during their teaching internship. Through its ability to simulate classroom situations and role-play interactions, AI tools can generate realistic teaching scenarios that allow students to practice pedagogical skills, experiment with teaching methods, and strengthen classroom management techniques.

For example, when using ChatGPT in a simulated "student" mode, preservice teachers can interact with virtual learners who ask questions such as: *"Teacher, why does the color blue make me feel calm?"* or *"I can't draw the shape of this animal—can you help me?"* Using Synthesia AI, students can create virtual teacher videos to demonstrate drawing techniques or lesson instructions, enabling them to observe and refine their communication, body language, and presentation skills. Additionally, AI-based simulation tools can recreate common classroom challenges—such as distracted students, off-topic questions, mistakes in drawing steps, or uncooperative behaviors—helping students develop adaptive teaching strategies and problem-solving abilities.

In practice, instructors may require students to prepare a lesson plan, conduct a simulated teaching session using AI, record the session, and perform self-assessment combined with instructor feedback. This process helps students enhance confidence, improve pedagogical communication, and prepare more effectively for real teaching environments.

Overall, incorporating AI into microteaching represents a practical and innovative approach that aligns with the goals of educational digital transformation and meets the growing need for innovation in teacher education today.

2.4.5. Implementing Project-Based Learning (PBL) with AI Integration

Organizing project-based learning (PBL) activities that integrate Artificial Intelligence (AI) enables students to combine subject knowledge, technological skills, and pedagogical competence to address complex tasks in Art Education. Applying the PBL approach not only enhances creativity but also fosters autonomy, collaboration, and lesson design ability among Primary Education students. When AI is incorporated, learning projects become deeper and more dynamic, allowing students to explore the vast digital resources supported by AI technologies.

A practical example is the project “Designing AI-Assisted Art Learning Materials for Grade 5.” In this project, students use DALL·E or Midjourney to create lesson illustrations; Color AI to generate color palettes and suggest harmonious combinations; RunwayML to produce short instructional videos demonstrating the painting process; and Canva AI to design digital lesson plans and interactive learning activities. Student groups may choose topics such as animals, landscapes, folk tales, or familiar objects, which they then develop into complete learning material sets and test in simulated classroom sessions.

Lecturers assess these projects based on criteria including creativity, AI integration level, pedagogical value, age appropriateness, and practical applicability. Such AI-based projects help students develop design thinking, teamwork, problem-solving skills, and technological literacy—all essential qualities for future primary school teachers in the digital transformation era. Moreover, this approach fosters a positive and exploratory learning environment, encouraging students to be innovative and confident in applying AI to Art Education practices.

3. CONCLUSION

The application of Artificial Intelligence (AI) in teaching Art Education for Primary Education students at Hai Phong University demonstrates significant value in the context of educational digital transformation. The proposed measures—including the use of generative AI, the development of visual learning materials, AI-assisted evaluation, microteaching integration, and project-based learning—collectively contribute to improving teaching effectiveness and developing students’ professional competencies.

AI helps expand creative ideas, enhance lesson visualization, and improve students’ self-directed learning capabilities. To achieve greater efficiency, it is essential to strengthen digital literacy training for both lecturers and students, and to ensure adequate technological infrastructure for teaching activities. Consequently, AI has become an indispensable tool in innovating Art Education pedagogy at Hai Phong University, aligning with the broader goals of Vietnam’s digital education transformation.

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