DISCOVERING JOAN MIRÓ THROUGH ARTIFICIAL INTELLIGENCE: AN EDUCATIONAL SCENARIO FOR PRESCHOOL EDUCATION

Asimina Katsouda

Hellenic Open University, Patras, Greece

ABSTRACT

This article presents an educational scenario designed for kindergarten students, aligned with the curriculum for Preschool Education in Greece, specifically within the thematic field of arts. The primary goal of this scenario is to introduce students to the artistic work of Joan Miró while incorporating Artificial Intelligence (AI) tools into the learning and information search process. The teaching methodology combines exploratory and experiential learning. In this scenario, ChatGPT-4o is used collaboratively with students to explore new knowledge. Additionally, other AI tools, including Lumen5, Suno, Leonardo.Ai, DALL-E, and ElevenLabs, were employed to create educational materials. This educational scenario aims to enhance children's active participation and interest, helping them acquire new knowledge about Miró and develop skills and positive attitudes towards the artist's work and the use of AI tools in the learning process.

KEYWORDS

Preschool Education, Joan Miró, Artificial Intelligence, Generative AI

1. INTRODUCTION

The integration of Artificial Intelligence (AI) into various fields, including education, has unveiled several opportunities and challenges, underscoring the need to explore effective ways of incorporating AI into education. In today's era, the importance of cultivating and developing skills during the educational process—such as creativity, innovation, critical thinking, problem-solving, decision-making, communication, collaboration, and digital media management—has become increasingly evident [1, 2, 3]. Additionally, there is a growing need to develop a new framework of knowledge, skills, and attitudes that are essential in today's era of ever-increasing AI usage, with an emphasis on Human-Centered AI that prioritizes the learner and their needs [4].

The use of AI in education opens up new horizons for supporting learning and enhancing the educational experience. AI tools can serve as auxiliary aids across various subject areas, such as visual arts, by providing personalized learning experiences that make the educational process more interactive and engaging [5]. As noted, AI can offer a range of possibilities to enhance personalised learning and improve the quality of education under certain conditions. However, the importance of ethical and responsible use of AI, the need to develop digital skills in students and the importance of supporting teachers in integrating these technologies into the educational process in a responsible way that respects educational values are underlined [6, 7, 8, 9]. Enriching the educational process with digital media and AI tools seems to encourage learners to develop positive attitudes towards technology and become familiar with it, while also acquiring essential

digital literacy skills necessary for their future educational journeys and broader societal roles [1, 3, 7].

AI tools for creating videos, images, audio, and music offer capabilities ranging from conducting realistic conversations to producing entire works of art, thereby re-evaluating traditional concepts of creativity and innovation [10]. AI offers a variety of opportunities that can enhance creativity and creative thinking in novel ways, fosters the generation of new ideas, and can, in some cases, optimize work processes (e.g., for teachers) [11]. The use of AI tools in creating images, videos, audio, and music facilitates the production of multimodal educational materials, which can enhance students' visual and auditory learning experiences. AI tools provide opportunities to adapt content to the specific needs of lessons and to present information in a variety of forms during the educational process. Among the most popular AI tools in education is ChatGPT, with several studies exploring its potential and appropriate uses [12, 13, 14, 15, 16, 17, 18]. It is also being used in the context of Preschool Education, further highlighting the potential it offers in enhancing the learning experience [19, 20, 21, 22]. ChatGPT has been trained on a large amount of text data from the internet, allowing it to generate coherent and contextually relevant responses. It is characterized by its flexibility and its ability to understand and generate text in a wide range of styles and formats.

In early childhood, exploratory and experiential learning are particularly important. Exploratory learning allows young learners to discover new knowledge through inquiry and research, enhancing their critical thinking skills. Experiential learning, on the other hand, promotes understanding through reflection and practical application [23, 24, 25]. Furthermore, by utilizing new knowledge through their active involvement with painting, children develop their imagination through aesthetic experience, which is a catalyst in their learning process [26]. The following section describes an educational scenario for kindergarten in which AI tools are used to explore the artistic work of Joan Miró. This scenario combines the aforementioned pedagogical approaches, enabling students to interact with the material in an enriched and dynamic manner [27].

2. METHODOLOGY AND DESIGN OF EDUCATIONAL SCENARIO

This educational scenario was designed for the school year 2023-2024 for a kindergarten class with children aged 4-5 years old. Titled "Discovering Joan Miró through Artificial Intelligence", this scenario is implemented within the framework of the Preschool Education curriculum in Greece, specifically under the thematic field of the arts, with a focus on visual arts [28]. The aim of this scenario is to introduce students to the artworks of painter Joan Miró while simultaneously familiarizing them with AI tools in a learning context.

During the implementation of this scenario, both printed and digital materials are utilized, beginning with photographs of Miró and selected artworks. Following this, educational content created using AI tools for video, image, audio, and music creation is introduced. Additionally, to explore more information about the teaching topic, ChatGPT is employed—specifically the latest model, ChatGPT-4o, which allows for online discussion using a microphone and audio—enabling students to learn more about Miró, his life, and his artworks.

In the design and implementation of this educational scenario and its educational materials, the following AI tools were used: ChatGPT-4, Lumen5, Suno, Leonardo.Ai, DALL-E, and ElevenLabs.

2.1. Title of the Educational Scenario

Discovering Joan Miró through Artificial Intelligence

2.2. Estimated Duration of the Educational Scenario

Two (2) teaching hours

2.3. Educational Aim and Objectives

The purpose of this educational scenario is for students to become acquainted with the artistic work of painter Joan Miró while simultaneously utilizing Artificial Intelligence tools in the context of learning and information search.

Learning Outcomes

After implementing the scenario students should be able to:

Cognitive Domain

- Understand basic information about the painter Joan Miró and his artistic work.
- Identify different techniques and styles of creating and representing artworks, particularly those used by Miró.

Psychomotor Domain
- Observe a work of art and make inferences about its content.
- Create their own artworks inspired by Miró's techniques and style.
- Formulate questions using an AI tool, such as ChatGPT, to gather new information.

Affective Domain

- Engage in open discussions about Miró's artworks and share their thoughts and interpretations.
- Adopt different artistic styles in their creative expressions.
- Develop a sense of familiarity and comfort with using AI tools in the learning process.

3. STEPS FOR THE DEVELOPMENT OF THE EDUCATIONAL SCENARIO

3.1. Building on and Exploring Prior Knowledge

Firstly, we ask the children if they know who Joan Miró is. After a brief discussion to gauge any prior knowledge about the painter, we show them a visual artwork (a photocopy) by Miró, specifically "Figures and Dog in Front of the Sun" (1949) [29]. We give the children some time to observe the artwork and freely express their thoughts about what they see (brainstorming). Following this, we present them with some photographs of the artist-painter Joan Miró [30, 31, 32], and engage in a discussion about these images.

Figures and Dog in front of the Sun, 1949 by Joan Miro

Figures and Dog in front of the Sun, Joan Miró, 1949 © joan-miro.net

Image 1. Artwork by Joan Miró

Joan Miró © Wikipedia
Figures and Dog in front of the Sun, Joan Miró, 1949 © joan-miro.net

Joan Miró, 1973, Francesco Català Roca © Hero Magazine

Image 3. Photograph of Joan Miró

Joan Miró, 1978, Jean Marie del Moral © Hero Magazine

Image 4. Photograph of Joan Miró

3.2. Teaching and Consolidation of the Subject Matter

We then prepare the students by saying, *"Let's go find out who Joan Miró is!"* and direct their attention to the computer, where we show a video created using the Lumen5 program. The video includes a text with basic information about the artist and his artworks, such as his artistic style. For the best results, the original text should be written in English, which can then be translated into Greek language during video editing. Additionally, images of Miró's artworks, sourced from the website https://www.joan-miro.net/, are incorporated into the video. The video also features music generated by a prompt through Suno. An example of a prompt for this purpose could be: *"craft a whimsical tune with soft flutes and string pizzicato, which plucks at the strings for a playful sound''*.

After watching the video and allowing a few minutes for initial comments, we then ask, *"Shall we go learn more about Miró?"* At this point, we explain to the children that we're going to have a

conversation with an "assistant" who can help us learn more about Miró by answering any questions we have. Using ChatGPT-4o, we choose to hold this conversation via microphone. We begin by saying, *"Hello! We are a kindergarten class, and we would like you to help us learn about Joan Miró. Can you help us?"* and we add the command, *"Respond in an appropriate tone when speaking to kindergarten children."* This ensures that the information provided is suitable, friendly, and understandable for the young learners.

We start with the first question, *"What do you know about Joan Miró?"* and continue with others like, *"Tell us more about Miró's works," "Tell us about his life,"* and *"Where can we find Miró's paintings?".* It's also important to encourage the children to ask their own questions, which we can repeat for clarity if needed. The session is conducted as an open dialogue. Notably, ChatGPT-4o converts the spoken conversation into written text, allowing us to save suggested resources and links, and keeping a record of the discussion for future reference.

After concluding the conversation with the ChatGPT "assistant," we agree with the children that it's time to draw like Miró. We then show a PowerPoint presentation featuring images that serve as examples of ''alternative-digital artworks'' created in Miró's artistic style. These images were generated using the DALL-E and Leonardo.Ai programs, with prompts mentioned alongside the corresponding images. The presentation also includes two audio prompts, before and after viewing the images, utilizing ElevenLabs and its "text-to-speech" feature. The first audio states, *"Before we paint, let's look at some drawings that we can make like Miró did!"* while the second, at the end, says, *"Let's paint now like Miró!"* As the pictures are shown, a brief explanation of each one is provided.

Prompt: *imagine an abstract painting of a dog using Joan Miró's distinctive style. Use bold primary colours and black outlines. The dog should be composed of simple geometric shapes.*

Image 5. Generative AI artwork through Leonardo.Ai

Prompt: *draw inspiration from Miró's "Personage Throwing a Stone at a Bird." Imagine a simplified, abstract figure, perhaps with a long, thin body and exaggerated features, in the act of throwing a stone. The bird, represented by a simple, abstract shape, hovers above. The background can be a flat, muted colour with the action taking place against it, surrounded by floating symbols like eyes, hands, and stars.*

Image 6. Generative AI artwork through DALL-E

Prompt: Imagine an abstract painting of a cat using Joan Miró's distinctive style. Use bold primary colours and black outlines. The cat should be composed of simple geometric shapes.

Image 7. Generative AI artwork through DALL-E

3.3. Student Assessment

After *"Let's paint now like Miró!"* is heard, we guide the children to the tables and provide them with a worksheet [33] inspired by the artist's style. Following this, we give each child a blank sheet of paper where they can create their own drawings based on what they have learned about Miró. During the drawing activity, it is recommended to play the music created through Suno, which was also used in the earlier video.

Once all the children have completed their drawings, we gather as a group for a presentation and reflective feedback. Each child is invited to present their drawing, and we engage in a reflective-feedback discussion about what we have learned. Guiding questions such as *"What did we learn about Miró?", "What colours did he use?",* and *"What did he paint?"* help facilitate the discussion and reinforce the learning objectives.
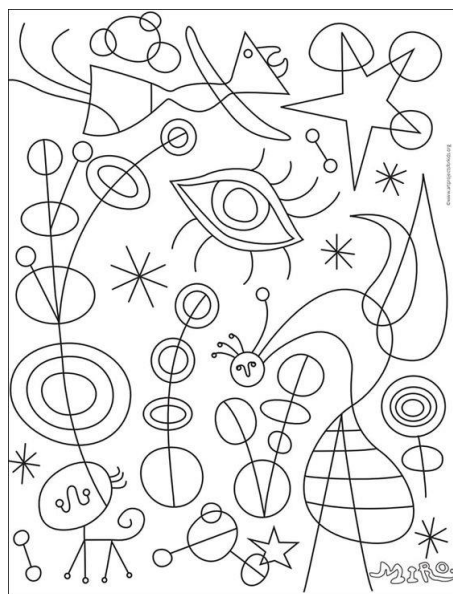
Miró Coloring Page © Art Projects for Kids

Image 8. Worksheet

4. RESULTS

This educational scenario aims to combine aesthetic experience with the engagement of children using AI tools. The use of ChatGPT-4o by the teacher can be a highly effective educational tool for exploring and gathering information to be integrated into educational materials. For students, with appropriate support from the teacher, this AI tool seems that can significantly enhance the learning process, particularly within the context of exploratory learning. By allowing students to ask their own questions and receive new knowledge, ChatGPT-4o supports active inquiry and deeper understanding. On the other hand, it is noted that more attention should be paid to the use of AI tools in the case of students with learning difficulties, as it seems that in some cases, they can capture the interest of children, but careful guidance and support are needed, otherwise AI tools can be a barrier to learning. However, the teacher plays a crucial role in this process, providing guidance on the proper use of the AI tool and evaluating the accuracy and relevance of the information it provides. Additionally, engaging with AI tools appears to increase students' interest and enthusiasm, thereby enhancing their active participation.

AI tools for creating videos (Lumen5), images (Leonardo.Ai, DALL-E), audio (ElevenLabs), and music (Suno) can provide various capabilities for developing multiform educational materials. However, these tools require time and familiarity to be used effectively. It is also important to note that some AI tools may require financial investment. For example, in the case of Leonardo.Ai, once the free credits are exhausted, a financial contribution is necessary to unlock additional features. Similarly, DALL-E via ChatGPT is available only on the paid PLUS account, and the full features of ChatGPT-4o also require a PLUS account for unlimited use. Another limitation is the need for proficiency in English, as using Greek language in some AI tools, such as Lumen5, may not yield optimal results. Regarding the connection between aesthetic experiences and AI tools, it seems that GenerativeAI images and related AI tools can stimulate children's imagination. Therefore, it is recommended to further explore effective ways of using AI tools in collaboration with children within the context of visual arts education.

5. CONCLUSIONS

The enrichment of the educational process and learning activities with a variety of tools, including AI tools, can conditionally support the achievement of learning objectives. AI can serve as a supportive tool for exploring and acquiring new knowledge in Preschool Education with appropriate use based on pedagogical principles. This educational scenario emphasizes the importance of identifying appropriate methods for integrating AI tools into Preschool Education and the educational opportunities they can offer across different subject areas, such as visual arts in this case.

Through the implementation of this scenario, students can gain new knowledge about artists while also becoming familiar with AI tools like ChatGPT in the context of inquiry-based learning. Additionally, the potential and limitations of AI tools for teachers in creating educational material are highlighted, including Suno for music creation, ElevenLabs for audio creation, Lumen5 for video creation, and Leonardo.Ai and DALL-E for images creation.

In conclusion, the selection of appropriate digital media, tools and practices when designing and implementing an educational scenario is crucial for ensuring a smooth learning process and achieving the learning objectives. It is important to enrich the learning process with various tools, but this should always be guided by pedagogical principles and the familiarity of teachers with these tools. In this way, we can reap the benefits of each digital and AI tool, cultivating and developing a wide range of skills that are essential in today's world. To conclude, it's important to remember that the selection of digital and AI tools in education should be carefully guided by learning objectives, rather than driven by enthusiasm for the technology itself. An improper choice of tools, based solely on their novelty, can negatively impact the educational process. The needs of students with learning difficulties should also be taken into account, as the use of AI tools can sometimes be a barrier to learning. However, when used correctly, these tools can engage students by offering an alternative, interactive way of learning.

REFERENCES

[1]   UNESCO, *Transforming Technical and Vocational Education and Training for Successful and Just Transitions: UNESCO Strategy 2022-2029*, Paris, France: United Nations Educational, Scientific and Cultural Organization, 2022. Accessed: June 1, 2024 [Online]. Available: https://unesdoc.unesco.org/ark:/48223/pf0000383360

[2]   R. Vivekanandan and M. Pierre-Louis, *21st Century Skills: What Potential Role for the Global Partnership for Education? A Landscape Review,* Global Partnership for Education, 2020. Accessed: June 1, 2024 [Online]. Available: https://eric.ed.gov/?id=ED627371

[3]   World Economic Forum. *Catalysing Education 4.0: Investing in the Future of Learning for a Human-Centric Recovery.* Cologny/Geneva, Switzerland: World Economic Forum, 2022. Accessed: June 1, 2024 [Online]. Available: https://www.weforum.org/publications/catalysing-education-4-0-investing-in-the-future-of-learning-for-a-human-centric-recovery/

[4]   P. Anastasiades, K. Kotsidis, K. Stratikopoulos, and N. Pananakakis, "Human-Centered Artificial Intelligence in Education: the critical role of the educational community and the necessity of building a holistic pedagogical framework for the use of HCAI in education sector," *Open Education - The Journal for Open and Distance Education and Educational Technology*, vol. 20, no. 1, pp. 29-51, 2024. [Online]. Available: https://ejournals.epublishing.ekt.gr/index.php/openjournal/article/view/36612

[5]   Mahmudi, R. Fionasari, B. Mardikawati, and L. Judijanto, "Integration of Artificial Intelligence Technology in Distance Learning in Higher Education," *Journal of Social Science Utilizing Technology*, vol. 1, no. 4, pp. 190-201, 2023, doi: https://doi.org/10.55849/jssut.v1i4.661

[6]   F. Miao, W. Holmes, R. Huang, and H. Zhang, *AI and Education: A Guidance for Policymakers*, Paris, France: UNESCO Publishing, 2021.

[7]   UNESCO, *AI and Education: Guidance for Policy-Makers*, Paris, France: United Nations Educational, Scientific and Cultural Organization, 2021. [Online]. Available: https://unesdoc.unesco.org/ark:/48223/pf0000376709

[8]   UNESCO, *Recommendation on the Ethics of Artificial Intelligence*, Paris, France: United Nations Educational, Scientific and Cultural Organization, 2022. [Online]. Available: https://unesdoc.unesco.org/ark:/48223/pf0000381137

[9]   UNESCO, *Guidance for Generative AI in Education and Research,* Paris, France: United Nations Educational, Scientific and Cultural Organization, 2023. [Online]. Available: https://unesdoc.unesco.org/ark:/48223/pf0000386693

[10]   Tlili, B. Shehata, M. A. Adarkwah, A. Bozkurt, D. T. Hickey, R. Huang, and B. Agyemang, "What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education," *Smart Learning Environments*, vol. 10, no. 1, p. 15, 2023, doi: https://doi.org/10.1186/s40561-023-00237-x

[11]   D. M. M. Fernández, "Prospective research in the field of teaching creative skills to artificial intelligence," Interdisciplinary Cultural and Humanities Review, vol. 3, no. 1, pp. 34-45, 2024, doi: https://doi.org/10.59214/cultural/1.2024.34

[12]   Adeshola and A. P. Adepoju, "The opportunities and challenges of ChatGPT in education," Interactive Learning Environments, pp. 1-14, 2023, doi: https://doi.org/10.1080/10494820.2023.2253858

[13]   D. Baidoo-Anu and L. O. Ansah, "Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning," *Journal of AI*, vol. 7, no. 1, pp. 52-62, 2023. [Online]. Available: https://dergipark.org.tr/en/pub/jai/issue/77844/1337500

[14]   G. Cooper, "Examining science education in ChatGPT: An exploratory study of generative artificial intelligence," *Journal of Science Education and Technology*, vol. 32, no. 3, pp. 444-452, 2023, doi: https://doi.org/10.1007/s10956-023-10039-y

[15]   E. Kasneci, K. Seßler, S. Küchemann, M. Bannert, D. Dementieva, F. Fischer, et al, "ChatGPT for good? On opportunities and challenges of large language models for education," *Learning and Individual Differences*, vol. 103, no. 102274, 2023, doi: https://doi.org/10.1016/j.lindif.2023.102274

[16]   C. K. Lo, "What is the impact of ChatGPT on education? A rapid review of the literature*," Education Sciences*, vol. 13, no. 4, pp. 410, 2023, doi: https://doi.org/10.3390/educsci13040410

[17]   D. Mhlanga, "Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning," *Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning*, Feb. 11, 2023. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4354422

[18]   M. M. Rahman and Y. Watanobe, "ChatGPT for education and research: opportunities, threats, and strategies," *Applied Sciences*, vol. 13, no. 9, pp. 5783, 2023, doi: https://doi.org/10.3390/app13095783

[19]   R. F. Ağmaz, "Early childhood educational resources on ChatGPT: Review of educational blogs and forums," *International Journal of Research in Teacher Education (IJRTE),* vol. 14, no. 3, 2023, doi: https://doi.org/10.29329/ijrte.2023.598.10

[20] W. Luo, H. He, J. Liu, I. R. Berson, M. J. Berson, Y. Zhou, and H. Li, "Aladdin's Genie or Pandora's Box for early childhood education? Experts chat on the roles, challenges, and developments of ChatGPT," *Early Education and Development,* vol. 35, no. 1, pp. 96-113, 2023, doi: https://doi.org/10.1080/10409289.2023.2214181

[21] H. Chin, S. Lee, M. Ashraf, M. Zago, Y. Xie, E. A. Wolfgram, et al, "Young children's creative storytelling with ChatGPT vs. parent: Comparing interactive styles," in *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems*, May 2024, pp. 1-7. [Online]. Available: https://dl.acm.org/doi/abs/10.1145/3613905.3650770

[22] Su and W. Yang, "Powerful or mediocre? Kindergarten teachers' perspectives on using ChatGPT in early childhood education," *Interactive Learning Environments*, pp. 1-13, 2023, doi: https://doi.org/10.1080/10494820.2023.2266490

[23] J. Dewey, *Experience and Education*, New York, NY, USA: Kappa Delta Pi, 1938.

[24] H. Dilek, A. Taşdemir, A. S. Konca, and S. Baltacı, "Preschool children's science motivation and process skills during inquiry-based STEM activities," *Journal of Education in Science Environment and Health*, vol. 6, no. 2, pp. 92-104, 2020, doi: https://doi.org/10.21891/jeseh.673901

[25] D. A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development*, Englewood Cliffs, NJ, USA: Prentice-Hall, 1984.

[26] J. Dewey, *Art as Experience,* USA: The Penguin Group, 1980.

[27] W. Holmes, M. Bialik, and C. Fadel, "Artificial intelligence in education," in *Data Ethics: Building Trust: How Digital Technologies Can Serve Humanity*, Globethics Publications, 2023, pp. 621-653.

[28] Ministerial Decision 13646/D1/2023, "Curriculum for Early Childhood Education," *Gazette of the Government of the Hellenic Republic*, Government Gazette B 687/10.02.2023.

[29] J. Miró, *Figures and Dog in front of the Sun* [Artwork], 1949. [Online]. Available: https://www.joan-miro.net/figures-and-dog-in-front-of-the-sun.jsp

[30] Carl Van Vechten, Joan Miró [Photograph], Wikipedia. [Online]. Available: https://el.wikipedia.org/wiki/%CE%96%CE%BF%CF%85%CE%AC%CE%BD_%CE%9C%CE%B9%CF%81%CF%8C#/media/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:Joan_Miro_(cropped).jpg

[31] F. Catala-Roca, Joan Miró [Photograph], Hero Magazine, 1973. [Online]. Available: https://hero-magazine.com/article/55402/this-new-exhibition-recreates-joan-miros-mallorca-atelier-where-he-created-some-of-his-most-revered-pieces

[32] J.-M. del Moral, Joan Miró [Photograph], Hero Magazine, 1978. [Online]. Available: https://hero-magazine.com/article/55402/this-new-exhibition-recreates-joan-miros-mallorca-atelier-where-he-created-some-of-his-most-revered-pieces

[33] *Miró Coloring Page* [Image], Art Projects for Kids. [Online]. Available: https://artprojectsforkids.org/how-to-draw-like-miro/#acolor

AUTHOR

Asimina Katsouda is a graduate of the Department of Educational Sciences and Early Childhood Education from the University of Patras. She holds two master's degrees, one in Adult Education and one in Education and Technologies in Distance Teaching and Learning Systems from the School of Humanities, Hellenic Open University. Additionally, she has completed various training courses in areas such as Human-Centered Artificial Intelligence, Synchronous and Asynchronous Distance Learning and Virtual Class Management, Transformative Learning through Aesthetic Experience, Art Therapy, Special Education, Digital Education, Counseling, Career Guidance and Mentoring, among others. Her research interests include accessibility in Open and Distance Education and Students with Disabilities, as well as Art in Conventional and Distance Education, Artificial Intelligence and Virtual Worlds into the educational process.