

Research Article

Co-creating with AI in Art Education: On the Precipice of the Next Terrain

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Abstract

In exploring the collaborative engagement of AI in envisioning the future through Art Education, a critical focus emerges on the role of preservice teacher education. This inquiry underscores the necessity of equipping educators with the essential skills and resources to integrate AI-driven content creation, thereby nurturing students' futuristic imagination. To empower educators in this endeavor, it is imperative to provide structured curriculum frameworks and technical proficiency in utilizing AI software tools. By adeptly training preservice teachers in leveraging AI resources, it is necessary to catalyze a new wave of aesthetic innovation transcending the digital era. The competency of educators in integrating AI will significantly shape the capacity of the next generation to innovate and co-create with this technology. Hence, there is a pressing need to invest in preservice training and foster a culture of AI experimentation within educational environments. There exist issues of bias, accuracy, ethics, and safety when utilizing AI, and these also need to be addressed in the classroom space. This paper aims to delve into instructional models for seamlessly integrating AI into preservice training. It will deliberate on strategies for incorporating AI tools to redefine the trajectory of art and design education. Through thoughtful exploration and implementation, teachers can harness the transformative potential of AI to inspire creativity and drive innovation in the realm of Art Education.

Keywords

Preservice Training, Art Education, AI, Art Technology, Curriculum Design

1. Introduction

In the realm of Art Education, a pivotal question emerges: How do humans collaborate with artificial intelligence (AI) to envision the future? The answer to this inquiry lies at the intersection of preservice teacher education. What skill sets and resources must trainers provide our educators with to enable them to integrate AI-driven tools into their teaching, fostering students' capacity to envision and shape the future? According to one 2021 estimate, the creative industries generate 30 million jobs and account for 3% of global GDP, employing more young people (aged 15-29) than any other sector.

[8] There's an imperative to equip our teachers to cultivate the next wave of creative talents.

Preservice teachers require adept training in utilizing emerging AI technologies to co-create content effectively, extending the trajectory of artistic innovation beyond the digital revolution. While technical guidance is essential, it's equally crucial to develop curriculum models that facilitate the integration of AI tools. It is not the technology that makes the artwork – no matter how advanced and efficient – but rather the artistic theory, approach, and design. [5]

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The proficiency of teachers in leveraging AI will shape the future generation's ability to engage with and innovate through this technology. In today's landscape, AI Assistance or AI augmentation of the human creative process has become the norm. [8] Viewers have difficulty with the Turing test and can no longer reliably distinguish image or text-based art made by humans versus algorithms. However, according to studies, they show a negative bias against artworks made by algorithms. [5] Hence, investing in preservice training is paramount, fostering a critical discourse around the integration of AI in classrooms and encouraging experimentation.

This paper will delve into models for integrating AI into preservice training, elucidating the purposeful utilization of AI tools in shaping the trajectory of art and design education. The discussion will commence by delineating essential teacher skills, examining the dynamics of co-creation with AI, and examining the nuances of preservice teacher training. Subsequently, it will expound upon curriculum examples that incorporate AI tools, evaluating their impact on learning outcomes while scrutinizing the associated risks in educational settings.

2. Skills Teachers Need Today and Shaping Them with AI

AI makes everything easier right? AI generators do the work for you isn't that true? Nothing could be further from the reality of working with creative tools. Image, text, sound, and video generation happens automatically seemingly from a string of text prompts but is your work really done? Can you accept the AI's result as the finished product of your efforts ready for presentation as your own work? In working with a tool such as Chat GPT 4 you have a variety of options. You can ask it questions about things you want to know about and request information or you can try to use it as a creative partner. While today the common method for teaching the computer to make artworks is to train it on a large data set of existing artworks which provides the computer with the results of the creative process, it could be better to instead use a sequence of actions which leads to the final artworks, ...a computer could be taught to think like a human creator... [9]

In the example below ChatGPT is asked to respond to my poetic writing.

"Cardinal, crows, and poppies in a wide-open field; took my breath away I didn't know where to enter this picture when I peered through the fog and a mountain appeared through the haze; A giant crow swept down from a tree, and nearly grazed my hair. It went for a poppy and snapped it up in its teeth. A cardinal whizzed by from the other direction and took a mid-line cruise through the trees. Upon closer examination, the field was full of poppies. It was a grove of brightly colored red and purple flowers. (My entry)"

"As the fog gradually lifted, revealing the beauty of the surroundings, you found yourself standing in awe. The

distant silhouette of a majestic mountain emerged from the haze, adding to the breathtaking view. It seemed as if nature itself had conspired to create this magical setting.

Just as you were taking in the stunning landscape, a sudden movement caught your attention. From a nearby tree, a giant crow gracefully descended, its wings outstretched. The bird's descent was so close that you could feel the rush of air as it nearly grazed your hair. It gracefully landed amidst the sea of poppies, capturing your gaze.

The crow, with its keen eyes, spotted a single poppy and swiftly plucked it from the ground with its beak. The vibrant red petals stood out against the bird's dark feathers as it clutched the poppy between its teeth. It was an unexpected sight, a fascinating interaction between nature's creatures and the vibrant flowers.

Just then, as if on cue, a cardinal streaked across the field in a burst of color. With its brilliant red plumage contrasting against the green foliage, the cardinal cut through the air, leaving a trail of awe in its wake. It moved with such speed and precision, a fleeting moment that added to the enchantment of the scene.

Intrigued by the crow's behavior, you ventured closer to the poppy-filled field. As you approached, the true extent of nature's artistry became apparent. The field was not just scattered with a few poppies; it was a grove of mesmerizing beauty. Bright red and purple poppies stood tall, their petals dancing in the gentle breeze.

You found yourself surrounded by a tapestry of colors as if you had stepped into a painter's dream. The vibrant hues of the poppies merged with the green landscape, creating a symphony of natural beauty. It was a sight that held you captivated, an unexpected discovery in the midst of fog and mystery.

With the presence of cardinals, crows, and a multitude of poppies. It was a scene that embodied the interconnectedness of nature. Each element added its own touch of wonder, creating a moment that would forever be etched in your memory.

And so, you stood there, taking in the magnificence of the field, feeling grateful for the serendipitous encounter with the crow, the cardinal, and the sea of poppies—a harmonious convergence of life's simple yet extraordinary pleasures. [11]"

The Open AI response is very well fleshed out and visually written. It takes my original snippet and really develops a picture of my theme – it could become a painting! But, is this a fait accompli? No, it needs editing and it needs to sound like me. I am not a poet; this is just an exercise. However, the AI launched me into another phase of writing as if I had a virtual editor by my side. I recently worked with a human editor and it was very similar to working with Chat GPT. I would write and then share my work with the editor and then they would respond with a new writing based on what I had given them. I would get stronger as a writer after I exchanged with the editor. I would build new skills.

Teachers need to be trained to use AI tools in this way as a virtual assistant that will help them build their skills. If they stop after the AI delivers a response or “product” to them they will be done for. First of all, AI’s make mistakes and does not fully understand your work and your goals. You need to edit what they give you. If teachers do not aggressively interact and understand how the AI tools work they will not be able to show and model using AI tools for their students and the students will be just delivering what the AI’s generate and not be co-creating. Teachers need to have editing, co-creation, and critical decision-making skills to work with AI tools.

What does it mean to co-create with technology? Can AI create on its’ own? Can AI imagine? These are burning questions. What does AI say for itself? “AI systems are limited to what they have learned from the data and cannot generate truly original or imaginative ideas [11].” AI searches existing data sets and learns patterns to generate content. It uses algorithms to accomplish these tasks. It is different from a human creating a painting or imagining an epic event never experienced before. AI is also learning from the data we provide and the decisions we make or another way to look at it: our input at the HCI (human-computer interface). Our feedback to the AI will enable it to interactively transform its output to us as in a cybernetic model. The AI will continue to learn and will improve its content generation. This takes collaboration with the end-user a.k.a. the human at the interface.

Society is moving out of a means of production where the human is in a privileged hierarchical position to their materials. Now that we share decision-making with our tools that impact our practice and our output, we have entered a phase of new materialism [15]. In their study with middle school students in the fall of 2022 [15] studied the new materialism relationships exhibited in a K-12 setting with the usage of AI text-to-image generators. They considered the students as co-creators who were collaborating with the computer to make these new images from previous data sets.

There are a lot of features in design software now taking advantage of AI such as content awareness in Photoshop that removes unwanted content for you and automatically completes the photo beneath. The computer in a sense is creating the artwork for you. The computer is finally co-creating with the artist as an advanced tool enabling their thoughts to materialize with fewer struggles and with more accuracy than before. These new AI tools are virtual assistants to the studio artist and teacher to make artwork beyond imagination. There will be another paradigmatic aesthetic shift due to AI’s influence on art making. However, for this to happen the artist and the teacher must remain in charge of the creative process. AI relies on the human to be the decision maker. The human is the teacher of the AI as well.

AI tools such as Midjourney, DALL-E2, Neural.love, and Bria are very strong visual creation tools that are fascinating for artists to experiment with. The ability to co-create with AI is highly probable with these tools and has only just begun to reveal what people can do with them. The work with these

images is not done after you enter a string of text prompts rather it’s just begun. Teachers need to experiment with curriculum models to pave the way for up-and-coming artists to use these new tools for self-expression.

3. AI Training for Preservice Teachers

Many people are playing with AI applications at this time, but preservice teachers would benefit from being provided with some context of what AI is and receiving a critical lens through which to work with it. AI is a big buzzword in the twenty-first century but needs to be unpacked for people, so they fully understand how it works. This is an important introduction for our teachers who are learning technology and being expected to incorporate it into their art rooms.

Preservice teachers will need to be introduced to a variety of text, image, audio, and video AI tools such as Midjourney, Bria, Neural.love, Dall-E2, Openai.com, My Heritage, and Sora that they can utilize with their students for hands-on instruction but will also need to be trained on how to utilize curriculum-building AI tools such as Teachology and post-class reflection tools such as Teach FX. There are many other possible AI tools to choose from these are just a few of my picks. Providing an overview of these tools and what they can do is an important part of training. The next step would be to provide some fleshed-out curriculum models for students to consider and then request them to develop their own incorporating AI.

The following curriculum, “Coding for Youth with Scratch,” below was designed utilizing Teachology AI. It was created using input from the program based on a course I was teaching this summer. The syllabus below is extensive for a first draft but was not finished. Teachers need to understand that the AI will not do their work for them.

4. Teachology AI Syllabus

Coding for Youth with Scratch

Coding is an essential skill for the modern world. In this lesson, students will learn the basics of coding, including its fundamentals, essential coding concepts, and how to apply them to the everyday world. They will gain the confidence needed to develop their projects and use coding as a tool to solve problems and create innovative solutions.

Objectives & Outcomes

By the end of this lesson, the student will be able to identify the fundamentals of coding (remember)

By the end of this lesson, the student will be able to navigate the Scratch interface (understand)

By the end of this lesson, the student will be able to use coding concepts to design animations (apply)

By the end of this lesson, the student will be able to develop game designs using coding (create)

By the end of this lesson, the student will be able to modify

backgrounds and sprites to create their own projects (evaluate)

By the end of this lesson, the student will be able to apply coding as a tool to solve problems (apply)

Introduction

Introduce the idea of coding by having a discussion about how coding is used in the world around us and why it is an essential skill. This can include examples such as how coding is used in robots, smart phones, computer games and websites

Have the students navigate the Scratch user interface and familiarize themselves with the basics of coding by using the tutorial provided by Scratch

Using animations, demonstrate how code is used to create movement and how the elements of coding can be used to design simple games

Give the students the opportunity to use coding concepts to modify backgrounds and sprites to create their projects. This can be done using Scratch or any other coding platform

Encourage students to apply coding as a tool to solve problems, by giving them practical tasks to complete such as designing a game or creating a website. This allows them to use their knowledge to create something new and innovative

Demonstrate and Explain

Students will be given an introduction to coding with an overview of the fundamentals. They will learn how to navigate the Scratch interface and create simple animations using coding concepts

Students will be given a project to work on to apply their coding knowledge. They will be asked to develop a game design with backgrounds and sprites they have modified

Students will be asked to analyze a coding problem and develop a solution using coding concepts

Students will be asked to discuss how coding can be used in everyday tasks. They will be encouraged to think creatively about how to apply coding to new and innovative solutions

Students will be given the opportunity to develop their own projects. They will be asked to create a project that demonstrates their understanding of coding fundamentals and concepts

Student Task

Introducing the fundamentals of coding to the students. Explain the basic concepts of coding and how it is used in everyday tasks. Provide examples of how coding can be used in real life

Introducing the Scratch interface. Demonstrate how to navigate the Scratch platform and create basic programs

Designing animations with coding concepts. Show students how to use basic coding concepts to create animations. Demonstrate the use of variables, loops, and other coding elements in animation design

Developing game designs with coding. Show the students how coding can be used to create games. Explain how game elements such as health, coins, and levels can be created with coding

Modifying backgrounds and sprites with coding. Demon-

strate how to modify backgrounds and sprites to create their own projects. Show the students how to use coding to manipulate background elements and sprites

Reflection

Reflect on the fundamentals of coding by writing a few sentences about the key concepts and ideas they learned

Write a list of the key features of the Scratch interface and how they could be used when coding

Create a list of key coding concepts they learned in regards to animation and how they could be used

Write a paragraph about the different game designs they created and how they used coding to enhance their projects

Make a list of the various backgrounds and sprites they modified and how they could use coding to enhance these elements

Write a paragraph on how they applied coding as a tool to solve problems.

5. Final Syllabus Post Teachology Edit

Below is the syllabus for Youth Coding after I edited the Teachology AI version.

Youth Coding with Scratch



Figure 1. Scratch Student Art, 9 years old.

Coding is an essential skill for the modern world. In this lesson, beginner students will learn the basics of coding with block coding, essential coding concepts, and how to apply them to fun projects designed to challenge themselves. They will gain the confidence needed to develop their projects and use coding as a tool to solve problems and create innovative solutions.

Objectives & Outcome

By the end of this lesson, the student will be able to identify the fundamentals of coding. (remember)

By the end of this lesson, the student will be able to navigate the Scratch interface (understand)

By the end of this lesson, the students will be able to use coding concepts to design animations. (apply)

By the end of this lesson, the students will be able to develop game designs using coding. (create)

By the end of this lesson, the student will be able to modify backgrounds and sprites to create their projects. (evaluate)

By the end of this lesson, the student will be able to apply coding as a tool to solve problems. (apply)

Introduction

1. Introduce the idea of coding by discussing how coding is used in the world around us and why it is an essential skill. This can include examples such as how coding is used in robots, smartphones, computer games, and websites.
2. Using animations, demonstrate how code is used to create movement and how the elements of coding can be used to design simple games
3. Allow the students to use coding concepts to modify backgrounds and sprites to create their projects. This can be done using Scratch or any other coding platform

Demonstrate and Explain

1. Students will be given an introduction to coding with an orientation to the software interface. They will create simple animations using coding concepts
2. Students will be given a project to work on to apply their coding knowledge. They will be asked to develop a game design with backgrounds and sprites they have modified
3. Students will be asked to analyze a coding problem and develop a solution using coding concepts
4. Account Set-up
5. What is SCRATCH? It is a web-based freeware that is made by MIT <https://scratch.mit.edu> that enables you to create interactive stories, animations, and games and share those with others. It uses block code to teach kids programming and is easy and fun to learn.
6. SCRATCH FAQ <https://scratch.mit.edu/info/faq> - learn about configuration requirements, teacher accounts, SCRATCH 3.0 features, and remixing.

1. Day 1

- 1) Overview of SCRATCH interface
- 2) Example animation
- 3) Two Sprites interface orientation
- 4) Running Cat
- 5) Make your own cat and background

2. Day 2

Create a Name Animation

3. Day 3

- 1) Create a Chase Game
- 2) Create your own sprites

4. Day 4

- 1) Make a Character Talk
- 2) Create dialog for your character

5. Day 5

- 1) Make It Fly
- 2) <https://www.youtube.com/watch?v=U8aQFsE5kPg>
- 3) Create a flying animation
- 4) Learn how to customize your Scratch projects
- 5) Personalize your own flying game

6. Day 6

- 1) Pong game
- 2) Sample code provided
- 3) Create your own pong game

7. Day 7

- 1) Generative Art
- 2) <https://scratch.mit.edu/projects/318442014/> Generative Squares
- 3) Work on Scratch project

8. Day 8

- 1) Makey Makey and Scratch
- 2) Intro to Makey Makey demo
- 3) Makey Makey block code
- 4) Virtual Drums with Makey Makey
- 5) <https://apps.makeymakey.com/bongos/>
- 6) <https://apps.makeymakey.com/piano/>
- 7) Set up Gallery Show and share projects with family

There was work to do to input the data to obtain the Teachology syllabus and more work to do to polish the final syllabus so that it was a right fit for the specific course that was being developed. However, the collaboration of the AI was appreciated and the Teachology application was very interesting to use as a curriculum development tool. It did not shorten the time of development it added a step and improved my student learning objectives. However, it did incorporate all of the source materials.

Copilot automatically generates an online PowerPoint lecture for you based on your input about your class topic. It also asks you about your audience so that it targets the right age group. It does a decent job. Like Teachology you need to do a lot of editing. AIs are good generalists at subjects, but you need to take over as the specialist and make sense of what they give you. That is where the co-creation lies. If you have a hard time getting a project started, an AI application is a good partner to have.

Can we create new curriculum models that incorporate AI for Art Educators to experiment with?

“If artificial intelligence is used to create images, can the final product be thought of as art? Should there be a threshold of influence over the final product that an artist needs to wield? [1]”



Figure 2. Midjourney variables.

In this example, I entered words such as crow, cardinal, poppies, etc., into Midjourney and the AI app gave me an image with variations such as the one below. This is starting from my concepts as an artist and entering them into the AI as text. I'm not coding the AI but feeding it data to yield an image created by the AI. Artists who want more influence over the AI, code the generator as an alternate option. But, the idea here is to take advantage of AI apps readily available online that are preferably free (Midjourney is not free but you can use DALL-E2 instead or other alternative image generators). This model is meant for art preservice teachers and classroom art teachers.



Figure 3. Digital Artwork after the Midjourney images, Sherry Mayo.



Figure 4. Bria.ai version of Digital Artwork above.

After I received the Midjourney variations, the process didn't stop there. The next step was to respond to the AI images. I transferred sections of them into Adobe Illustrator and remixed and developed a digital artwork from there. The next step was to bring the image as a JPEG into Adobe Photoshop to develop some of the atmospheric qualities that I was looking for that Midjourney had brought into play e.g. the foreboding sky. I played with that and developed my interpretation of a dark and cloudy sky.

Finally, I decided that the AI apps could have the last word. I wondered what an AI generator would do to my image. I uploaded my image to Bria.ai and entered a strand of text such as stormy dark clouds on an overcast day and Bria focused on those words until the background became increasingly obliterated by dark stormy clouds. The image above is the first variation of my image. You can decide who the best artist is Midjourney, Bria.ai, or me. It is about collaborative decision-making. This process is an iterative process of feedback between myself and an AI application to create many different possibilities. This curriculum model is meant to reveal that. You can stop or start wherever you like. You can begin by feeding your images into the AI or text into the AI or feed the AI image back into the AI and edit it yourself. The interplay between you and the AI and the order of your decision-making it critically important [1].

6. AI's Impact on Learning

“The value of AI might come not so much in making machines that act like humans but stopping humans acting like machines. [10]”

Machine learning begins with human-initiated code and vast data sets from which to draw from. The issue is that the machine does not have consciousness or intentionality [10]. As interaction with the environment changes, as input from end-users increases, the AI learns more and becomes more adept at solving problems.

The most expensive piece of AI artwork to go to auction was a “Portrait of Edmond Belamy,” sold for \$432,500 at Christie's recently [1]. AI is both reminiscent of the camera and Duchamp. It may be the next anti-art aesthetic. Will AI get any creative credit for its contribution? There are several ways an artist can collaborate with an AI to create art. They can write the originating code for the algorithm, they can upload images to the AI generator, can input text prompts to the AI generator, and can post-curate the output of images from the AI. The artist maintains creative decision-making throughout the process.

“But it's not just about the final image. It's about the creative process—one that involves an artist and a machine collaborating to explore new visual forms in revolutionary ways [1].”

[6] Some scholars assert that a limitation of AI is that it cannot understand the user's intended emotional state which they utilize to assess creative work. Non-experts are more

likely to appreciate and interpret art by relating their personal feelings and memories than experts who may use domain-specific knowledge [6]. Finally, the study suggests that it is better to utilize AI as an extension of the mind rather than a replication of the human mind [6].

There are several implications for education and art education in particular in AI integration. UNESCO in 2019 identified a general education framework for the utilization of AI in education [12]. These four points included: planning AI in education policies to achieve sustainable development goals, creating new models that enable personalized lifelong learning systems, ensuring AI technologies empower teachers not replace them, and promoting inclusive and equitable AI use. As Otto, F., Kling, N., Schumann, C-A., Tittmann, C. [12] mention, Universities race to prepare students for the workforce by training them on emergent technologies, especially AI. The problem is do the benefits outweigh the risks? Are we teaching them the right values in working and developing AI? “The use of AI should serve to support people and not create a dominance of technology over people [12].”

The integration of AI into the education system allows for personalization of education. This level of customization on a systemic scale has tremendous potential to serve students and their unique learning needs. However, what about the standardization of testing, national standards, and core curricula? There’s a balance between individualization and standardization of education. Artificial Intelligence in Education (AIED) is not new but has grown beyond the Computer Science Department. It is time for AIED to play a big role in STEAM where AI Thinking can evolve [4]. AI Thinking can leverage data analytics and cognitive computation with human interpretation of findings. The human is to interpret the patterns identified by the AI in the data. This is another example of how human-AI collaboration distributes labor to problem-solve together.

Some of the opportunities for AIED include that an AI system could record and analyze students’ work and report back to the teacher with suggestions of which students might need extra attention to support differential learning [3]. AI has much potential to increase efficiency in teaching and learning. Administrators, teachers, and staff need to become educated about AIED and how it works. Educators need to become well-informed so that they can make good decisions to shape education into the next two decades. Leaders need to push past the hype of AI and obtain critical information to determine what is the right fit for their institutions and their students.

There are wide arrays of AI tools that are accessible for creative use. This is a great opportunity for art educators to integrate AI into their curriculum. You don’t need to code to get started. There is a myriad of ways to interact with AI generators to obtain creative output. More valuable than the output is where it can lead to from there, other iterations, other modalities, and critical reflections on our relationship with AI.

7. The Risks of Using AI

AI is not to be trusted [13]. There is a tendency to anthropomorphize AI and we misplace human characteristics in it. AI cannot be held accountable for its actions; it does not have intention, consciousness, or emotions. It should not be misconstrued as a reliance on this technology for trust [13]. There exist extinction fears regarding the future development of super-intelligent AI. This technology is being monitored by CSER (Centre for the Study of Existential Risk), at the University of Cambridge [2]. They are looking at the transition of AI from narrow (what we mostly use now e.g. Natural Language Processing (NLP)) to general (broad-based, problem-solving) to super-intelligent (systemic level broad problem-solving self-learning AI). Possible threats that CSER is concerned with involve global security and possible human extinction. CSER cautions us that AI systems may become superior to human capabilities and transform the world on par with the Industrial Revolution. This will have both positive and negative effects some of which could be catastrophic consequences. Many leading AI companies including OpenAI, DeepMind, and the Centre for Human-Compatible AI are spearheading machine learning safety research.

Humble, N. & Mozelius, P. [3], point out threats in the education sphere with the integration of AI including that while AI may not replace teachers, it will replace other personnel such as TAs and administrators. It also has the potential to harm the student-teacher relationship and make students too reliant on technology. There is also a caution that there could be a trend toward too much individualization in education with the onset of AI. At this stage, educators still know too little about AI to integrate purposefully and ward off these threats [3].

The main risk issues include: privacy and security of personal data, bias and fairness by AI algorithms, unemployment due to AI automation, lack of accountability and transparency in AI decision-making, AI’s making mistakes and their work must be vetted, ethical dilemmas e.g. military, security, misuse of AI caused by malicious actors, safety and reliability e.g. healthcare, dependency on AI systems, over-reliance by humans on AI leads to skill loss and vulnerability to system failure, and inequity including global economic inequality.

What is being done about this? Currently, President Biden has gotten seven leading AI companies in the United States to agree to voluntary commitments. The companies participating included Amazon, Anthropic, Google, Inflection, Meta, Microsoft, and Open AI. The voluntary commitments are not enforceable but a step in the right direction in obtaining guardrails for AI in this country. These commitments include safeguards for security testing by independent experts, research on bias and privacy, information sharing about risks with governments and other organizations, development of tools to fight societal challenges like climate change, and transparency measures to identify AI-generated material [14].

8. Conclusion

As a human race, it is still the beginning of life with AI. It has been in development since the 1950s and roll out to the masses as narrow AI is just happening. Life with AI integration in education, healthcare, the military, and the government are starting to take shape now. Self-driving cars are not quite ready nor is AI ready to safeguard our nuclear warheads completely but it's coming. AI is not to replace the teacher, the artist, the doctor, the lawyer, or any human decision-maker. AI needs to be a collaborator. AI trains us in a new way of seeing. [9] The role of education in the future is crucial to ensure that there is no loss of human skills in the face of AI development. If human beings cannot vet AI information, then we are very vulnerable to machine-learning misinformation. Regarding art and art education, this era is not only of the fourth Industrial Revolution, but of another avant-garde and paradigmatic aesthetic shift where AI transforms art, culture, and society. It will take the next avant-garde of interactive artists to experiment with this new media and they will need art educators to facilitate their practice. AI data analysis is a powerful tool to unearth "data unconsciousness," uncovering patterns that often elude our perception due to human perceptual and cognitive limitations. [9] This gives us access to reality that is akin to what photography, cinema, and other technologies have given to us previously in history, giving us an enhanced ability to see what has not been seen before. All students whether they become avant-garde artists or join the workforce in any capacity will need new arts technology skills and art educators will have a critical role to play in their development. This will require more curricula development that will integrate digital technologies and AI. "A post-human-influenced art education curriculum that recognizes machines and other nonhumans as both creators and creative partners should have profound implications on the domain [7]." Leonard proposes an Entanglement Art Education curriculum that is based on the entanglement of all matter that yields new possibilities through intra-actions that include non-human content [7]. His framework provides a structure to build upon for art educators starting to assemble their curriculum designs. It is now time to start building a post-human art education curriculum and integrate it into pre-service training.

There exists a dynamic relationship between artists and evolving technologies in the 21st century, amid the 4th Industrial Revolution, where the trajectory of human-machine collaboration remains uncertain. I foresee the next interface – a transparent interface where the body is the ultimate interface, and our environment is entirely smart. Our environments will read our retinas, sweat, temperature, EKG, blood pressure, and other bodily metrics while taking voice commands and gestures through thin air without a controller. The potential for a transparent interface, where our bodies become direct transmitters of data across global networks is infinite.

The central question revolves around the role of AI in studio art practice. While some may view AI as a potential

competitor for artist jobs, can artists instead develop their relationship with AI as a co-creator, propelling artistic endeavors to new and innovative heights? This ongoing dialogue will delve into the delicate balance between leveraging AI's capabilities to increase efficiency, automate tasks, and synthesize data while ensuring that it enhances rather than eclipses the human element in the creative process.

Acknowledging the looming possibility of a future where AI and humans collaborate seamlessly, there are serious concerns about potential pitfalls, such as the generation of algorithmic garbage that could undermine the meaningful output of human artists, bias, copyright infringement, and theft. The overarching goal is to explore ways in which AI can be harnessed to save time, illuminate new creative pathways, and allow humans to maximize their creative potential. Human beings are standing on the precipice of the next terrain and art educators have a role through teaching and preservice training to shape the pathway of this journey.

Author Contributions

Sherry Mayo is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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