

PAPER

Art Education in the Era of Artificial Intelligence: Advancing the Elimination of Technological Anxiety

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ABSTRACT

This study focused on the phenomenon of technological anxiety in the contemporary art world within the context of artificial intelligence (AI) technology. By analyzing cases of anti-AI movements initiated by artists on platforms such as ArtStation and GitHub, this study identified the key issues that arise in the art world under the influence of technological anxiety. A dialectical analysis of two central issues—intellectual property and occupational substitution—was conducted from four perspectives: technology, legal principles, user perspectives, and historical context. Furthermore, the study discussed core artistic values and compliance anxiety, particularly as they relate to the concerns of art students. Qualitative research methods, including content analysis and case studies, were employed. The study uncovered the underlying reasons for technological anxiety in the art world, critiqued the irrational aspects of the anti-AI movement, and offered solutions to alleviate technological anxiety. Additionally, it provided recommendations for the career development of practitioners. The study also highlighted the importance of core artistic values, the elimination of compliance anxiety, and the improvement of teachers' proficiency in AI as key areas for enhancing student education.

KEYWORDS

art, education, artificial intelligence (AI), technological anxiety, intellectual property

1 INTRODUCTION

Since IBM Deep Blue defeated the human world chess champion Garry Kasparov in 1997, artificial intelligence (AI) has entered a period of rapid development [1]. Over the past two decades, various intelligent automation applications have been introduced to the art industry. Numerous software tools have begun to replace traditional paper-based tasks, and artistic creation has increasingly shifted to digital formats. Programmatic techniques in filtering, music synthesis, design, and typesetting have replaced some manual labor. Subsequently, there has been a surge in the development of small-scale AI tools. Image recognition-based technologies, such as automatic frame interpolation and inpainting, have facilitated film and television

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editing [2]. AI-based image super-resolution technology has restored classic films and television works to 4K ultra-high-definition resolution. Ray tracing and intelligent rendering technologies have become practical, enhancing the rendering quality of virtual scenes. Deepfake technology has introduced new possibilities in the film and television industry [3]. In 2016, AlphaGo's victory over GO champion Lee Sedol significantly increased public attention towards AI [4]. During this period, AI technologies such as voice assistants, recommendation systems, and facial recognition have become more integrated into daily life, impacting various aspects of it. Generative Adversarial Networks (GAN) models in AI can produce high-quality images [5]. Voice AI can mimic human speech. Systems such as Ali Luban and DALL-E can now handle tasks such as typesetting design. The release of GPT-3 and Stable Diffusion in 2020 marked the beginning of the era of large-scale AI models. Aesthetic evaluation AI can rate and classify images. The large language models can facilitate communication and writing. The large image models can achieve on-demand generation of images [6]. Global internet companies are now investing in general-purpose AI models, and some have begun exploring AI applications in product design, architectural design, and virtual image creation. With the significant leap in the practicality of AI technology, its integration with the art industry has intensified, and technological anxiety issues arising from AI in the art world have become increasingly prominent.

The technological anxiety discussed in this paper refers to the uneasiness or fear experienced when facing the application and development of emerging technologies, arising from the unknown, complexity, or potential social, ethical, and professional impacts of technology. In the art industry, this anxiety primarily manifests in concerns that AI technology may infringe on intellectual property rights, replace the professional roles of artists, and affect core artistic values.

The case studies in this paper include tracking the widely influential anti-AI movement on social media, the remarks of prominent art industry figures on AI technology, user comments shared on art community websites about AI art, and reviews of art school graduation exhibitions. Focusing on themes such as intellectual property disputes, career replacement issues, emotional expression patterns, and changes in social attitudes, this paper analyzes the primary manifestations of technological anxiety among art practitioners and students.

This paper discusses the education of art students in school, as well as education in a broader sense, including lifelong learning for practitioners. The significance of this study lies in revealing the anxiety issues and root causes triggered by AI in the art industry and in proposing practical measures to alleviate such anxiety, providing a useful reference for lifelong learning among practitioners and school art education. The findings of this paper can help practitioners, teachers, and students update their understanding, eliminate technological anxiety, and keep pace with the wave of AI development. Moreover, through the leadership of the art industry's top-level figures, these ideas can cascade downward, ultimately fostering a conducive environment for the integrated development of art and artificial intelligence.

2 TECHNOLOGICAL ANXIETY IN THE ART INDUSTRY

2.1 Outbreak on Artstation: Intellectual property concerns

As AI transitioned from simple automation to innovative creation, AI-generated artworks began to rival human creations, sparking a backlash among image content creators. In 2022, ArtStation, a prominent portfolio site, saw a surge in

anti-AI sentiment. Creators flooded the homepage with the icons “No AI,” as depicted in Figure 1, sourced from an ArtStation homepage screenshot.

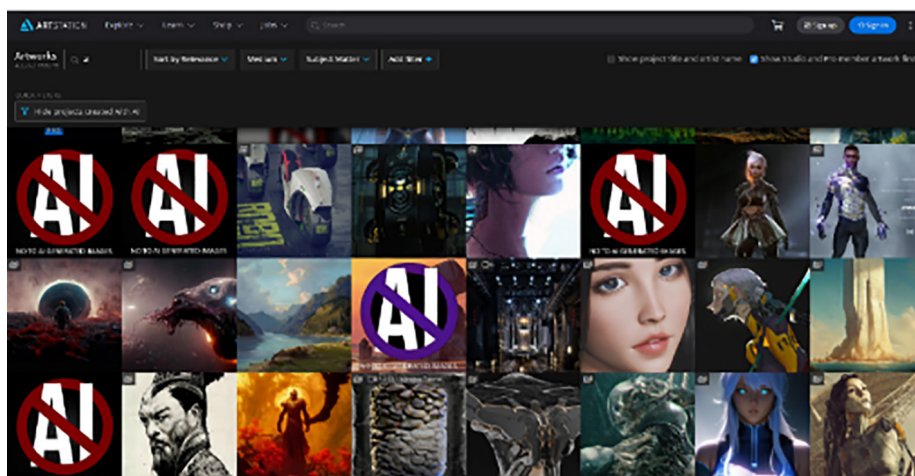


Fig. 1. Anti-AI icons inundate the ArtStation homepage

The controversy began with Bulgarian artist Alexander Nanitchkov, who initially posted a series of anti-AI messages on ArtStation. These posts were deleted by the site, prompting Nanitchkov to repost and eventually see the comment feature disabled. In protest, he replaced all his previous works with anti-AI icons. Nanitchkov’s key points were:

- a) Alexander believes that the so-called AI art is based on the creations of hundreds of thousands of artists and photographers, who have spent considerable time and effort creating billions of images. He feels that these artists’ works are being stolen and used unethically and that using AI to generate the final image and then claiming to be the artist is disrespectful.
- b) Alexander is critical of artists who use AI to accelerate the creative process or rely entirely on AI to generate images. He argues that this is not only an issue for art industry professionals but also involves the violation of privacy data.
- c) Alexander opposes justifying the use of AI to steal and utilize others’ works with reasons such as technological progress and artistic freedom, believing that such behavior lacks morality and foresight. He advocates for regulating and eliminating improperly obtained data through actions and laws, including restricting or prohibiting the use of AI-generated assets and artworks in the industry.
- d) Alexander also made it clear that he is not opposed to new technologies but hopes to advance art and technology using AI that has not been trained on a large volume of stolen images [7].

Nanitchkov’s stance garnered substantial support from ArtStation users, leading to a widespread anti-AI campaign that also spread to other social platforms. Despite ongoing opposition, the campaign’s momentum has diminished over time.

2.2 Outbreak on GitHub: Career replacement concerns

Another outbreak occurred in 2024, triggered by a GitHub project called Paints-Undo [8]. The author of this project is Lvmin Zhang, a prominent contributor in the

field of image generation AI. He has developed various enhancement tools for image generation AI, including automatic coloring, automatic comic filters, and smart shadows. The most famous of his works is ControlNet, a tool that provides a series of control methods for image generation AI, allowing it to generate images that better meet user needs [9] [10] [11] [12]. Paints-Undo is an AI project that simulates the “undo” action in digital creation. It aims to offer a fundamental model of human painting behavior, with the hope that future AI models can better address the genuine needs of human artists. Paints-Undo provides a set of models that take an image as input and output a drawing sequence of the image by simulating the undo action. The model showcases various human behaviors, including but not limited to sketching, inking, coloring, shading, transformation, left-right flipping, color-curve adjustment, changing the visibility of layers, and altering the overall approach during the drawing process. This outbreak occurred because the image sequence generated by Paints-Undo can be used to create realistic time-lapse photography of the painting process. As a result, some artists, who had been trying to prove their work was manually created by documenting the painting process, found their method of self-verification nearly obsolete. They argue that this technology can only be used to falsify the creative process. Although this outbreak received less attention compared to others, a notable difference was that the opponents began to attack AI technicians. The irrational discussions led to their comments being quickly closed by GitHub.

3 ELIMINATE ANXIETY AND EMBRACE CHANGE

3.1 Technical principles and legal analysis

The issue of “theft” that concerns creators refers to the inclusion of illegal data in the material databases used by AI during training. For example, the LAION-5B dataset, mentioned in the “anti-AI movement,” is a text-labeled image dataset comprising 5.85 billion images filtered through contrasting language images. It is the largest publicly accessible image-text dataset in the world at that moment [13]. Some creators have reported finding works in this dataset that they had publicly uploaded to the internet without granting permission for others to use, while others have found their private information in the database [14]. Consequently, creators believe that using these databases to train AI constitutes infringement and that the works produced by such AI also involve infringement.

Current AI mathematical models simulate the neuronal structure of the human brain, and the AI training process bears similarities to human learning. For instance, the diffusion model, which is prominent in the field of image generation, first adds noise to a sample until it becomes entirely noise, then fits the reverse process of noise addition, ultimately generating an optimal set of reverse process weight parameters after sufficient iterations. This weight parameter set does not contain any sample data, as illustrated in Figures 2, 3, and 4 [15] [16]. Another well-known model in image creation is the GAN, which employs a generative network and a discriminative network to compete with each other. The generative network outputs data that the discriminative network cannot accurately identify. Researchers typically use expected samples to guide discriminators in distinguishing between real data and generated data. Similarly, the final weight parameter set does not include sample data [17]. This learning process closely resembles human learning, where knowledge and behavior are acquired through observation and imitation [18]. Just as humans learn creative skills from studying predecessors’ works, this does not imply that new creations are merely patchworks of prior works or combinations

of previous artworks. Even individuals renowned for their ability to mimic, such as Han van Meegeren from the Netherlands, are celebrated for their skill [19]. However, this ability in AI does not evoke the same perception. AI's superior imitation, learning speed, and iteration speed, especially in learning visual styles, sometimes give the impression of "plagiarism." Creators, who lack the technical understanding of AI neural networks possessed by computer science researchers, often perceive AI creation as sophisticated stitching, exacerbating this misunderstanding.

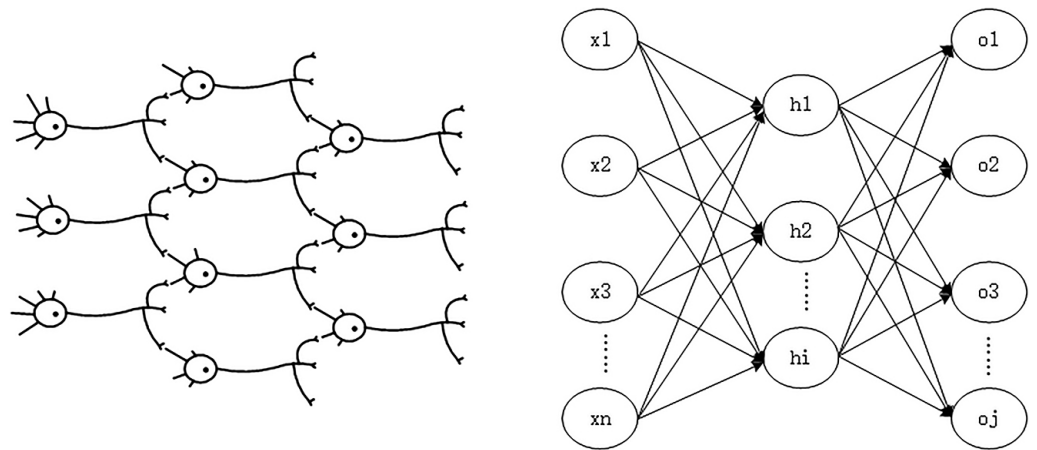


Fig. 2. Comparison of the structural similarities between biological neurons and neural network models

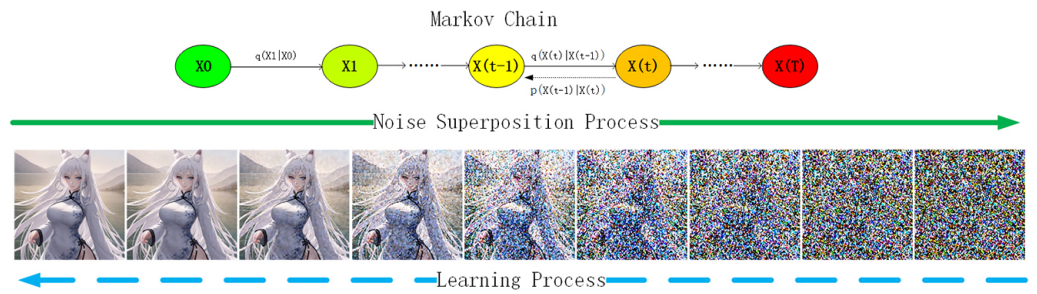


Fig. 3. Schematic diagram of the diffusion model learning process

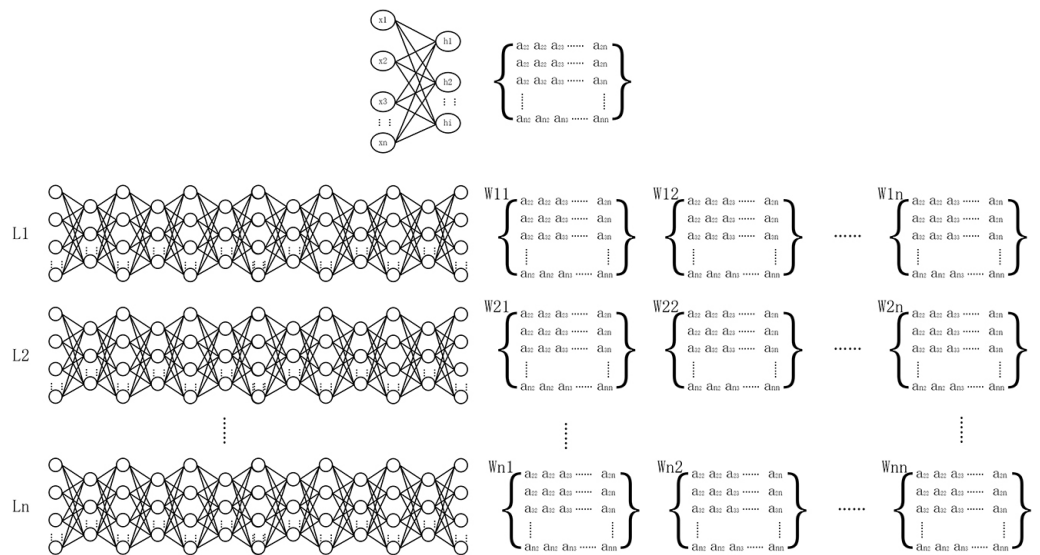


Fig. 4. Architecture of deep neural networks and the corresponding weight matrix diagram

From a legal standpoint, AI cannot yet be considered a rights holder. AI itself does not hold intellectual property rights and cannot infringe upon them. The rights holders remain the human individuals or organizations who study and utilize AI. The learning behavior of AI is typically not considered infringement under current legal principles. Copyright law protects the expression of works but does not restrict the underlying ideas or concepts. For example, if predecessors have created fantasy works with magical elements, this does not legally prevent successors from creating similar works. Similarly, science fiction works with elements such as aliens or energy shields cannot legally prevent future works from using the same elements. Ideas should not be monopolized, as this would stifle human development. In the arts, visual style also constitutes an idea and is not protected by intellectual property law. This is precisely the aspect that AI learns the fastest. Infringement judgments are usually based on the similarity between the details and the overall effect of two works. Therefore, AI-generated art is unlikely to be deemed infringing in a legal sense. However, it is important to acknowledge that an artist's distinctive visual style is a crucial identifier. If AI easily replicates this style, it poses a grievous blow to the creator, which is why many artists oppose using their works in AI training. The most likely area for infringement risk in AI is data collection crawlers, which can automatically gather public resources from the internet and compile datasets. This process may involve unauthorized copying, posing a risk of infringement. Legal frameworks often lag behind technological advancements, and the question of whether AI's use of unauthorized data constitutes infringement is ahead of current laws. Furthermore, the sheer volume of data makes it difficult to determine whether AI has used unauthorized data in its training. For instance, the Laion-5B dataset's extensive text labeling allows researchers to set filters to exclude irrelevant data during AI training. Consequently, it is challenging to assess which specific data AI has learned. The determination of infringement in AI-generated works ultimately relies on similarity comparison [20] [21].

The purpose of intellectual property protection is to foster societal development by providing monopolistic market benefits through the protection of work expression and inventive results, thereby encouraging creators and researchers to innovate. This, in turn, benefits society and drives progress. Effective intellectual property protection must balance the interests of intellectual property holders with the public interest, ensuring that it neither stifles creativity nor impedes the flow of knowledge. In the future, AI's learning behavior is likely to enjoy similar rights to human learning, as learning and research purposes are typically considered fair use without requiring permission from copyright holders. Likewise, AI use should adhere to the principle of promoting societal development and achieving a balance between intellectual property interests and the public good. On one hand, AI should advance productivity; on the other hand, its abuse must be prevented to avoid hindering human creativity [22].

3.2 Comparison of attitudes between user groups and creators

The attitudes of creators towards AI can generally be categorized into three types: optimistic and confident, pragmatic, and resistant.

The group with an optimistic and confident attitude typically includes art masters, such as top illustrators like Mai Yoneyama. In the 2023 Netflix Anime's "Passion of Drawing" special program, Mai Yoneyama and Naoki Urasawa discussed AI's role in artistic work. Both Yoneyama and Urasawa agreed that the creative process is

their source of enjoyment and that delegating this work to AI would make their work monotonous. They believe that their own creative content cannot be replaced by AI.

The group with a pragmatic attitude includes art directors and students. They often use AI to quickly generate high-quality samples from drafts. Art directors use numerous samples to help users clarify their needs and refine modification plans. Students gain inspiration from a variety of samples.

The group with a boycott attitude usually consists of experienced professionals in the digital art field. These creators view AI as a significant threat to their profession and generally believe that AI's learning process infringes on copyright. The summary results are shown in Table 1.

Table 1. Classification of attitudes of creators towards artificial intelligence

Attitude	Group Profile	Viewpoint
Optimistic & Confident	Art masters	They believe that their own creative content cannot be replaced by AI
Pragmatism	Art directors	It is very helpful for users to clarify their needs
	Students	Getting inspiration
Boycott	Experienced professional artist	A serious threat to their careers Copyright infringement

Overall, creators generally have a negative view of AI, with many fearing that AI will take their jobs. In contrast, users of artworks are more accepting of AI creations. Data analyzed from the Stable Diffusion and Midjourney communities show that while the user base for generative AI is growing rapidly, its primary use is for entertainment rather than professional art creation. Seventy-five percent of users are casual users with low usage frequency, typically entering fewer than 15 prompt words. This distribution indicates that most users are not original creators. Among them are many potential artwork users, such as amateur novelists, who enjoy using AI to create cover images and illustrations for their articles. Before generative AI was available, they were unwilling to pay higher royalties for these illustrations [23] [24] [25]. This trend is due not only to the rapid development of AI but also to the market conditions in the art industry. For instance, Pixiv, another illustration community website, allows users to publish their own illustrations, facilitating communication between creators and art enthusiasts. Pixiv's interface minimizes text communication, focusing on illustrations and comics, and is widely supported globally. Pixiv has over 50 million users, more than 90 million submissions, and over 4 billion page views per month. The platform's concept of "not dividing illustrations by genre" allows users to freely add keywords, achieving flexible and multidimensional browsing. Pixiv serves both creators and general audiences, unlike ArtStation, which is geared towards creators displaying their work and finding job opportunities, primarily targeting industry insiders. In other words, ArtStation's platform is a formal presentation of creators' resumes, while Pixiv is a community for amateur enthusiasts. Correspondingly, Pixiv's user base generally holds a positive view of AI, welcoming high-quality AI creations and sharing them on the platform. This acceptance is also related to the market conditions of the art industry. In the era of booming internet new media, many individual artwork users have emerged. The relationship between the individual artwork users and the creators is very different from the traditional business models, where the enterprises have a strong position [26] [27]. As shown in Figure 5.

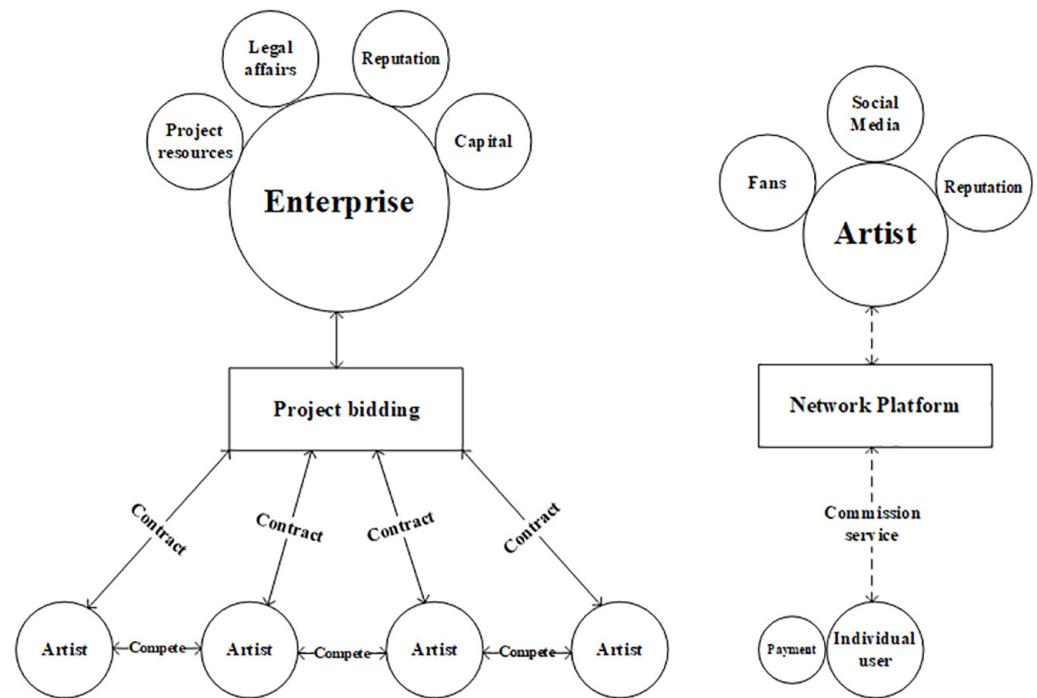


Fig. 5. Comparison between enterprise users and individual users

Excellent creators can gain substantial popularity and fan bases through self-media channels. However, most commissioners are individual users who lack effective communication channels. When commissioning artworks, individual users often do not have a comprehensive contract outlining modification terms and product quality. The commissioning party generally has the phenomenon of “difficulty in proposing modification suggestions.” Some creators, due to the popularity and fan base acquired through self-media, may develop arrogance and a lack of responsibility, refusing reasonable revision requests and even engaging in cyberbullying against dissatisfied commissioners. This behavior has tarnished the art industry’s reputation. The emergence of AI provides a new avenue for individual users, allowing them to create freely without worrying about rejection of their revisions. Despite current AI’s considerable shortcomings, it has gained high recognition among users, which may prompt reflection among some creators in the art industry.

3.3 Reviewing the AI technology revolution from a historical perspective

From a historical perspective, creators need to align with the trend of developing productivity and learn to utilize AI as a tool. Much of modern artistic creation is done using Adobe software. In the 1980s, as graphic design began its shift toward digitalization, Adobe was merely a small company with just over 40 employees. In many businesses requiring graphic design, decisions regarding fonts and font usage were made by specialized printing technology engineers rather than designers. These engineers focused on the technical aspects of fonts, while corporate managers were primarily concerned with getting products to market quickly. Technical limitations often led to many typesetting needs being overlooked, and the aesthetic aspects of fonts and typesetting were typically neglected. During this time, designers still drew on paper and were dismissive of digital graphic design. However, this did

not halt the trend towards digital graphic design, which significantly increased work efficiency. By the 1990s, publications created with digital graphic design had become widespread. Many designers criticized and questioned the quality of this typesetting, and the debate over whether computers should be used in graphic design became a focal point in the design community. Just as society once faced the challenge of digital graphic design, it now faces the emergence of AI in creative fields. Some fear the capabilities of machines, while others admire technological advancements. The technological revolution has enhanced production efficiency, transformed production models, and changed industry dynamics, leading to the disappearance of old professions and the emergence of new ones. As new software such as Adobe evolved, encapsulating the expertise of graphic design within a technical “black box,” there was no longer a need for specialized personnel for fonts, photo color processing, or grayscale correction [28]. These tasks were then entrusted to designers. As digital tools continued to advance, design became accessible not only to professional designers but also to others. Concerns about job loss among designers emerged, with arguments suggesting that “everyone is a designer, and designers will lose their value.” Nevertheless, looking back, designers did not lose their jobs or value. Instead, they adapted by learning to use new technological tools. The evolution of art creation tools from digital to intelligent technologies is illustrated in Figure 6.

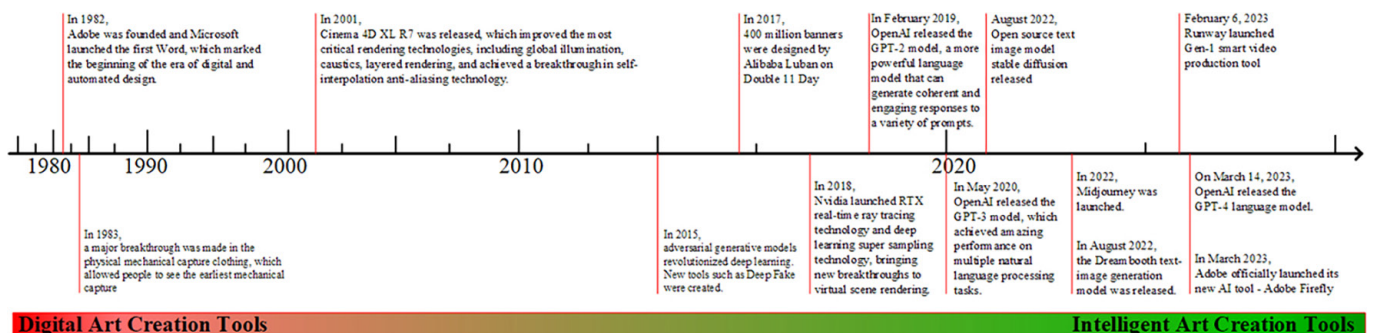


Fig. 6. The Evolution of art creation tools from digitalization to intelligence

Historically, new technologies have not destroyed art but have instead made practitioners in the art industry more specialized. Artists have transitioned from working solely on paper to roles requiring more technical skills, such as graphic designers, 3D modeling engineers, and video editors. The advent of digital creation tools was a technological revolution, and the current rise of AI represents another technological revolution. Just as photography did not eliminate art, digital creation tools will not destroy it. Likewise, creators need not worry that AI will diminish their value [29] [30] [31].

3.4 Opportunities, challenges, and future outlook

From the current norms, the three major players in AI technology, the United States, China, and Europe, have taken some measures on AI, but the methods are different. The United States has many leading AI companies. Due to commercial interests and development strategy, it has less regulatory interference in AI applications. The European Union remains highly cautious about AI applications. Its upcoming “AI Act” focuses on prohibiting certain uses that may harm the public interest while establishing due diligence requirements for AI companies. China adopts a more

balanced approach, striving to encourage innovation while preventing disorderly development. Overall, the use of AI to assist in creative work is encouraged for the advancement of social productivity [32]. Before the advent of strong AI, AI will remain within the domain of machines. The apparent creation of value by machine systems is essentially the result of the intellectual labor of scientists and technologists. In other words, AI is not yet capable of completely replacing human labor, and labor creating value remains a fundamental truth. Creators need not fear losing their intrinsic value; however, they should recognize that each industrial revolution necessitates the accumulation of more knowledge and skills. The development of society is intrinsically linked to the advancement of productivity, which in turn relies on technological upgrades and industrial revolutions. AI is at the heart of the fourth technological revolution. In the upcoming industrial revolution, AI will be a crucial enabler. The practical application of AI represents the forward trajectory of history. The Neo-Luddite anti-AI movement is both irrational and futile [33] [34] [35]. It is foreseeable that the integration of AI with artistic creation will hold significant potential in the future. Nevertheless, artistic creation will still require human creative intention as its driving force. In the new wave of technological revolution, creators must embrace technological advancements, leverage AI to drive industry development and upgrading, and uphold the core values of art.

4 ART EDUCATION NEEDS TO PROMOTE THE ELIMINATION OF TECHNOLOGY ANXIETY

Technology anxiety in the art industry requires a top-down approach involving lifelong learning to gradually mitigate it. Eliminating technology anxiety requires not only changing the perceptions of current practitioners but, more importantly, educating current students of the arts. They will become future professionals and play a crucial role in the integration and development of art and AI. The concerns of art students are also different from those of current professionals. Although AI technology is already widely applied in art education. The personalized learning plans powered by big data analysis, the interactive teaching models, and the augmented reality, which have significantly enhanced students' learning outcomes and creative thinking abilities [36] [37] [38]. However, students' awareness of AI technology still remains insufficient, which leads to technology anxiety. This anxiety primarily centers around two aspects: the core value of art and compliance concerns.

In the past three years, an increasing number of works created using AI have appeared in the graduation exhibitions of various art academies. Reviews of these exhibitions have increasingly highlighted students' concerns regarding this trend. As previously mentioned, students tend to adopt a pragmatic attitude. It is precisely because they embrace and use new technologies that they have a deep understanding of them. After gaining a comprehensive understanding of AI's functionalities, they worry whether the knowledge and skills they are currently acquiring may already be outdated given the rapid development of AI. They are also confused about the core value of art. Although there is extensive discussion on the core values of art in education, there is little comparative analysis between AI-generated art and human-created art. Existing research indicates that human art holds distinct advantages in emotional expression and narrative. Audiences tend to perceive human-made art as having greater emotional depth and authenticity, with richer conceptual layers and more complex story backgrounds. Human art is often closely linked to the creator's personal experience, cultural background, and social context,

which imbues the work with specific meanings and narratives. By contrast, although AI-generated art may technically match or even surpass human art, the lack of genuine emotional involvement during the creative process makes it difficult for audiences to experience the same emotional resonance. This emotional expression and narrative depth are critical core values in art. Experimental research has shown that even when controlling for biases such as anthropocentrism, human-created works are still slightly more favored in Turing tests [39] [40] [41]. The creative intent of a work still requires human mediation to be conveyed to AI. Current art education needs to include more in-depth discussions to help students identify and understand their own core artistic values.

Another major concern is compliance anxiety. Students often lack a comprehensive understanding of the complexities of software licenses. They worry about inadvertently violating license terms or having their works forced to become open source due to the use of open-source content. Existing research in this area mainly focuses on computer software developers, many of whom have a basic grasp of the requirements of common permissive licenses (e.g., MIT, Apache) and mandatory open-source licenses (e.g., GPL). For example, they generally understand that the MIT license permits closed-source distribution, whereas the GPL requires derivative works to be open source. However, when multiple licenses intersect or legal terms become more complex, developers' understanding significantly diminishes. Research shows that many developers, when faced with mixed licensing scenarios, struggle with how to legally combine, modify, and distribute components under different licenses. This confusion manifests in their inability to accurately determine which actions trigger the transitivity requirements of a license. Many users of open-source software do not fully grasp the specific terms and legal implications of the licenses governing their codes or applications [42] [43]. For students, fully understanding open-source agreements and the licenses of various AI tools is even more challenging, exacerbating their compliance anxiety. Addressing these concerns should be a priority in art education curricula.

Linked to this issue is the capacity of teachers. Effective teaching of these topics requires that educators fully understand them first. However, current levels of digital literacy among teachers seem to pose an obstacle. Research indicates that students are often more adept than teachers at mastering digital technologies, particularly in using tools such as social media, while teachers mainly have advantages in academic knowledge and information retrieval. Teachers, especially older ones, frequently exhibit resistance to new technologies. In contrast, younger teachers are generally more open to adopting and utilizing new technologies. When it comes to new technologies such as AI, art educators are often no more knowledgeable than their students [44] [45]. If art education aims to promote the elimination of technology anxiety, it may need to begin by enhancing teachers' understanding of these technologies.

5 CONCLUSION

This paper analyzed the views of creators on AI, beginning with the outbreak of the anti-AI movement on online platforms, and highlighted the current technological anxiety and key issues within the art world. The concerns raised by creators are addressed from technical, legal, user, and historical perspectives. Provided a theoretical foundation and thinking path for creators to eliminate technology anxiety. Also, how creators should approach AI was discussed. Furthermore, this paper

emphasized that alleviating technological anxiety among current art students is a critical area of focus. The key efforts should include helping students clarify their core artistic values, eliminating compliance anxiety, and enhancing teachers' proficiency in AI technology. The findings propose practical measures to alleviate this anxiety, providing a valuable reference for the lifelong learning of practitioners and the education of art professionals in schools. It can assist practitioners, teachers, and students in updating their understanding, eliminating technological anxiety, and ultimately contributing to the establishment of a conducive environment for the integration and development of art and AI. This study holds significant implications for current practices in art creation and art education. However, the primary limitation of this study lies in its inability to accurately predict the future development of AI capabilities. As of the time this article was completed, more advanced image generation models has already been introduced. The core artistic values discussed in this study continue to face significant challenges. We hope that this study can bridge differences and urge the art community to focus on exploring the harmonious integration of AI and human creativity, thereby promoting the healthy development of the art industry.

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