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## ETHICAL RISKS AND COPING STRATEGIES OF GENERATIVE AI IN MUSIC EDUCATION

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### Abstract:

The increasingly prominent role of generative AI in education, and the application of generative AI in music education and industry have drawn sustained scholarly attention to its pedagogical value, ethical challenges, and effects on musical creativity. AI tools are applied in intelligent composition, music production, music creation, assisted lesson preparation, etc. Although generative AI has effectively enhanced music creation, production efficiency, and pedagogical innovation in the field of music, according to the UNESCO (2021) Recommendation on the Ethics of Artificial Intelligence, China's (2023) Interim Measures for the Management of Generative Artificial Intelligence Services, and relevant literature, the ethical risks of generative AI in music field remain significant. Based on relevant literature, this study contributes a risk taxonomy, an ethical governance framework, and actionable policy guidelines to promote the ethical and healthy development of generative AI in music education.

### Keyword:

Coping Strategies, Ethical Risks, Generative AI, Music Education



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## Introduction

The wave of artificial intelligence has swept the world, and artificial intelligence is slowly changing people's lives. With the advent of generative AI, there has been an unprecedented impact on the field of education (Bahroun et al., 2023). Generative AI is a special artificial intelligence that can generate text, images, audio, video and other materials according to the user's instructions (Tang & Cooper, 2025). In music education, many aspects are assisted by generative AI, which not only makes all aspects efficient, but also saves time and economic costs. However, there are still some potential risks in the use of AI tools in music education, and how to avoid these risks is particularly important in the use of such technologies.

This article discusses and summarizes the application of generative AI in music education. In addition, the Recommendation on the Ethics of Artificial Intelligence (2021) issued by UNESCO and China's Interim Measures for the Management of Generative Artificial Intelligence Services (2023) should be combined with music education. In addition, relevant literature is integrated, which ethical risks exist in generative AI in music education are summarized, and corresponding coping strategies are proposed, in order to provide some suggestions for promoting the standardized application of AI tools and promote the healthy development of generative AI in the field of music.

## Research Background

### *The Penetration of Generative AI in Music Education*

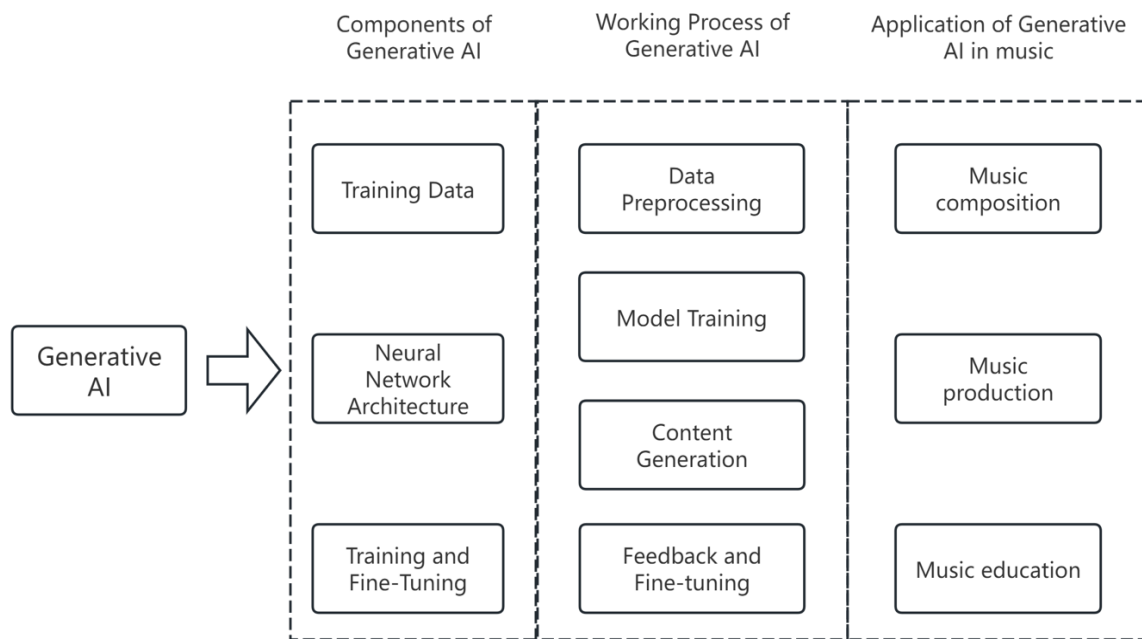
AI technology is an indispensable part of today's technological era (Hellman, 2024). With the emergence of ChatGPT, generative AI has attracted a lot of attention around the world, and various generative AI applications have been born, which has had a huge impact on the education community. At the same time, it has also caused a major change in music education, which is a double-edged sword for development of the music education (Cheng, 2025). Generative AI is a type of artificial intelligence diversification (Sáez-Velasco et al., 2024). Specifically designed and developed for music generative AI is trained with big data such as music style, melody writing, and audio output (Merchán Sánchez-Jara et al., 2024), so that users can learn music effortlessly.

In music education, the application of generative AI is reflected in various aspects. The emergence of generative AI has brought great changes to music composition, and AI composition tools have diversified development. Users can easily generate original lyrics and melodies through generative AI composition tools (such as Suno) and input personalized demand text and even choose different music styles (such as rock, blues, pop, etc.), making music creation easier. In composition, harmony, and other designs, creators use generative AI music creation tools, which can help creators make new attempts and make up for aspects they are not good at. Assisting students in polyphonic music creation has improved students' enthusiasm for learning polyphonic music, and music creation based on generative AI may become a new trend for future music creation (Yuan, 2024).

These systems also support music production in music education. Although generative AI research in music production is still in primary stage, as an efficient music production tool, generative AI has become a powerful auxiliary tool in music production (Novikova, 2024). In pop music production, generative AI copying music production is more convenient than simple MIDI production (Deruty et al., 2022).

In music education, instructors use these AI tools to prepare lessons, generate teaching materials (such as melody creation, orchestration schemes, etc.), plan activities, and give feedback on students' homework (Hellman, 2024). They also facilitate interactive theory games, strengthen practical understanding of music concepts, and improve student engagement (Arnecke et al., 2024). At the same time, generative AI is also used in music history courses, so that students can have a better understanding of music history and different musical styles corresponding to the era (Wissner, 2024).

Figure 1 explains the internal mechanism of generative AI in music from three aspects: the components of generative AI, the working process of generative AI and the application of generative AI in music.



**Figure 1 The Internal Mechanism of Generative AI in Music**

Generative AI is changing from a technical tool to an ecological reconfigurator, and its emergence is promoting the development of music education to an intelligent, personalized, and low-threshold direction. Although the use of generative AI in all aspects of music education saves time and creative costs, the potential threats and risks of generative AI have always been a concern of researchers (Cheng, 2025; Göçen & Asan, 2023; Rohwer, 2024; Walczak & Cellary, 2023).

## ***The Contradiction between Technological Empowerment and Ethical Risks***

Technology empowerment adds impetus to music education. The emergence of AI tools can help the large-scale production of music resources, such as music composition, music production, and adaptive course materials generation. At the same time, generative AI can provide precise learning paths based on user information, such as music rhythm perception training.

Meanwhile, with the extensive use of AI tools in the field of music, some ethical risks have gradually emerged, such as the disclosure and abuse of learning behavior data that may lead to the construction of psychological profiles of students (Uddagiri & Isunuri, 2024), such as the analysis of the association between personality and music preference. At the same time, generative AI training data, if there are cultural differences or gender biases, may output some discriminatory content (Candusso, 2024), such as some musical styles or musical forms are rejected. Meanwhile, over-reliance on generative AI tools to generate music-related content may lead to the degradation of users' musical creativity, and direct use of generative AI generated results.

The UNESCO (2021) *Recommendation* emphasizes four binding principles:

**Transparency:** Educational AI needs to disclose the algorithmic logic to avoid 'black box operations' (such as the decision-making basis of music scoring systems).

**Inclusion and diversity:** ensure that AI services reach all groups (such as students with disabilities learning music through voice interaction).

**Responsibility demarcation:** to clarify the boundaries of data use by developers, educational institutions, and users. Such as prohibiting unauthorized collection of music training data (Rodriguez Maffioli, 2023).

**Cultural sensitivity:** Protecting traditional musical heritage. For example, folk music generated by AI tools needs to label cultural sources to avoid cultural appropriation (Dugeri, 2024).

China's Interim Measures for the Management of Generative Artificial Intelligence Services highlights some targeted provisions:

**Content safety:** Prohibiting the production of pornographic, violent, or contrary to core socialist values of music content (such as AI tools must not generate songs that promote separatism).

**Right to know:** and this approach requires educational AI to clearly label the AI attributes of the generated content (for example, piano sparring software needs to distinguish between human teacher comments and AI suggestions).

**Data governance:** education data within China must not flow outside the country without approval. Such as recordings of student exercises are prevented from being used for international AI model training.

**Minor protection:** the implementation of content classification and use time limits for minor users (such as children under 12 years old to disable the AI generation of lyrics).

### ***Research Objectives***

RO 1: To explore the generative AI ethical risks in music.

RO 2: To provide a practical guidance framework for teachers and policy makers.

## Literature Review

Through a search of the existing literature, several closely related studies on the risks associated with generative AI in music education since 2024 have been compiled below:

Cheng (2025) explored the impact of generative AI on music education in schools and summarized the potential pros and cons. Generative AI can create works that are indistinguishable from music created by humans, lowering barriers to musical creativity and democratizing music creation. However, issues such as cultural bias in the training data set, the impact on students' creative development, the quality of generated music, and equity and inclusion are also concerns. A series of policy recommendations to guide the effective and ethical integration of generative AI in school music education, these include enhancing AI literacy among students and teachers, developing assessment frameworks that reflect the collaborative nature of AI-assisted music creation, defining acceptable boundaries for the use of AI tools, and providing professional development opportunities for music teachers.

Patil (2024) argued that using generative AI in composition, lyric, and sound design, musicians can now experiment with new styles, genres, and sound effects. At the same time, the use of generative AI also faces risks and challenges such as authorship, copyright and the authenticity of AI-generated works. AI is blurring the lines between human-machine innovation, raising problems about ownership and proper compensation for the work of original authors versus the results of AI. And generative AI's ability to produce deceptive or plagiarized information threatens the integrity of related fields and devalues human creativity. It also pointed to the need to improve the legal framework to help better use generative AI for the benefit of humanity.

Kang and Shin (2024) examined generative AI-related guidelines provided by universities in North America and Europe and explored ways to apply them to music teacher training institutions. The main results are as follows: First, the guidelines encourage students to use generative AI in research and learning and ask teachers to take the lead in determining the use options. Second, these guidelines cover governance aspects such as privacy protection, transparency, fairness, accountability, and academic integrity. Third, on the operational side, it emphasized the need to regularly monitor the use of generative AI, ensure compliance with relevant guidelines, and prepare for and explore the changing AI environment.

Generative AI has the potential to transform traditional music education by providing personalized, efficient, and engaging learning experiences. However, successful integration depends on addressing ethical, legal, and technical challenges, in the process of data collection and use, privacy protection needs to be strengthened, and the transparency of algorithm programming needs to be improved. In addition, AI interaction is superficial, and resources are not sufficient, and the ethical use of these technologies has spawned a series of complex derivative issues. The authors advocated for ethical and legal reasons to minimize the ethical risks of generative AI in music, while promoting hybrid teaching models in which AI supports (but does not replace) the traditional role of the music teacher, ensuring that technological innovation complements human expertise and promotes genuine artistic growth (Merchán Sánchez-Jara et al., 2024).

Zhu et al (2024) mentioned in the application of generative AI in the field of art that the use of ChatGPT promoted the development of creativity in music creation. But in the process of using

generative AI, the ownership and copyright of works are also accompanied by the crisis of artist identity, and the cultural identity of generative AI is also one of the problems to be solved, only by correctly viewing the cultural “identity” of generative AI can we make more rational use of generative AI. Given the wide application of artificial intelligence in the field of art, the formulation of guidelines for its responsible use can not only effectively safeguard the rights of artists but also help defend the authenticity of art under the impact of technology and promote the healthy development of art ecology.

Barenboim et al. (2024) explored the principle of music interpretation by generative AI, but most of the music material training for generative AI is based on western music materials, so the diversity of music-related materials generation is relatively scarce, and the cultural characteristics and regional characteristics of folk music are difficult to show. This is also one of the issues that needs attention.

Based on the search of existing literature, the relevant risks and coping strategies of generative AI in music education are summarized as shown in Table 1.

**Table 1 Research on Generative AI Risks and Coping Strategies in Music Education**

Author (year)	Risks	Coping Strategies
Cheng (2025)	Cultural bias, originality, fairness, ethical issues.	A series of policy recommendations are presented that can ethically and effectively guide the use of generative AI.
Patil (2024)	Intellectual property issues, data ethics issues.	These creative areas require strong legal frameworks and corporate norms. Intellectual property rights must be changed to protect human inventors and recognize artificial intelligence.
Zhu et al. (2024)	The problems of authorship and authenticity.	Develop guidelines for the responsible use of AI, uphold the rights of artists, and protect the authenticity of art.
Merchán Sánchez-Jara et al. (2024)	Data collection, privacy, transparency of algorithmic programming, superficiality of AI responses, current lack of resources, or other issues derived from the ethical use of these technologies	Consider the important role of ethics and law in consolidating a clear frame of reference for the development of guidelines for action.
Kang & Shin (2024)	Information protection, transparency, content accuracy, and academic integrity.	Develop a generative AI ethics education program for music teachers. More research on generative AI ethics and guidelines in music education is needed.
Barenboim et al. (2024)	Most of the data training music materials are western music materials, and it is	Not mention

difficult to highlight the characteristics of national music.

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In recent years, many scholars have focused on the application of generative AI in music education. Researches showed that generative AI shows great potential in music education, which can not only lower the threshold of music creation and provide musicians with space for innovation, but also is expected to change the traditional music education model and promote the creative development of music creation. But the technology has also raised many issues, such as cultural bias in the data, copyright ownership of works, student creativity cultivation, artistic authenticity, and insufficient representation of ethnic and regional musical characteristics. To this end, scholars have proposed a series of coping strategies, including the development of guidelines, improving the legal framework, improving AI literacy, and promoting hybrid teaching models, aimed at helping people make better use of generative AI and promoting the healthy development of the music education.

### **Ethical Risks of Generative AI in Music Education**

Through the above existing studies, it can be seen that generative AI not only brings various conveniences to people but also has ethical risks that cannot be ignored. According to relevant literature, the ethical risks of generative AI in music education are mainly summarized as follows:

#### ***Data and Privacy Risks***

Since generative AI needs to continuously input massive data to train the model (Yu & Guo, 2023), once the user's personal information, music learning behavior data and other sensitive information are leaked or abused (such as the performance data collected by the AI sparring system), it will lead to data and privacy security risks (Mittal et al., 2024; Uddagiri & Isunuri, 2024; Zlateva et al., 2024). This violates the rule of UNESCO (2021) regarding privacy and data protection, which stipulates that privacy must be protected throughout the entire lifecycle of artificial intelligence. Sensitive information, such as performance and singing recordings and practice tracks generated by the AI system, may be used for commercial purposes (Ji, 2023). At the same time, in the process of using generative AI to create music, copyright issues should also be paid attention to (Mittal et al., 2024; Novikova, 2024). Whether generative AI-generated tracks involve the rights, and interests of original authors, as well as the ambiguity of ownership of music scores and musical works generated by generative AI, are all risks that need to be considered when using GAI (Ioannidou et al., 2024; Zhu et al., 2024). This is in conflict with the provisions in the provisional measures of China's (2023) that require respect for intellectual property rights.

#### ***Algorithm Bias and Content Distortion***

The process of using generative AI to generate music may imply cultural bias (Aamir et al., 2024; Nguyen, 2025), such as the stereotypical imitation of folk music styles. The lack of diversity in generative AI data training may lead to the deviation of the generated folk music style from the cultural connotation of knowledge. This is contrary to the regulations on cultural sensitivity issued by UNESCO (2021). At the same time, the accuracy of the teaching materials generated by generative AI is still doubtful, for example, there are errors in the music theory

knowledge generated by AI. Meanwhile, the use of generative AI may also lead to teaching content bias: the repertoire, music score, etc., recommended by the generative AI algorithm may strengthen the mainstream aesthetic and ignore the niche music types.

### ***Academic Integrity and Creativity Dissolve***

The majority of generative AI users said that over-reliance on GAI tools for music creation affects people's creativity and lack of critical thinking (Novikova, 2024). At the same time, students will rely more on generative AI to complete assignments or papers or directly use scores, musical works, harmonies, etc., generated by generative AI, which will lead to academic misconduct and plagiarism risk (Higgs & Stornaiuolo, 2024; Walczak & Cellary, 2023). This violates the regulations set by UNESCO (2021) regarding the boundaries of user data usage. Meanwhile, if teachers over-rely on AI-assisted teaching, it will weaken the emotional interaction between teachers and students and the cultivation of critical thinking.

### ***Cultural Ethics and Identity Risks***

Generative AI's deconstruction of traditional music culture may weaken cultural identity, such as AI-generated pseudo-folk music. The standardized folk music generated by generative AI may dilute and solidify local cultural characteristics. At the same time, in the process of music creation, generative AI is over-deified as the creative subject, which dispels the status of human artists and weakens the emotional expression value of human artists (Higgs & Stornaiuolo, 2024; Zhu, 2024). This violates the content of UNESCO (2021) regarding cultural diversity and inclusiveness, as well as the requirements in China's (2023) Interim Measures for the Management of Generative Artificial Intelligence Services to uphold core values and respect cultural traditions.

### **Coping Strategies and Governance Path**

#### ***Construct Hierarchical Ethical Framework***

The construction of an ethical framework requires multi-faceted efforts, combined with international standard reference and industry self-regulation. Implement the UNESCO Guidelines for Generative Artificial Intelligence in Education and Research (Miao & Holmes, 2023), and establish the Committee for the Ethical Review of AI in Music Education (Aamir et al., 2024). Draw on Saudi Arabia's (2024) Guidelines for using AI in education to develop ethical guidelines for generative AI tool development in music education. Clarify the boundaries of the rights and responsibilities of teachers, schools, and developers, and prohibit generative AI from replacing teachers' core teaching functions. At the same time, a special fund can set up to support ethical research, focusing on overcoming key technical problems such as emotional computing and cultural adaptation.

#### ***Teacher Role Transformation and Ethical Education***

Promote the GenAI-TPACK framework (Lan et al., 2025), incorporate ethical assessment knowledge into teacher training, improve teachers' ability to critically review generative AI-generated content, and cultivate the dual-dimensional ability of technology+ethics. The human-machine cooperative teaching case base is established to provide reusable hierarchical teaching design templates. At the same time, teachers' responsibility for reviewing AI-generated content

should be strengthened, such as requiring labeling of sources and multiple verification (Allen et al., 2024). This complies with the cultural sensitivity requirements for artificial intelligence literacy stipulated by UNESCO (2021), as well as the requirements in China's (2023) Interim Measures for the Management of Generative Artificial Intelligence Services that require clear labeling of the content generated by artificial intelligence.

### ***Technical Specifications and Data Governance***

According to the principles of transparency and responsibility division as stipulated by UNESCO (2021), develop transparent AI tools, promote open-source algorithms and visual interface design, and reveal the logic of music generation (Ferreira et al., 2023; Sanganeria & Gala, 2024). Meanwhile, a classification and protection mechanism for music education data should be established to prohibit the collection of students' biometric data, restrict the collection of sensitive information, and strictly restrict cross-border data flow (Kang & Shin, 2024). Embed data privacy issues in the teaching process, such as clearly informing students about the boundaries of biometric data collection when using generative AI for music writing.

### ***Policy Support and Multi-party Collaboration***

Set up a dynamic management mechanism, establish a white list of generative AI educational products, and regularly evaluate ethical compliance (Si et al., 2024). Governments provide funding to support AI ethics research and encourage interdisciplinary collaboration (technology, education, ethics) (Southworth et al., 2023; Teessar, 2024). Universities, technology companies, and intangible cultural heritage organizations jointly build a GAI+ traditional music laboratory. Through policy guidance, institutional constraints, and individual collaboration, the human-computer collaborative music education ecology is constructed.

### ***Cultural Protection and Innovation Balance***

In accordance with the regulations of UNESCO (2021) regarding cultural diversity and the protection of traditional music heritage, using generative AI to restore endangered traditional music, protect digital heritage, and mark the traces of manual intervention (Yu et al., 2024; Zou & Lin, 2024). For example, the intelligent transcription and recovery of ancient music scores and oral tracks through generative AI can be combined with virtual performance technology to reproduce historical music scenes and reduce the threshold of traditional music inheritance. Establish a digital protection platform for folk music and use AI to record endangered musical forms. Using the AI-assisted+human-led mode, generative AI is used for material generation, and humans complete the cultural connotation injection. Of course, the cultivation of students' cultural literacy should also be paid attention to, and the module AI Ethics and Music Culture should be added to the curriculum to enhance cultural consciousness (Wang et al., 2025).

### **Conclusion**

In music education, generative AI needs to be technology-oriented and ethically oriented. By building a systematic governance framework, strengthening teachers' ethical awareness, and balancing innovation and protection, the benign development of man-machine collaboration can be achieved. By constructing a three-dimensional framework of technology transparency+ethical institutionalization+cultural humanism, a balance can be achieved between technological innovation and cultural inheritance. Future research should focus on the

new challenges of AI iteration to music education ethics (such as the authenticity crisis of deeply forged audio), dynamically adjust ethical norms, and promote the formation of localized governance programs with a global vision.

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