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Investigating the Effects of Artificial Intelligence in Music Learning and Composition

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Abstract: In recent years, many industries have been transformed with the rapid rise of artificial intelligence, and the music industry is no exception. Given the rise of AI-integrated apps and generative software, it is important to understand both their potential for personalisation, lowering musical boundaries and boosting engagement and the risks they pose such as overreliance, inhibiting creativity, and reducing emotional depth in creative practices. This literature review explores the impact of artificial intelligence on the learning and composition of music. It delves into the various applications of AI in music education, including personalised learning, music composition and production, and VR/AR learning environments. It also examines the impact of AI on students' motivation, mood and self-efficacy, and growth. Finally, the study discusses the importance of a balance between AI and human teaching.

Keywords: *Artificial Intelligence; Generative AI; Musical Boundaries; Music Composition; Music Learning.*

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I. INTRODUCTION

Artificial intelligence (AI) has rapidly transformed various industries and has reshaped how people learn, create, and interact with knowledge. Within education, AI has been used to create adaptive tutoring systems to offer a personalised learning environment. The fields of music education and music composition are also beginning to experience these shifts. Emerging AI tools are able to offer customised learning solutions and can compose songs instantaneously from just a prompt.

Despite these innovations, the integration of AI into the above music fields raises important questions. Advocates argue that AI can provide personalised feedback, stimulate creativity, and boost self-efficacy. Critics caution against overreliance, the risk of undermining human expression, and a lack of emotional intelligence and depth in future music. Furthermore, while some studies examine AI-integrated apps like Yousician and AR-assisted guitar learning, the larger implications of AI on motivation, self-efficacy, musical growth and learning success remain underexplored. Current research on AI in these specific areas has fewer systematic discussions. This review aims to address these tensions by synthesising current research on both the opportunities and challenges of AI in music learning and composition. It also aims to bridge the gap in research by synthesising data from music-specific and general educational research to apply it to the larger and more specific context of the impact of AI on music learning and composition.

The review is structured as follows: Section 2 discusses the various applications of AI in music learning and creativity, including personalised learning, music composition and production, and VR/AR learning environments. Section 3 examines the impact of the integration of artificial intelligence on students' motivation, mood and self-efficacy, and musical growth. The review concludes by reflecting on both the benefits and limitations of AI in music learning, and the current lack of emotional depth in AI systems in the music domain.

II. VARIOUS APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN MUSIC LEARNING AND COMPOSITION

Artificial intelligence has been implemented into traditional methods of music learning and composition, changing the field through innovation. This section of the paper investigates some of its applications. Each of these applications presents opportunities for reducing barriers to learning, enhancing engagement, and supporting growth.

- *Personalised Learning*

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One of artificial intelligence's major uses in music education is personalised learning and assessment. Music learning apps using AI can provide real-time feedback on rhythm, accuracy and dynamics during performance. It reduces the load on music tutors as the assessment is faster. It also allows tutors to focus more on specific regions of improvement of their student and personalise their teaching according to the student's abilities. AI-integrated apps have also made the learning process more inclusive: students of varying skill levels and backgrounds can learn music easier. Using the example of SimplyPiano, this app guides students using live audio input and offers them real-time feedback on their timing and accuracy. It uses deep learning algorithms to recognise notes from a polyphonic instrument, while filtering out background noise.

- *Music Composition and Production*

Likewise, artificial intelligence is also being used in music composition and production. Generative AI is being used to compose entire pieces from simple prompts. By crossing genres for compositions, it transcends musical boundaries and creates symphonies with a blend of different genres. It encourages the development of creativity and novel thinking by allowing composers to create music across genres.

One significant advantage of this implementation of AI is that it lowers barriers to music creation. Music can be created by those even with limited or no musical talent and creativity. Musical tools like Suno AI and Udio are being used to develop songs using just a prompt. Another advantage is that the speed of music creation has massively increased. From taking hours to write lyrics and create instrumentals, it now takes barely a minute to generate a song using AI. This surpasses the speed of traditional methods and yields music outputs that are often comparable to current industry standards.

Despite these benefits, overreliance on AI tools could stifle the creativity of students and composers, which could go on to demotivate them. Generative AI may also have a cultural bias. Training datasets may rely heavily on western sources which could result in a reduction of diversity and cultural awareness when creative prompts ask for diverse elements. Additionally, there may be a lack of emotionality expressed in the songs, and this uncanny inhumanness may not typically appeal to human emotions.

The results from a study conducted by Lecamwasam and Chaudhuri (2025) depict that there is no significant difference in the emotional response in participants invoked by human-composed music and AI-generated music. However, participants claimed human-generated music was more likely to induce emotion, which indicates a bias towards human-generated music. This goes on to show that preference for music of a certain origin is not due to the emotion it invokes but rather a bias towards AI-generated music. This conclusion is further backed up by a study conducted by Shank et al. in 2023. In this study, participants were played classical music generated by both human and AI composers, but the composer's identity was manipulated when presenting it to participants. The results indicated that participants preferred music less when they were given the idea that AI was the original composer, which indicates a reluctance about accepting AI generated music for certain genres.

David Cope, a composer and professor at UCSC, who developed EMI: Experiments in Music Intelligence, said *"...a human built the machine, listens to the output, and chooses what's the best. What's less human about that…"*. This reflects on the concern of authenticity and humanness of the origin of pieces and songs. However, opposing views argue that human compositions involve people drawing from their feelings and emotions; every feeling is unique and cannot be replicated. According to Mr. Tanmoy Guha, a faculty member at Future School of Performing Arts, Goa, India, *"Every event is experienced uniquely by people, even if they are experiencing the same event"* (T. Guha, personal communication, April 14, 2025). It suggests that human experiences are unique and individual, and music composed from these experiences has a depth that AI-generated music struggles to replicate.

- *VR and AR Learning Environments*

Similarly, virtual reality and augmented reality systems have begun to incorporate artificial intelligence to create learning environments and simulate concert settings. While VR/AR technologies create an immersive and spatially oriented environment, AI adds adaptability and personalisation. Using AI algorithms, AR devices map the physical world around them, and this gives them spatial clarity, allowing these systems to layer virtual elements onto elements from the real world.

A study conducted by Rio-Guerra et al. in 2019 involved comparing AR-assisted guitar learning methods to traditional methods to measure the effectiveness and success rates of the AR-assisted methodology. The study involved two groups: one that used AR technology and one that used traditional teaching methods. At the end of the study, it was found that both methodologies had high success rates with no notable difference in learning times between the two groups.

Participants in the AR group were motivated by positive and negative in-app feedback cues, and participants in the traditional group were open to and appreciated the feedback and physical assistance from the human instructor (for example, ensuring correct finger and hand placement on the instrument). However, participants in the traditional group felt a certain pressure to meet the instructor’s expectations and felt frustrated when they struggled to complete a task. Participants in the AR group did not experience this same pressure and were seemingly more relaxed while completing the tasks independently. However, some of them expressed the want for a human teacher for further confirmation and feedback on whether they were playing the chords correctly, highlighting the need for the balance between human teaching and AI. These findings suggest that AR-assisted learning could be an alternative to traditional methods, offering similar learning success rates.

Overall, the integration of AI into VR/AR environments represents a significant shift in the music domain. AI

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contributes adaptive intelligence and personalization, and VR/AR systems provide immersion and spatial interaction, creating a new learning environment that is highly interactive and is supported by evidence as effective.

III. IMPACT OF THE INTEGRATION OF ARTIFICIAL INTELLIGENCE IN MUSIC LEARNING AND COMPOSITION

With the rise of artificial intelligence has come the rise of AI-integrated learning apps and composition tools. Many students around the world use these apps, which have made music learning more accessible to students who do not have such opportunities around them and more relevant to a wider audience. This part of the paper aims to explore and evaluate the impact of these AI-integrated apps on students' motivation, mood and self-efficacy, and their growth and learning as opposed to traditional methods.

- *Impact on Motivation*

Real time feedback from AI-integrated music learning apps allows students to understand their mistakes and monitor their growth easily. The feedback from these apps is constructive and simple, which could stimulate students' intrinsic motivation and sustain their passion and enthusiasm. The AI tracks progress and adjusts the complexity of practice pieces according to the skill level of the student. This allows students to consistently improve their musical skills without feeling discouraged as their practice sessions are tailored to their growth patterns and skills. This increases their engagement and cultivates their interest towards learning music.

In a study conducted by Fan et al. (2024), participants were tasked with writing an essay and were split into four groups based on the writing support they were given - ChatGPT, a human expert, writing tools and no extra support. The results from this study highlighted that while AI tools, like ChatGPT, can improve short-term academic performance, they may not foster long-term intrinsic motivation or deep learning. In their study, students supported by AI showed better essay scores but no significant improvement in knowledge gain or intrinsic motivation compared to other learning conditions. The study also revealed that the group using AI showed reduced engagement and were more likely to rely on AI feedback, which is indicative of overreliance on AI. The authors say this could lead to decreased internal cognitive engagement and have termed this phenomenon "metacognitive laziness". Although this study was not music-specific, its findings depict the relationship between students and AI tools that may generalise to music education: AI-based composition and production tools could similarly risk reducing students' creative autonomy and motivation.

- *Impact on Mood and Self-Efficacy*

A study conducted by Tan and Thiruvural (2021) focused on the capacity of mobile applications, in specific Yousician, for music learning and practice. It was found that the gamified features of the app - levels and scores - could motivate students, leading to more practice time. The AI-driven elements - adaptive difficulty and personalised feedback - use deep learning algorithms to carefully decide the difficulty level of practice pieces, based on analysis and pattern recognition from previous practice sessions. Results from the study show that participants felt a sense of fulfilment as they completed levels and progressed through the app.

On another note, self-efficacy has been proven to be directly associated with increased student achievement (Motlagh et al., 2011). GenAI (Generative AI) has the capability to tackle complex and challenging tasks, like producing beats and composing songs with lyrics. It is thought that by interacting with GenAI, students may realise their potential to create similar content by collaborating and using GenAI. While they could possibly overestimate their capabilities, this higher assessment could make them more confident in their skills, thus improving their self-efficacy. Moreover, GenAI creates personalised learning environments in AI-integrated music learning apps. It adapts to each student and can offer different approaches to learning the same concept, which human instructors may be unable to consistently provide due to the lack of time, energy and creativity to an extent. By adapting to the students' needs, it effectively communicates concepts, making it easier for students to understand. This could also make students more confident in their learning ability and skills, thus improving their self-efficacy (Liang et al. 2023).

- *Impact on Musical Growth and Learning*

Mr. Guha stated that he uses AI tools like Gemini and ChatGPT to help him make lesson plans and claims it makes him more *"productive and efficient"*. He notes that not only does it help teachers become more efficient, but it can also help students and *"gives [students] an edge"*. However, he also highlighted the importance of setting boundaries when using AI. While partial use is allowed, he imposes *"restrictions"* on his students during some assignments and instructs them to *"apply themselves"* to avoid overreliance. He warned that students who *"use AI just for the sake of submitting their assignments"* may fail to truly engage with the learning process, which could eventually affect the quality of their skills.

Furthermore, this concern is backed by findings from a study conducted by Lei Zhang (2025). In the study, students with "low self-control" often got distracted when using modern mobile devices to study. The study indicated that while there are benefits to using AI-integrated learning apps, digital distractions remain a major drawback when compared to human teaching.

IV. CONCLUSION

Music is an art and a language, grounded in emotion and experiences from life. Though artificial intelligence has grown exponentially and has significantly advanced in its capabilities, its capacity to replicate the same emotional depth and intelligence as humans is limited. AI tutors may provide accurate feedback on rhythm, dynamics, and accuracy, however, feeling and judging expressive nuances and improvisations that arise from emotions during a performance

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is an area where human instructors cannot yet be replaced. For example, a voice crack during the vocal performance of a sad song could be seen as a fault by AI systems but can carry a lot of strong emotion and powerfully affect an audience; AI systems focus on precision and accuracy, and emotionality is something they may struggle to appreciate.

This goes on to highlight what remains uniquely valuable about human instructors: cultivating rich emotion from human experiences and bringing it out in music. Referencing Mr. Guha's words, composing music involves reflecting on unique experiences; every event is experienced uniquely by every individual. While AI can generate music from simple prompts almost instantaneously, a question remains as to how long it can generate music that doesn't sound like others. Human pieces remain relatively unique, owing to the unique emotions felt behind it. The Japanese concept of 'wabi-sabi' - perfection in imperfection - illustrates the beauty in imperfectness; the beauty in the raw imperfectness of human-composed songs that AI has yet to replicate.

At the same time, AI's benefits in music learning and composition should not be discounted. Literature demonstrates that AI-integrated platforms can enhance personalization, support student motivation and self-efficacy, and decrease boundaries to learning and composing. Yet, evidence also warns against overreliance, digital distraction, and the risk of reducing creativity.

In conclusion, the future of music education seems to lie not in replacing human instructors with AI, but in integrating both in a balanced way. Music, at its core, is an expression of human emotion and experience; these are qualities that AI may assist but may not fully replicate. In the future, leveraging the strengths of AI while preserving the unique human qualities of teaching, learning, and creating music is key.

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