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Bridging the Gap Between Human and AI in Music Creation: An Empirical Study on Stakeholder Perspectives and Industry Expectations

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Abstract
AI Music Ecosystem (AIME) refers to the integration of artificial intelligence technologies within the music industry, encompassing the creation, performance, or generation of special voices. This type of co-creation scenario is widely being developed and is reshaping both the music industry and education. However, there is no suitable evaluation system to redefine the value of musical labor outputs under AIME. This empirical study addresses this gap by conducting interviews to explore the real-world application of music generators from the stakeholders' perspective, while also analyzing the real music output needed by the music industry. Chinese musicians (n=18) participated in semi-structured interviews, and educators used thematic analysis and open coding to analyze the satisfaction levels of music outputs. The results indicated that cultural output is regarded as the pinnacle of the co-creation of human and AIME, though very few outputs reach this standard. The study highlights a significant gap between educational evaluation standards and market benchmarks, with human contributions predominantly valued at the emotional level and AIME limited to technical capabilities. This is the first time that data from stakeholders in the music industry has been used as an evaluation benchmark, making it more relevant to the assessment scenarios faced by graduates. An evaluation hierarchy has been developed for the co-creation scenarios involving humans and AIME, which is more suitable for music talent assessments and offers inclusiveness.
Keywords: Artificial Intelligence, music education, music industry, satisfactory evaluation, education revolution

1. Introduction
AI Music Ecosystem (AIME) refers to the integration of artificial intelligence technologies within the music industry, encompassing the creation, performance, or generation of special voices. By studying large amounts of music data, AIME learn different styles and structures. This ecosystem leverages AI to facilitate music composition, reduces the barriers to entry, and lowers production costs in the music industry. Automate audio workflows across tools like Suno, Soundful, Synthesizer V Studio, and RastSound Soren to handle generation, singing, mixing, and mastering based on personalized user preferences. Through AIME, artists and consumers alike

experience innovative changes in how music is produced and encountered, ultimately reshaping traditional musical processes and the broader cultural landscape.

Recent studies indicated that Artificial Intelligence (AI) significantly enhances educational practices in music (Liu & Guo, 2025). At the same time, it was believed that the rapid expansion of AI would bring significant changes and challenges to traditional practices in school music education and beyond, especially in areas like student assessment and grading (Holster, 2024; Shaw, 2024). This adaptability is indicative of a larger trend in which AI technologies are reshaping educational paradigms in the music industry.

However, as it becomes common for musicians to produce music using the AIME, there is no new evaluation system in place to redefine the value of musical labor outputs. Consequently, the field of music education is also unable to assess the knowledge levels students should master in the AI era. As Laak and Aru (2025) stated, in reality, there was a gap between educational goals and technology. Exactly, a growing disconnection between the music industry and educational systems compounds the anxiety and thinking. The misalignment, characterized by a gap between industry training practices and real-world market demands, hinders the professional development of music students and restricts their career progression (Yang & Welch, 2023). Witte (2023) contends that to maintain relevance, the music industry must adopt a more market-oriented approach, challenge previous assumptions, and encourage students to create greater market value. In line with this perspective, Huang and Ang (2022) introduced a framework that clarifies the value flow in music content production, delving into production efficiency and examining the unique contributions of singers (Huang & Ang, 2024; Su & Huang, 2024). Consequently, educators require a comprehensive analysis of the various roles and levels of output—whether human or AI-driven- crucial for a sustainable music education system (Ma & Wang, 2025).

This study adopts an evaluation framework from the perspective of the music industry and collaboratively constructs a music talent assessment system in the context of using AIME from the viewpoint of educators. This is the first time that data from stakeholders in the music industry has been used as an evaluation benchmark, making it more relevant to the assessment scenarios faced by graduates. An evaluation hierarchy has been developed for the co-creation scenarios involving humans and AIME, which is more suitable for future music talent assessments and offers greater inclusiveness.

Traditional music talent assessment is built on the foundational elements: professional knowledge, theoretical literacy, innovation, and practical skills (Jing & Keat, 2024; Webb, 2023). In a context where AIME can already compose, sing, perform, and mix, the talent assessment should be reconstructed. Hence, we aim to find a path for the continued existence of music as a discipline in an era where humans and AIME create music together. In the first phase of exploring human and AIME co-creation, we attempt to establish an evaluation model. By examining the output, we identify the value of collaborative work between humans and AIME and propose a theoretical framework for cultivating talent in the discipline. In this research, we answered the following questions: (1) What is the current value produced by humans and AIME

in the music industry? (2)What are the human music capabilities in industrial evaluation? (3) How to construct a sustainable music talent of higher education in the AI era?

2. The Hiring of AIME in the Music Industry

The collaboration between human singers and AIME is becoming increasingly close, forming a new creative working model (Deruty et al., 2022). AI singers have been integrated as production tools in contemporary music, rather than merely being substitutes (Gu, 2024). The first generation of AI singer platforms, such as ACE Studio and AIsingers Studio, focused on replacing the singing voices by typing the words, effectively saving music production time. Since 2023, human voice AI technology has started to gain mainstream attention, with platforms like Musicfy, Lalals, and Elf.tech emerging. These advancements in synthesis technology have opened up unprecedented possibilities for musicians in music production. As Goodfellow (2024) pointed out, AI-generated works result from a collaboration between humans and machines, blending human creativity with algorithm-driven processes.

Besides AI singers, the AI music generators are becoming more popular in the music industry because they assist with composition, inspire creativity, and make the production process more efficient (Zenieris, 2023). For example, Suno allows one to customize original music based on mood, style, and tempo, suitable for marketers and content creators. OpenAI's MuseNet can generate four-minute music compositions featuring ten dissimilar instruments and varying styles (Dash & Agres, 2024). Multiple studies provided evidence that these systems not only automated parts of the composition process but also stimulated human creativity. Chen (2024) discussed how AI music generation models assisted musicians and composers in the creative process, emphasizing that human involvement is essential for refining and shaping the final compositions. Given the current popular modes of these AIMEs involved in music creation, we sought out users for the interview.

3. Theoretical Background

The interview questions were set based on the Social Construction of Technology (SCOT) (Pinch & Bijker, 1984), which was a science and technology studies theory that assumes technology is not created in isolation but is constructed and shaped by social processes, cultural environments, and social groups. Through this approach, we observed that musicians have different output requirements for human and AIME, which together defined the current boundaries of AIME. According to the varying evaluations by musicians of music technology and their understanding of the output, this study categorized human and AIME outputs into three levels. Each of the levels symbolized the content of the outputs according to social needs, which was empirically confirmed through interviews.

In the evolving landscape of music, where human creators and AIME were increasingly collaborating, educational strategies played a crucial role in shaping future musicians. If current training methods continue to rely on traditional notions of talent and skill, there is a risk that students will develop abilities that increasingly resemble those of AIME, leading to overlapping

competencies. In this new era, students worked hand-in-hand with AIME, combining their creative insights with machine-generated capabilities to accomplish musical tasks more effectively (Novakovic & Guga, 2024). To support this collaboration, the outputs produced by both humans and AI need to be systematically organized, providing clear benchmarks for evaluating and understanding different levels of musical talent in the future.

This study aimed to identify the gap between the evolving music industry and music education brought about by AI series technologies and proposed a framework for evaluating collaborative artistic production involving both AIME and human musicians. The objective was to inspire educators to reconsider and refine approaches to music talent development within this context.

4. Method

18 musicians from Beijing, Chongqing, Shanghai, Hunan, Jiangxi, Tibet, Xinjiang, Liaoning, Jiangsu, Zhejiang, and Guangdong were interviewed. All the musicians (including composers, lyricists, music arrangers, and music producers) were active at the forefront of the music industry. They have over five years of experience in music production and have experience working with both humans and AIME in music output. Before the interview, we ensured all of them had an independent perspective for evaluating music and collaborators, and all assessments were conducted without any conflicts of interest. DJI Osmo Mobile SE was used to record both the video and audio. After obtaining their agreement, we extracted the interview data. We used Nvivo for thematic analysis from the videos and frequency counts, and SPSS for statistical analysis.

Six questions made up the semi-structured interview. Throughout the pre-interview, these questions proved to be soft and deep conversations with the musicians. Interestingly, each question appeared to focus on exploring AIME's practical performance, but they actually stimulated respondents to compare the contributions of both. This made our thematic analysis and evaluation model development feasible. Additionally, we found that some musicians were very cautious in their responses regarding their use of AIME in the pre-interview. To avoid revealing experimental practices that weren't yet publicly known for commercial reasons, we adjusted the sequence of questions for these individuals by moving questions about their creative experiences and motivations for using AIME to the later part, which improved the response process.

5. Results

Musicians generally recognized that current AI singers and generative tools posed the capacity to meet basic market demands, particularly demonstrating practicality in terms of efficiency, execution of technical tasks, and provision of inspiration materials. They actively explored the potential of these tools as supplementary aids for future collaboration, highlighting applications such as stimulating creativity, automating workflows, and conducting sound experiments. However, they overwhelmingly emphasized the fundamental limitations of AIME, especially regarding emotional depth, genuine originality, understanding of artistic intent, expression of

unique personality, and flexibility in collaborative processes. These shortcomings were directly linked to core human values that were deemed irreplaceable—specifically, the emotional infusion, intuitive artistry, originality, storytelling ability, and distinctive individuality that only human musicians provided.

Moreover, participants in satisfaction assessments expressed significantly higher appreciation for the contributions of human creativity at critical stages of conceptualization and decision-making. Consequently, their primary motivation for using AIME is positioned as enhancing efficiency and exploring new possibilities to assist rather than replace human artists in realizing their artistic visions. Ultimately, the authority to define the soul and core values of art remains firmly rooted in human agency.

5.1. Thematic Analysis

From a global perspective, all the responses acknowledged AIME's output capabilities, but also expressed a critical attitude, with higher expectations for human musical abilities. Such diverse responses indicated that the output of AIME also contributed at different levels. Hence, we coded the references and classified them. After coding, these descriptions were found to reveal three main themes of music output: technical, emotional, and cultural aspects.

Table 1: The Generated Three Themes

Theme	Music Technique	Music Emotion	Music Culture
References	143	61	27

In Q1, musicians showed critical opinions on the current open AIME in the market. Among these, negative coding such as "still a technical gap from my expectations (music technique)", "cannot accurately express my emotions (music emotion)", "less of national spirit (music culture)", and "not satisfied with the timbre and sounds (music technique)" were recorded. While they were widely using AI music tools, they were not very satisfied with their technical output. In Q2, positive judgment began to appear in their response. Technical high-frequency terms were shown (n=94), along with music emotional terms (n=47). Only a few terms indicated the cultural requirements (n=2) of the future AI music output. The majority of the discussion was centered on the technical contribution of AI and also the realization that AI brought about efficiency and convenience in the production process, and provided ideas. This proved that music technology has significantly transformed music education by expanding access, diversifying teaching approaches, and inspiring new avenues of creative expression (Ma & Wang, 2025).

Musicians showed expectations on AIME's contributions at three levels, but so far, it has only fulfilled the output of the first level (music technical). In Q3, when comparing the contribution within human musicians and AIME, the satisfaction for human musicians was shown:

> "I asked it (one AI music generator) to provide me with a framework, and I modified the lyrics, so whatever it prints out is not based on my life experience. Then I remove the chords and melody and modify them myself. It's excellent and I've tried it many times. It's more or less a source of inspiration." (Music arranger, Zhou)

Musicians preferred to describe their collaborative process with AI using detailed workflows. In these descriptions, the technical conveniences provided by AI align with the proportions of the statistical terms.

> "……indistinguishable from reality. I enjoy incorporating them (AI singers) into choral arrangements, using different timbres as a foundation. I can avoid hiring so many human choir singers. Some of the AI singer plugins even sing better than soloists." (Music Composer, Xia)

According to the responses of Q4, we found that those who frequently mentioned the theme of culture tended to have higher evaluations of either humans or AIME. This suggested that when the output of a work reached a high level of cultural significance, it may receive the highest praise from industry stakeholders. To verify this, we counted the number of references corresponding to the three levels of satisfaction for each topic. The results are summarized in Table 2 below.

Table 2: The Three Themes Corresponding to the Satisfaction Levels

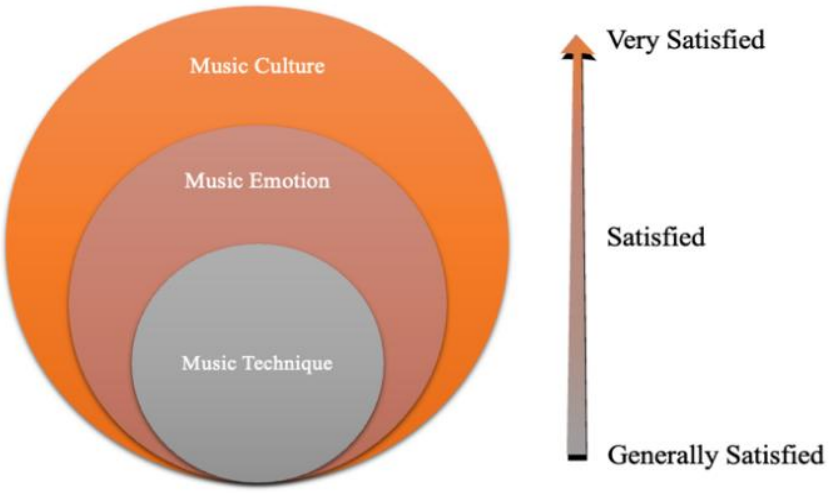
Levels	Themes	High-Frequency Word	Reference to the mentioned times	Total reference in themes
Very Satisfied	Music Cultural	- (SE, MD) Advanced listening of culture	10	19
		- (MC) Expression in her own background	5	
		- (MD) Knowing how to cooperate in co-creation	4	
		- (SE) Able to integrate feedback and improvisation	5	
	Music Emotional	- (MD, MA) Full of emotion	9	25
		- (MC) Appropriate expression	5	
		- (SE, MC) Emotional Transformation Proficiency	6	
		- (MA, SE, MC, MD) Actively	23	

			communication		
		-	(SE, MD) Interpretive precisely	11	
	Music Technical	-	(MC, MD) Beautiful voice	9	69
		-	(SE, MD) Skillful singing	8	
		-	(SE, MD) Fast sight reading	9	
		-	(MA) Resilient and changeable voice	4	
		-	(SE) Familiar with controlling the microphone equipment	5	
Satisfied	Music Cultural	-	(SE) Got a general direction for making	4	4
	Music Emotional	-	(MC) Receive the expressive idea of the work soon	9	22
		-	(SE) Does not require a manual emotional dynamic range master	4	
		-	(MD) No need to explain too much about this work for the production team	3	
		-	(MA) Knowing the feeling as soon as listening	6	
	Music Technical	-	(SE) Voice is always in good condition	4	29
		-	(MD, MA) Slightly more individual than the conservatory singing	7	
		-	(MA) Knowing the feeling as soon as listening	6	
		-	(MA, MD) Rich and layered vocal tone	12	
Generally Satisfied	Music Cultural	-	(SE) Lack of overview on Classical and Contemporary	4	4
	Music Emotional	-	(MD) Reasonable emotional release	3	10
		-	(MA) Sometimes the expression was different	7	
	Music Technical	-	(MA) Sounds like a textbook/ Sounds right	2	45
		-	(MD, SE) Sing with composure	14	
		-	(SE, MA) Fully respect the note text	10	
		-	(MD) Strictly with her own vocal outcome	5	
		-	(MD, SE, MA) Good at using her own voice	14	

Abbreviation:MC=Music Composer, MA=Music Arranger, SE=Sound Engineer, MD=Music Director

Based on the scaled satisfactory answers in Q4, the corresponding thematic terms were coded and enumerated in the three levels. **Very Satisfied**: Cultural (n=19), Emotional (n=25), Technical (n=69). **Satisfied**: Cultural (n=4), Emotional (n=22), Technical (n=29). **Generally Satisfied**: Cultural (n=4), Emotional (n=10), Technical (n=45).

Figure 1: Outputs and Corresponding Satisfaction in the Music Industry



5.2 Satisfaction with the Ideal Scenario and Reality

Figure 1 illustrates the satisfaction associated with outputs in the music industry. A notable disparity exists between the ideal AIME and its current outputs. The ideal scenario should encompass three key aspects: music technical, music emotional, and music cultural outputs. However, in reality, their evaluations of humans are mostly limited to the emotional level, while their assessments of AIME are primarily confined to the technical level. This indicated that human music practitioners can harness their professional value in music's emotional and cultural dimensions.

5.3. Term Frequency Regression

To embed the above evaluation model into practice, we need to understand the balance between AIME capacity and human production in the evaluation. To describe the relationship between the current levels of evaluation and different capability outputs, we conducted a regression analysis for the term frequency (SPSS, version 29.0.1.0).

We categorized and labeled the human capabilities, AIME capabilities from Q2 and Q5, and their corresponding evaluation of AI and overall evaluation in Q4. Two educators then performed the statistical analysis and classification of these requisite skills. **Human musical capabilities**

contained high frequency description on 1= vocal technology, 2= sight reading, 3=improvisation, 4=emotional expression, 5= music social bonding, 6= music interpretation, and 7= music execution. **AI musical capabilities** contained 1= algorithm, 2= computational power, 3= flexibility, 4= options, 5= accuracy, 6= learning ability, and 7= practicality. However, because the interviews didn't get detailed information or an equal amount of data for each capability, this study couldn't measure precisely how much each one mattered (or which mattered most) for the satisfaction ratings.

Subsequently, based on the frequency classification of keywords, we conducted a linear regression analysis using human and AIME capabilities as independent variables and satisfaction levels as the dependent variable. Table 3 presents the results that the capabilities of both AIME and humans made up the overall evaluation. As shown in Table 3, the R^2 of the model was 49.4%.

Table 3: Linear Regression of Overall Satisfaction

Variables	β	S. E	95% CI		R^2	ΔR^2
			LL	UL		
Constant	2.471		1.705	3.236		
AI_capability	-.446	.246	.978	.086	.494	.416
H_capability	.258***	.058	.063	.314		

AI_capability = AIME musical capability, H_capability = Human musical capability.

The overall level significantly affected human musical capabilities (β=.258) in the evaluation of satisfaction. Thus, the overall assessment of value output was primarily determined by human musical ability. AIME capabilities have a negative impact (β= -.446) on the overall satisfaction. In other words, the more in-depth the interviewees' understanding of how AIME is used in music creation, the more critical their evaluations tend to be. Conversely, in assessing human musical abilities, the deeper their understanding of human capabilities, the more favorable their evaluations become.

Based on the results of thematic analysis and word frequency regression, the outputs across three levels of the music industry, namely, music technical, music emotional, and music cultural. Although the integration of AIME and humans in the industry occurs frequently, there is a stronger emphasis on human-led creativity that is expected to serve as a key driver for shaping future talent objectives.

6. Discussion

From a perspective of SCOT, new technologies give rise to new capabilities. When humans collaborate with AI-augmented musical instruments and equipment (AIME), abilities such as computational power and accuracy are incorporated into the domain of human evaluation. If the creativity associated with AIME cannot survive under the new evaluation system, artistic

creation will be subjected to limitations in this era. Therefore, we need to reserve a space in music education for AIME and human co-creation.

6.1 Rethinking the Music Educational Evaluation System

> "The way we evaluate things in education is different from what's used in the industry. We look at a composition longitudinally, focusing on the depth of expression, but in education, it's more about being broad and inclusive—giving more credit to those who have a wider range of knowledge." (Sound Engineer, Zhang)

As Figure 1 shows, achieving high industry acclaim means elevating musical output to the level of cultural significance. It involves creating a fusion of different musical styles, generating new musical phenomena, or emphasizing highly individualized vocal characteristics—that is, producing more than just technically "right". A decade ago, the skills deemed necessary in music talent were largely adapted from Western contexts, and educators believed these abilities aligned with market demands and could generate value within the industry. However, as the industry undergoes ongoing transformation, it increasingly requires skills such as music interpretation, music social bonding, as well as the computational power and accuracy that AIME systems demand—these are emerging new productive forces in music. Consequently, computational power of music should also be re-recognized as a musician's ability, not just AIME.

6.2 Human and AIME Music Talent Training

In Li (2024)'s Music Research Development Report of the Past Decade in China, he pointed out that resources for music majors in China are imbalanced. We aim to address the imbalance in music education resources through this curriculum model and utilize it to establish clear objectives for university-level music education. Currently, music programs are categorized into applied and academic disciplines. While it is clear that applied programs focus primarily on music technology and academic programs emphasize knowledge creation, there is still no clear definition of the specific value that music students can contribute to the industry. By applying the model proposed in this study, we can more accurately identify the core value that future music talents are expected to deliver within the industry, moving beyond mere employment guidance to provide a deeper understanding of their strategic contributions.

For instance, in the area of music technology, it is suggested to train students in the use of sound equipment, harmony and composition techniques, vocal performance, instrument play, or AI-generated creative methods—emphasizing listenable art forms. Traditional music performance programs can be integrated with music technology majors, as both students' skills—whether in performance or in AIME—need to be trained. Key competencies to cultivate include vocal technology, sight-reading, improvisation, as well as algorithms, computational power, flexibility, options, and accuracy. Regarding the second tier—musical emotional output—we focus on whether students' performances or works can deliver emotional value, promote mental health, or contribute to social and educational problem-solving. Courses in music therapy, sociology, and

psychology should be incorporated at this stage. The core skills include emotional expression, social bonding through music, interpretation, and execution. At the level of cultural output, the focus shifts to students' creativity in developing new styles and musical phenomena, as well as their influence on international cultural dissemination. Cultivating this level emphasizes innovation in musical style and the ability to shape cultural impact on a global scale.

6.3 Incorporate AIME Capabilities into Assessments

Although the impact of AIME capabilities on the overall evaluation was not significant in this study, it constitutes an important theme in talent assessment. Over the next decade, the talent development system will focus extensively on the ability to collaborate between humans and AI. It is therefore recommended to incorporate human-AIME collaboration skills into the talent development framework.

To effectively connect traditional musical skills with AIME, it is necessary to build a new "technological bridge" competency module. This includes foundational music informatics, creative coding, music programming, sound design, and electronic music production, as well as data literacy, which establishes the essential interdisciplinary knowledge and technical foundation for students to proficiently utilize AIME.

7. Conclusion

The research reveals that market evaluations of music output are divided into three levels: namely, music technical output, music emotional output, and music cultural output. Currently, human capability contributions dominate in the market's evaluation. The ideal assessment of both AIME and human contributions is reflected in cultural output. However, presently, humans generally meet only the second level—emotional output, while AIME can mostly fulfill the first level—technical output. Additionally, the study finds a disconnect between educational evaluation systems and market assessment standards. Based on these findings, we propose considerations for pedagogical reform. Firstly, strategically integrating human-AIME collaboration competencies; secondly, redesigning the assessment systems along with the three levels of evaluation.

8. Limitations

This study has certain limitations. Firstly, the terminology employed in the assessment is rooted in the precision of musicians' expressive capabilities; however, the aspects of human contribution may not fully encompass all relevant abilities. Future research should aim to explore a more comprehensive and in-depth understanding of human musical capabilities, conducting a holistic evaluation of how each dimension contributes to industry standards.

Secondly, the case-based evaluation of AIME usage by musicians tends to become more critical among users with deeper engagement. This phenomenon could potentially bias the fairness of the assessment of AIME's capabilities. Consequently, subsequent studies should endeavor to collect larger and more diverse snowball samples to better validate and assess the contributions and potential of AI in music production.

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