



Generative AI and Learning Motivation among Music Major Students in Chinese Universities: The Challenges and Strategies

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Abstract. This study investigates the impact of generative AI on learning motivation among music major students in China, emphasizing the mediating role of teacher-student interaction. Using a quantitative design, the study collected data in two universities in Nanjing, China. Regression analyses and mediation models were performed to assess the hypothesized relations between variables. The results reveal a positive relationship between the use of generative AI and students' learning motivation. Teacher-student interaction is identified as a key mediator in this relationship. The findings highlight the need for integrating generative AI into music education. Practical implications include the incorporation of AI tools in teaching practices, professional development for educators, and curriculum design improvements. These insights provide a foundation for enhancing educational practices and underscore the importance of balancing technological advancements with personalized, supportive teaching methods.

Keywords: Generative AI, Learning Motivation, Student Interaction

1 INTRODUCTION

Generative Artificial Intelligence (AI) has gained significant traction in various educational fields, including music education. These technologies, such as AI-driven composition tools and interactive software, facilitate a more personalized and engaging learning experience^[1]. Recent studies have highlighted the potential of AI to enhance interaction, creativity and provide instant feedback^{[2][3]}, which could play a crucial role in music education. Therefore, it is critical that studies investigate the mechanism of AI in enhancing students' learning.

Despite the promising potential of generative AI, integrating these technologies into music education presents challenges. Issues such as technological complexity, the need for teacher training, and resistance to change can impact the effectiveness of AI applications^[4]. It is important to examine whether these challenges are true among music major students with empirical studies.

dents, motivation can be influenced by factors such as student interaction and teaching tools ^{[2][5]}. Generative AI holds significant potential to enhance students' learning motivation through various innovative approaches. One of the primary ways AI achieves this is by offering personalized learning experiences ^[2]. This personalization ensures that students are consistently challenged at an appropriate level, maintaining the motivation.

Another key benefit of generative AI is its ability to provide instant feedback. Traditional educational settings often involve delayed responses from teachers, which can be frustrating for students ^[3]. AI tools, however, can deliver immediate feedback on assignments, helping students quickly identify and address areas for improvement. This real-time interaction not only accelerates the learning process but also keeps students motivated.

Interactive learning tools powered by AI contribute significantly to student motivation ^[5]. AI tools can enable students to work together on projects, share ideas, and provide mutual feedback ^[2]. This collaborative environment fosters a sense of community and shared purpose, making the learning process more social and engaging. Students are often more motivated when they feel connected to their peers and are working towards common goals.

At the same time, the role of student interaction in learning environments has been extensively studied, with evidence suggesting that collaborative and interactive learning can enhance educational outcomes ^[3]. In the context of generative AI, interaction with AI tools and other students can impact motivation by providing immediate feedback and fostering a sense of community ^[2]. This interactive dynamic may mediate the relationship between AI use and learning motivation, as students who actively engage with AI tools and their peers might experience increased motivation and a more enriched learning experience ^[6].

The integration of generative AI into music education holds significant promise for enhancing student motivation and engagement. However, understanding the mediating role of student interaction is crucial for developing effective application strategies. The current study seeks to assess the impact of generative AI on learning motivation among music major students in Chinese universities, and examines the mediating effect of student interaction.

The hypotheses of this investigation are presented as follows:

H1: Use of AI is positively associated with learning motivation.

H2: Use of AI is positively associated with student interaction.

H3: Student interaction mediates the relation between use of AI and learning motivation.

2 METHODS AND RESULTS

2.1 Data Collection

This study was conducted among music major students in two universities in Nanjing, China. In July, 2023, a cross-sectional survey was carried out. The survey was conducted with a convenience sampling strategy. The study utilized a self-administered

online questionnaire, which was on the Wenjuanxing platform. The researcher distributed the questionnaire through a workgroup chat, sending a QR code for access. Participation from students was voluntary. The study was reviewed and approved by the participating universities. A total of 400 questionnaires were administered, with 20 invalid responses excluded. Consequently, 380 valid responses were used for the analysis in this study.

2.2 Measurement and Analysis

Use of generative AI was measured using a question on the frequency of use in music teaching classes. Participants rated the question on a 5-point Likert scale (1 = very often; 2 = often; 3 = sometimes; 4 = rare; 5 = very rare).

Learning motivation was captured using the Academic Motivation Scale (AMS) widely used in prior studies [2]. This scale had 28 items rated on a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The Cronbach's alpha for the measurement in this study was 0.871.

Teacher-student interaction was assessed using Student Teacher Relationship Scale (STRS) [6]. Participants rated each item on a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The Cronbach's alpha for the scale in this study was 0.890.

The control variables include gender, age, and urban/rural residence.

Statistical analyses were conducted using SPSS version 22.0. Multiple regression analysis was employed to explore impacts of use of generative AI and student-teacher interaction on student learning motivation. The strength of the associations between variables was assessed using standardized parameter estimates. A p-value of less than 0.05 was considered statistically significant. To investigate the mediating effect, Structural Equation Modeling was used, with learning motivation as the dependent variable, use of generative AI as the independent variable, and student-teacher interaction as the mediator.

2.3 Results

The demographic characteristics of the participants included gender, age, urban/rural residence, and family SES. The demographic information is presented in table 1.

Table 1. Demographic Information (N = 380)

Variable	N (%) or M ± SD
Age (years)	20.97 ± 1.20
Gender	
Male	165 (43.42%)
Female	215 (56.58%)
Residence	
Urban	291 (76.58%)
Rural	89 (23.42%)

The table 1 provides demographic information about the participants in the study. The average age of the participants is 20.97 years, with a standard deviation of 1.20 years. In terms of gender distribution, there are 165 males, accounting for 43.42% of the sample, while 215 females make up 56.58%. Regarding residence, a significant majority of the participants, 291 (76.58%), live in urban areas. This shows that the sample is predominantly urban-based.

As show in table 2, the regression analysis results show that the use of generative AI has a coefficient of 0.490 with a standard error of 0.141, and it is statistically significant at the 0.001 level. This strong positive effect indicates that the use of generative AI has a significant impact on students’ learning motivation. Similarly, teacher-student interaction has a coefficient of 0.294 with a standard error of 0.081, also significant at the 0.001 level. This suggests a significant positive relationship between teacher-student interaction and learning motivation, reflecting a substantial impact. However, the coefficient for age, gender, and residence are not significant, indicating that learning motivation are consistent on these demographic characteristics. The overall R-squared value of 0.193 indicates that approximately 19.3% of the variance in the dependent variable is explained by the model.

Table 2. The multiple regression analysis results

Variable	β	S.E.
Age	.092	.083
Gender	.106	.119
Residence	.141	.095
Use of Generative AI	.490***	.141
Teacher-student Interaction	.294***	.081
R-squared	0.193	

Note: *. $p < 0.05$, **. $p < 0.01$, ***. $p < 0.001$

Table 3 displays the findings from the SEM analysis. The coefficient for indirect path use of generative AI \rightarrow teacher-student interaction \rightarrow learning motivation is 1.091 and significant at 0.001 level. The critical ratio is 4.131. This indicates a statistically significant indirect relationship between use of generative AI and learning motivation through teacher-student interaction. The model fit indices are acceptable, with $\chi^2/df = 2.171$, GFI = 0.977, AGFI = 0.931, CFI = 0.929, TLI = 0.921, and RMSEA = 0.047.

Table 3. The path coefficients of mediation model

Path	β	S.E.	C.R.
Use of generative AI \rightarrow Teacher-student Interaction \rightarrow Learning Motivation	1.091***	.209	4.131

Note: *. $p < 0.05$, **. $p < 0.01$, ***. $p < 0.001$

3 DISCUSSION

The positive relationship between generative AI usage and learning motivation underscores the potential of advanced technologies to enhance educational experiences. For music major students, whose learning often involves complex tasks, generative AI might offer unique and tailored resources for their specific needs and interests.

The mediation analysis reveals that teacher-student interaction significantly influences the relationship between generative AI use and learning motivation. This suggests that while generative AI can enhance motivation directly, its impact is more pronounced when coupled with effective teacher-student interactions. Teachers who actively engage with students and facilitate the use of AI tools can enhance the educational experience, making the learning process more interactive and supportive [5].

This study contributes to the literature by demonstrating the practical benefits of generative AI in the context of music education and highlighting the crucial role of teacher-student interactions. The positive effects observed suggest that educational institutions should consider incorporating AI tools into their teaching strategies while also fostering strong teacher-student relationships. This dual approach could potentially lead to more motivated and engaged students, particularly in specialized fields like music [3].

However, this study is not without limitations. The sample is restricted to music major students in China, which may limit the generalizability of the findings to other academic disciplines or cultural contexts. Future research could expand the scope to include a broader range of students and educational settings to validate the results further. In addition, this study only examined teacher-student interactions as a mediator, there are other potential mediators and moderators could provide a more comprehensive understanding of the dynamics between generative AI use and learning motivation.

The findings of this study offer several important implications for educational practice, particularly in the context of music education in China. For example, AI could be used to generate customized practice exercises, provide instant feedback on performances, or create interactive learning modules that align with students' individual needs and interests. In addition, teachers in Chinese universities can emphasize a supportive and engaging learning environment where technology is used to complement, rather than replace, personal interactions. Teachers should also actively engage with students, facilitate the effective use of AI tools, and provide meaningful feedback and encouragement. Curriculum designers should collaborate with technology experts and educators to develop courses and activities that incorporate AI tools in meaningful ways. This approach will ensure that students gain both technological proficiency and enhanced learning experiences.

4 CONCLUSION

This study investigates the relationship between the use of generative AI and learning motivation among music major students in China, with a specific focus on how teach-

er-student interaction mediates this relationship. The findings reveal that generative AI usage is positively correlated with learning motivation, and teacher-student interaction plays a significant mediating role in this process. The integration of generative AI into educational practices holds promise for enhancing teacher-student interactions and learning motivation for music education in Chinese universities.

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