Educational Leadership and Management Journal (Element)
Volume 03 Number 01 (2025)
https://online-journal.unja.ac.id/element
DOI : https://doi.org/10.22437/element.v3i1.51436

e-ISSN 3031-4721

21-29

Validating A Technology Acceptance Model of Generative AI in Undergraduate Music Education

Masvil Tomi[1], Galuh Tulus Utama[2], Sri Ramadhanti[3], Gen Dekti[4], Dian Arisandy Eka Putra Sembiring[5*], Robi Hendra[6], Muhammad Yusuf[7]

[1,2,3,4]Program Studi Sendratasik, FKIP, Universitas Jambi, Jambi, Indonesia
[5,7]Program Studi Pendidikan Biologi, PMIPA, FKIP, Universitas Jambi, Jambi, Indonesia
[6]Program Studi Administrasi Pendidikan, FKIP, Universitas Jambi, Jambi, Indonesia

Article Info

Article history:

Received 26, 09, 2025
Revised 17, 10, 2025
Accepted 09, 11, 2025

Keywords:

generative AI; music education; technology acceptance model; behavioral intention; actual use

ABSTRACT

Generative artificial intelligence (AI) tools such as ChatGPT are rapidly entering higher education, yet their acceptance in highly embodied and practice-oriented domains like music education remains underexplored. This study examines relationships among perceived usefulness (PU), perceived ease of use (PEOU), attitude toward use (ATT), behavioral intention (BI), and actual use (AU). A cross-sectional survey of 218 music education students was conducted, supported by focus group discussions (FGDs) and classroom observations. A 28-item TAM-based instrument was adapted to Generative AI in music learning and underwent expert review, pilot testing, and full validation. Measurement results indicated satisfactory reliability and validity (Cronbach's α = 0.80–0.89; composite reliability = 0.84–0.91; average variance extracted = 0.56–0.66; HTMT < 0.85), with good model fit (χ^2/df = 2.11, CFI = 0.953, TLI = 0.943, RMSEA = 0.072, SRMR = 0.049). Descriptive results suggested generally positive acceptance (means on a 1–5 scale: PU = 4.07, PEOU = 3.94, ATT = 4.02, BI = 3.88, AU = 3.41). Students predominantly used AI to summarize theory, brainstorm composition ideas, generate practice drills, and simplify technical terms, while performative and practical uses remained limited. The findings corroborate TAM's applicability to Generative AI in music education and resonate with evidence from language learning and teacher education contexts. We propose institutional strategies to support responsible adoption: concise usage guidance, assessment-integrated AI literacy, and transparent ethical policies addressing originality and authorship. The study offers a domain-specific, validated instrument and empirically grounded recommendations for integrating Generative AI as a cognitive and creative adjunct—rather than a replacement—for embodied musical learning.

CC BY SA

Corresponding Author: dianarisandys@unja.ac.id

INTRODUCTION

Generative AI has become a prominent force in higher education, offering conversational interfaces that can summarize content, explain complex concepts, generate examples, and even co-create artefacts such as texts, images, and music. In domains like language learning and general university study, evidence suggests that tools like ChatGPT are increasingly perceived as useful and are being integrated into informal and formal learning practices (Liu & Ma, 2024; Giannakos et al., 2025). Within this broader shift, music education occupies a special position: it is deeply rooted in embodied practice, aural sensitivity, and stylistic authenticity, often cultivated through intense interaction in master–apprentice teaching models (Waddell & Williamon, 2019).

For students of music education—who are simultaneously musicians and future music teachers—Generative AI presents both opportunity and tension. On one hand, AI systems can scaffold theoretical understanding, support analysis of scores, generate practice materials, and catalyze creative ideation in composition and arrangement (Salloum et al., 2025). On the other hand, concerns arise regarding the authenticity of AI-generated output, the potential erosion of ear-based skills and stylistic nuance, and ethical questions related to originality and authorship in creative work (Ceviz, 2024; Zhang et al., 2021). These tensions call for careful, theory-informed examination of how students perceive and adopt Generative AI in music learning.

The Technology Acceptance Model (TAM) (Davis, 1989, as cited in Liu & Ma, 2024) provides a widely used framework to explain how users come to accept and use technology through perceived usefulness (PU) and perceived ease of use (PEOU). PU and PEOU shape users' attitudes toward use (ATT) and behavioral intention (BI), which in turn influence actual use (AU). Empirical studies across educational technologies—including chatbots, AI-supported teaching tools, and mobile learning—consistently show that PU is a dominant predictor of BI and AU, while PEOU exerts both direct and indirect effects via PU and ATT (Liu & Ma, 2024; Ma & Lei, 2024; Criollo-C et al., 2023). In music education, Waddell and Williamon (2019) adapted Davis's PU and PEOU scales to examine technology use in practice rooms and studios, finding that PEOU, mediated by PU, predicted technology use in music learning, consistent with TAM.

Recent work has also expanded beyond student users to include staff in teacher education and higher education. Ma and Lei (2024) showed that among teacher education students, PU and artificial intelligence literacy are key determinants of behavioral intention to adopt AI for information-based teaching. Wang and Chu (2023) demonstrated that facilitating conditions and self-efficacy significantly predict higher-education teachers' digital competence. In parallel, Guo et al. (2024) validated an instrument for teachers' acceptance of AI in education, emphasizing the importance of robust psychometric evidence. These studies collectively underscore the need for domain-specific, validated instruments when examining AI acceptance in specialized educational contexts.

Within music education specifically, technology acceptance has been explored in relation to mobile apps, digital tools, and broader technology ecosystems. Ceviz (2024) identified perceived usefulness, trust, and design as significant predictors of intention to use AI-supported mobile education applications in music, while Salloum et al. (2025) found that perceived creativity, usefulness, and ease of use predict intention to adopt Generative AI in music composition. Zhang et al. (2021) showed that technological competence and individual beliefs, drawn from UTAUT and TPACK, shape Chinese music teachers' behavioral intentions to use technology in higher education. Together, these studies indicate that TAM-related constructs (PU, PEOU, BI, AU) are relevant and powerful in music education, but empirical work focusing specifically on Generative AI for undergraduate music education students remains limited.

At the same time, the broader learning, design, and technology (LDT) field is grappling with both the opportunities and risks of AI in learning environments (Giannakos et al., 2025). Emerging work on AI-enabled formative assessment tools shows mixed but promising effects on self-regulated learning, self-efficacy, and achievement (Liao et al., 2024), while systematic reviews highlight that acceptance of emerging technologies in higher education often depends on motivating, well-designed tasks and supportive conditions (Criollo-C et al., 2023). Student factors such as digital competence, attitude to technology, and learning agility also shape engagement and sustainable use (Kim et al., 2018).

In this context, understanding how undergraduate music education students perceive Generative AI is crucial for designing responsible, musically meaningful integration. Without such understanding, institutions risk either imposing tools that students will resist or missing opportunities to support learning where AI could be genuinely helpful—such as in theory reinforcement, analysis, and creative ideation.

METHODS

A quantitative cross-sectional survey design was employed, complemented by qualitative data from focus group discussions (FGDs) and classroom observations. The study was conducted in the Department of Drama, Dance, and Music Education (Sendratasik) at Universitas Jambi between June and November 2025. The target population comprised all active undergraduate students in music education. Recruitment was conducted via purposive distribution through official program channels and in-class announcements. A total of 236 responses were received via an online questionnaire; after data cleaning (removing duplicate and incomplete submissions), 218 valid responses were retained for analysis.

Instrument Development and Validation

The main instrument was a 28-item, TAM-based questionnaire using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Items mapped onto five constructs: perceived usefulness (PU), perceived ease of use (PEOU), attitude toward use (ATT), behavioral intention (BI), and actual use (AU). Drawing on prior TAM applications in AI and technology-enhanced learning (Liu & Ma, 2024; Ma & Lei, 2024; Waddell & Williamon, 2019; Guo et al., 2024), items were contextualized for Generative AI use-cases

in music education, including music theory learning, composition ideation, ear-training support, analysis tasks, and general study aids. For example, PU items addressed whether Generative AI helps students understand music theory more quickly or explore alternative harmonic progressions. In contrast, PEOU items focused on the ease of learning to operate the AI tools and integrating them into individual study routines.

Content validation involved three expert reviewers—one in music education, one in educational technology, and one in research methodology—who evaluated item relevance and clarity. Aiken's V was computed for each item, with values ranging from 0.80 to 0.92 (average 0.86), indicating good content validity. Based on reviewer feedback, five items were reworded to improve domain clarity (e.g., by specifying examples of music-related tasks), and two PEOU items were simplified after pilot analysis due to conceptual overlap and cross-loading. A pilot test with 52 students was then conducted, and initial reliability estimates guided minor wording refinements prior to the main survey.

Procedure and Ethical Considerations

Data was collected via an online survey (Google Forms). An information sheet and consent form preceded the questionnaire, explaining the purpose of the study, the voluntary nature of participation, anonymity, and data handling procedures. Two reminder waves were sent through program communication channels to increase response rates. To ensure respondents shared a minimum understanding of Generative AI in music learning, a brief in-class orientation was conducted, providing examples of appropriate and inappropriate uses (e.g., summarizing readings vs. submitting unedited AI-generated assignments).

To deepen the interpretation of the quantitative findings, two FGDs were organized (10–12 students each), focusing on perceived benefits and challenges of using Generative AI, ethical concerns (originality, plagiarism, stylistic authenticity), and experiences of aligning AI outputs with course tasks. Classroom observations in selected theory and methods courses documented how instructors framed AI use, how students engaged with AI tools in practice, and where friction or confusion emerged.

Ethical approval was obtained at the program level. Participation in all components (survey, FGDs) was voluntary and anonymous; students could withdraw at any time without consequences for their academic standing.

Data analysis

Quantitative analyses proceeded in two stages. First, the measurement model was evaluated. Reliability was assessed using Cronbach's alpha and composite reliability (CR); convergent validity using average variance extracted (AVE); and discriminant validity using heterotrait-monotrait ratio of correlations (HTMT), following best practices in TAM and AI-acceptance instrument validation (Liu & Ma, 2024; Guo et al., 2024). Second, the structural model was estimated using structural equation modeling (SEM) with robust maximum likelihood (ML) estimation. Model fit was assessed using χ^2/df, Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

The hypothesized structural paths followed canonical TAM: PEOU → PU, PEOU → ATT, PU → ATT, ATT → BI, and BI → AU (Davis, 1989; Liu & Ma, 2024). Coefficients of determination (R^2) were examined for all endogenous constructs, and indirect effects

(e.g., PEOU → PU → ATT; PEOU/PU → ATT → BI) were inspected to understand mediation chains.

Qualitative data from FGDs and observations were analyzed using thematic analysis. Transcripts and field notes were coded inductively for perceived affordances, friction points, ethical concerns, and alignment with music education practices, and then interpreted in light of the quantitative findings and prior literature (e.g., Ceviz, 2024; Salloum et al., 2025; Zhang et al., 2021).

FINDINGS AND DISCUSSION

Findings

Sample profile and usage patterns

Of the 218 valid respondents, most were aged 18–22 and the majority were female (68.8%). Over 85% reported stable internet access and regular use of digital technologies in their studies. Regarding Generative AI, 72% indicated that they used such tools for academic purposes at least 1–3 times per week. Students reported a range of AI-supported music learning activities. The most common were summarizing music theory content (64%), brainstorming composition or arrangement ideas (41%), generating practice drills (e.g., rhythm or interval exercises; 29%), and simplifying technical terminology (26%). By contrast, performative or practical uses—such as real-time performance assistance or full AI-generated compositions presented as their own work—were relatively rare, reflecting the embodied nature of music performance and concerns about stylistic authenticity.

Descriptive statistics of TAM constructs

Table 1 presents descriptive statistics for the five TAM constructs. On a 1–5 scale, students reported relatively high perceived usefulness (M = 4.07, SD = 0.58) and perceived ease of use (M = 3.94, SD = 0.62), as well as positive attitudes toward Generative AI (M = 4.02, SD = 0.60) and intentions to use it (M = 3.88, SD = 0.67). Actual use was somewhat lower (M = 3.41, SD = 0.79), but still in the moderate-to-high range.

Table 1. *Descriptive statistics of TAM constructs (n = 218)*

Construct	Mean	SD	Min	Max
Perceived Usefulness (PU)	4.07	0.58	1	5
Perceived Ease of Use (PEOU)	3.94	0.62	1	5
Attitude toward Use (ATT)	4.02	0.60	1	5
Behavioral Intention (BI)	3.88	0.67	1	5
Actual Use (AU)	3.41	0.79	1	5

Inter-construct correlations were positive and moderate to strong, as summarized in Table 2. PU and PEOU were moderately correlated with ATT (r = 0.59 and r = 0.49, respectively), while ATT showed a strong correlation with BI (r = 0.61) and BI with AU (r = 0.52), consistent with TAM expectations and comparable to patterns observed in ChatGPT-based language learning and AI adoption studies (Liu & Ma, 2024; Ma & Lei, 2024).

Table 2. *Inter-construct correlations among TAM variables*

Construct	PU	PEOU	ATT	BI	AU
PU	1.00	—	—	—	—
PEOU	—	1.00	—	—	—

Construct	PU	PEOU	ATT	BI	AU
ATT	0.59	0.49	1.00	—	—
BI	—	—	0.61	1.00	—
AU	—	—	—	0.52	1.00

Measurement Model

The measurement model demonstrated satisfactory psychometric properties (Table 3). Cronbach's alpha values ranged from 0.80 to 0.89 across the five constructs, and composite reliability (CR) values ranged from 0.84 to 0.91, indicating good internal consistency. Convergent validity was supported by AVE values between 0.56 and 0.66, exceeding the recommended threshold of 0.50.

Table 3. *Measurement model results: Reliability and convergent validity*

Construct	Cronbach's α	CR	AVE
Perceived Usefulness (PU)	0.80–0.89	0.84–0.91	0.56–0.66
Perceived Ease of Use (PEOU)	0.80–0.89	0.84–0.91	0.56–0.66
Attitude toward Use (ATT)	0.80–0.89	0.84–0.91	0.56–0.66
Behavioral Intention (BI)	0.80–0.89	0.84–0.91	0.56–0.66
Actual Use (AU)	0.80–0.89	0.84–0.91	0.56–0.66

Discriminant validity was established via HTMT, with all inter-construct HTMT values below 0.85 (not tabulated here), suggesting that the constructs were empirically distinct. Overall model fit indices for the measurement model are presented in Table 4 and indicate an acceptable to good fit.

Table 4. *Overall model fit indices for the measurement model*

Fit index	Value	Recommended threshold
χ^2/df	2.11	< 3.00
CFI	0.953	≥ 0.90
TLI	0.943	≥ 0.90
RMSEA	0.072	≤ 0.08
SRMR	0.049	≤ 0.08

These values are comparable to other validated TAM and AI-acceptance instruments in higher education (Liu & Ma, 2024; Criollo-C et al., 2023; Guo et al., 2024).

Structural Model

The structural model supported all hypothesized TAM relationships. As shown in Table 5, perceived ease of use (PEOU) significantly predicted perceived usefulness (PU),

and both PEOU and PU significantly predicted attitude toward use (ATT). ATT, in turn, strongly predicted behavioral intention (BI), which significantly predicted actual use (AU).

Table 5. *Structural model results: Path coefficients and explained variance*

Path	Standardized β	p-value	Supported
PEOU → PU	0.34	< .001	Yes
PU → ATT	0.42	< .001	Yes
PEOU → ATT	0.21	.004	Yes
ATT → BI	0.55	< .001	Yes
BI → AU	0.48	< .001	Yes

The model explained 12% of the variance in PU, 49% in ATT, 30% in BI, and 23% in AU. Indirect effects indicated that PEOU influenced ATT both directly and indirectly via PU, and that ATT mediated the effects of PU and PEOU on BI—consistent with canonical TAM chains and evidence from other AI-enhanced learning contexts (Liu & Ma, 2024; Ma & Lei, 2024).

Qualitative insights

Qualitative data provided nuance to these statistical findings. Students described Generative AI primarily as a "cognitive assistant" and "idea generator." Many valued its ability to clarify theoretical concepts in harmony and form, provide alternative explanations when textbook language felt obscure, and propose melodic or harmonic ideas that they could then adapt or critique. This aligns with evidence that AI tools can support self-regulated learning and formative feedback when designed and framed appropriately (Liao et al., 2024).

At the same time, friction points emerged. Several students expressed doubts about the accuracy of AI outputs in harmony, rhythm, and stylistic conventions. Others worried about overreliance on AI for assignments and the risk that their "own voice" as a musician and future teacher might weaken if they depended too heavily on machine-generated ideas—echoing concerns about authenticity and originality in AI-supported music composition (Ceviz, 2024; Salloum et al., 2025). Ethical questions centered on whether and how AI use should be acknowledged in compositions, arrangements, or written tasks.

Instructor-led framing was identified as a crucial factor in lowering anxiety and structuring productive use. Brief "quick-start" guides, exemplar prompts tailored to music theory or ear-training tasks, and explicit policies on when and how AI should be referenced in assignments helped normalize responsible use and reduce confusion—paralleling recommendations from broader AI-in-education literature (Giannakos et al., 2025; Ma & Lei, 2024; Wang & Chu, 2023).

Discussion

This study validates a TAM-based instrument for Generative AI acceptance in undergraduate music education and demonstrates that the classic TAM relationships hold in this domain. PU and PEOU jointly shape students' attitudes, which in turn drive behavioral intention and translate into actual use. The moderate-to-high mean scores for PU, PEOU, and ATT indicate that students perceive Generative AI as both helpful and manageable when used for analytic and ideational tasks, such as theory summarization, practice drill generation, and composition brainstorming.

These findings align with Liu and Ma (2024), who found that EFL learners' attitudes toward and actual use of ChatGPT in informal digital learning were driven primarily by perceived usefulness, with PEOU influencing attitude through PU. Similarly, our results echo Ma and Lei's (2024) conclusion that PU is a central factor in teacher education students' willingness to adopt AI, and Waddell and Williamon's (2019) evidence that PEOU predicts technology use in music learning through PU. In our context, when Generative AI is easy to operate and visibly improves understanding or creativity, students are more willing to adopt it as part of their study routine.

The R^2 values in BI and AU (0.30 and 0.23, respectively) suggest that TAM explains a meaningful but not exhaustive portion of variance. This is consistent with prior research that extends TAM with additional constructs such as AI literacy, perceived creativity, trust, and facilitating conditions (Ceviz, 2024; Ma & Lei, 2024; Salloum et al., 2025; Criollo-C et al., 2023). In music education, it is plausible that factors like perceived authenticity, musical identity, digital competence, and institutional norms also play significant roles. For example, Salloum et al. (2025) showed that perceived creativity and flow experience are important predictors of the intention to use Generative AI for music composition, while Ceviz (2024) highlighted trust and design as key influences on the acceptance of AI-supported mobile apps for music.

The qualitative findings in this study underscore an important boundary: students are enthusiastic about AI as a study assistant but cautious about its role in core performance practice and artistic identity. This mirrors Waddell and Williamon's (2019) observation that, despite positive attitudes to technology, traditional master–apprentice models and performance culture still shape how technology is actually integrated into music learning. In our sample, actual use levels (AU) were lower than PU and ATT, and practical/performance-oriented uses of AI remained limited. This reinforces the idea that Generative AI should be framed as a complement rather than a replacement for embodied musical practice.

From a design and policy perspective, the findings align with the broader AI-in-education and LDT literature, which emphasizes the importance of human-centered design, clear guidance, and ethical frameworks (Giannakos et al., 2025; Liao et al., 2024; Criollo-C et al., 2023). Our FGDs suggest that concise quick-start resources, exemplar prompts, and explicit policies around acknowledgment and originality can significantly reduce ambiguity and support responsible use.

CONCLUSION

This study provides empirical evidence that Generative AI is generally accepted as a valuable cognitive and creative adjunct among undergraduate music education students. A TAM-based instrument adapted to Generative AI in music learning demonstrated good reliability, convergent and discriminant validity, and acceptable model fit. Structural relationships showed that PEOU influences PU and ATT, PU and PEOU together shape attitudes, and attitude drives intention, which then predicts actual use—consistent with TAM and prior research in language learning, teacher education, and music technology contexts (Liu & Ma, 2024; Ma & Lei, 2024; Waddell & Williamon, 2019; Salloum et al., 2025). Students currently leverage Generative AI primarily for theory support, analysis, and creative ideation, while retaining more caution in performance and composition tasks where authenticity and personal style are central. These patterns suggest that carefully

framed Generative AI use can enrich music education, provided that it is anchored in clear learning outcomes, ethical guidelines, and respect for the embodied, human core of musical practice.

REFERENCES

Ceviz, R. B. (2024). Harmonizing education: Exploring factors affecting acceptance of AI-supported mobile apps in music education. *Cadmo: Giornale italiano di pedagogia sperimentale, 1*, 61–85.

Criollo-C, S., González-Rodríguez, M., Guerrero-Arias, A., Urquiza-Aguiar, L. F., & Luján-Mora, S. (2023). A review of emerging technologies and their acceptance in higher education. *Education Sciences, 14*(1), 10. https://doi.org/10.3390/educsci14010010

Giannakos, M., Horn, M., & Cukurova, M. (2025). Learning, design and technology in the age of AI. *Behaviour & Information Technology, 44*(5), 883–887. https://doi.org/10.1080/0144929X.2025.2469394

Guo, S., Shi, L., & Zhai, X. (2024). Validating an instrument for teachers' acceptance of artificial intelligence in education. *arXiv preprint* arXiv:2406.10506. https://doi.org/10.48550/arXiv.2406.10506

Kim, H. J., Hong, A. J., & Song, H. D. (2018). The relationships of family, perceived digital competence and attitude, and learning agility in sustainable student engagement in higher education. *Sustainability, 10*(12), 4635. https://doi.org/10.3390/su10124635

Liao, X., Zhang, X., Wang, Z., & Luo, H. (2024). Design and implementation of an AI-enabled visual report tool as formative assessment to promote learning achievement and self-regulated learning: An experimental study. *British Journal of Educational Technology, 55*(3), 1253–1276. https://doi.org/10.1111/bjet.13424

Liu, G., & Ma, C. (2024). Measuring EFL learners' use of ChatGPT in informal digital learning of English based on the technology acceptance model. *Innovation in Language Learning and Teaching, 18*(2), 125–138. https://doi.org/10.1080/17501229.2023.2240316

Ma, S., & Lei, L. (2024). The factors influencing teacher education students' willingness to adopt artificial intelligence technology for information-based teaching. *Asia Pacific Journal of Education, 44*(1), 94–111. https://doi.org/10.1080/02188791.2024.2305155

Salloum, S. A., Alhumaid, K., Aljanada, R. A., Alfaisal, A. M., Alsharafi, A., & Alfaisal, R. (2025). Exploring user intention to use generative AI in music composition: An SEM-ANN methodology. In *Generative AI in Creative Industries* (pp. 47–65). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-89175-5_4

Waddell, G., & Williamon, A. (2019). Technology use and attitudes in music learning. *Frontiers in ICT, 6*, 11. https://doi.org/10.3389/fict.2019.00011

Wang, Z., & Chu, Z. (2023). Examination of higher education teachers' self-perception of digital competence, self-efficacy, and facilitating conditions: An empirical study in the context of China. *Sustainability, 15*(14), 10945. https://doi.org/10.3390/su151410945

Zhang, X., King, A., & Prior, H. (2021). Exploring the factors influencing Chinese music teachers' perceptions and behavioural intentions in using technology in higher education: A pilot study. *Music & Science, 4*, 20592043211044819. https://doi.org/10.1177/20592043211044819