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Adoption of AI Music Generator by Early Childhood Educators in Digital Communities: A Netnographic Study of Practices, Perceptions, and Dynamics

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ABSTRACT
The rapid advancement of generative artificial intelligence (AI), particularly in AI music generation platforms, presents new opportunities for early childhood educators to produce varied and contextually relevant musical learning materials. Empirical evidence regarding how early childhood education (PAUD) educators in Indonesia adopt, construct perceptions of, and negotiate AI music generators within digital communities remains limited. This study examined three research questions: what forms of practice PAUD educators demonstrate in utilizing AI music generators; how educators construct perceptions, opportunities, and concerns through digital community interactions; and what patterns of role differentiation characterize community dynamics around AI music generator adoption. A netnographic approach was employed, with data collected from Facebook Groups, TikTok, and YouTube communities of PAUD educators over 12 months. Data sources comprised 286 digital archival interactions, online interviews with ten purposively selected informants, and researcher field notes, analyzed through inductive thematic analysis with inter-rater reliability verification (Cohen's kappa = .81). Three dominant practice patterns were identified: thematic song creation via text-to-music prompting (54.2%), adaptation and reimagination of existing children's songs (23.8%), and active distribution of AI-generated musical content (22.0%). Educators' perceptions were polarized, combining positive constructions of efficiency, accessibility, and pedagogical creativity with concerns about overreliance on technology, Western-centric algorithmic bias, and unresolved copyright status. Community dynamics revealed three organically differentiated roles, namely active creators, adopters, and critical curators, with platform algorithms creating a discursive hierarchy that privileges practical-demonstrative content over reflective-critical engagement. These findings confirm that PAUD educators' digital communities function as horizontal professional learning ecosystems in which the adoption of AI music generators is negotiated through intersecting values of pedagogy, cultural identity, and technological pragmatism.

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■ INTRODUCTION

Music education in early childhood constitutes an essential component in supporting the holistic development of young children. Varadi (2022) demonstrated that music education contributes significantly to children's social-emotional competencies, encompassing the ability to manage emotions, build social relationships, and make responsible decisions. Ilari et al. (2021) found that early childhood music programs improved children's cognitive flexibility, though long-term interventions are required to produce comprehensive effects on working memory and prosocial behavior. Neurologically, early childhood is a critical period when musical stimulation most strongly influences children's linguistic capacity, memory, and attention (Turyamureeba, 2024). Music also mediates oral language development by improving phonological awareness, speech articulation, and vocabulary acquisition in young children

(Roldan-Cardona et al., 2025). Kurian (2023) further documented the ethical imperative of safeguarding young children from the risks of AI systems that were not designed with child-centered principles, arguing that children's vulnerability during the early years makes them particularly susceptible to systems trained on adult-centric data that may be unresponsive to children's developmental, linguistic, and emotional needs. Given these contributions, providing high-quality musical experiences is a pedagogical responsibility that PAUD practitioners cannot set aside.

The advancement of artificial intelligence (AI) technology has introduced fundamental change to the global educational landscape, including music education. Generative AI has evolved from rule-based composition algorithms toward deep learning models capable of producing stylistically coherent and emotionally expressive musical output (Carnovalini & Roda, 2020). This trajectory produced platforms such as Suno AI and Udio, which allow users to create complete musical compositions through simple text commands, known as text-to-music prompting, without requiring formal musical training (Choi & Chang, 2025). Suno AI was released publicly in December 2023 and was widely adopted in early 2024, while Udio launched in April 2024. These two events marked the period when AI-generated music became practically accessible to non-specialist users, including classroom teachers, and the subsequent 12 months formed the observation window for this study. Choi and Chang (2025) found that teachers using AI music generators reported increased student motivation and expanded opportunities for differentiated instruction. Chen (2025), in a quantitative study of 521 music students, provided complementary evidence that positive perceptions of AI in music education significantly predict student motivation, engagement, and creative learning outcomes, underscoring the broader pedagogical value of integrating AI tools across music education contexts. Cheng (2025) noted that generative AI simultaneously introduces challenges including content ownership disputes, technological over-reliance, and the need for educator training in responsible AI use. Zhou and Kim (2024), in a comparative empirical study, demonstrated that students taught with AI tools in music education significantly outperformed those in conventional instruction in knowledge mastery and learning experience, indicating that AI tools can meaningfully enhance pedagogical outcomes when integrated with deliberate instructional design. He and Ren (2025), examining pre-service music teachers' acceptance of generative AI using the UTAUT2 framework, found that performance expectancy and the availability of facilitating conditions were the strongest predictors of adoption intention in music education contexts, suggesting that technology adoption dynamics in music education are shaped by both perceived utility and institutional support structures.

Specifically in early childhood education, Roldan-Cardona et al. (2025) documented that AI-assisted music education sessions produced measurable improvements in children's oral language development, with an average post-intervention improvement of 28 percent on oral vocabulary tasks compared with conventional instruction groups. Ljungcrantz (2026), in a state-of-the-art review of AI and early childhood education literature from 2020 to 2024, confirmed that AI integration holds meaningful potential for personalizing learning in early childhood settings, while also raising concerns about algorithmic bias and its consequences for cultural identity formation among young learners. In the Indonesian context, Fitria (2024) documented PAUD teachers' use of Suno AI to create English-language songs, reporting improved student engagement and emotional connection to learning materials. Ulfa and Hina (2025) showed that AI technologies can improve PAUD service quality through adaptive content delivery and personalized learning experiences. These studies signal growing recognition among Indonesian PAUD practitioners of the pedagogical value in AI-generated content. However, they focus on individual classroom outcomes rather than on the community processes through which educators discover, evaluate, and collectively negotiate the adoption of such technologies.

As digital platforms have expanded across Indonesian society, PAUD educators have increasingly joined online communities to share pedagogical practices and learning resources. Kim (2025) established that educator communities on digital platforms serve as communities of practice where professional knowledge is constructed horizontally through peer participation, a concept originally theorized by Wenger (1998) as learning systems in which practitioners collectively develop shared repertoires of resources, practices, and identities. The selection of Facebook Groups, TikTok, and YouTube as field sites for this study was guided by the distinctive community architecture of each platform. Facebook Groups provide bounded, membership-based environments with text-rich, threaded discussions suited to sustained

professional knowledge exchange; two groups of Indonesian PAUD teachers, each exceeding 10,000 active members, were identified during the preliminary investigation phase (Faisol et al., 2024). TikTok distributes short-form video content through algorithmic recommendation, enabling the rapid dissemination of practical pedagogical innovations far beyond established follower networks (Rowe et al., 2025). Vizcaíno-Verdú and Abidin (2023), in a netnographic walkthrough study of teacher communities on TikTok known as TeachTok, found that educators leverage the platform's algorithmic affordances not only to distribute instructional content but to construct professional identities through micro-celebrification dynamics, wherein high-engagement demonstrative content functions as a form of algorithmically mediated peer knowledge authority. YouTube offers in-depth tutorial content that is persistently searchable and accessible, making it well-suited for documenting and archiving pedagogical demonstrations. WhatsApp was not selected as a primary field site because its encrypted, closed-group architecture does not permit systematic netnographic observation of community interaction; however, it emerged as a significant secondary redistribution channel for content originating on the three primary platforms and is documented accordingly through informant reports and cross-platform references. Instagram was excluded because educator content on this platform in the Indonesian PAUD context skews toward personal lifestyle sharing rather than structured pedagogical practice exchange.

Academic studies specifically examining PAUD educators' practices with AI music generators in digital communities remain scarce. Existing research either focuses on secondary education contexts (Choi & Chang, 2025) or on general AI use in PAUD, without specifically addressing the musical dimension (Ulfa & Hina, 2025). This gap represents a significant research opportunity, given the importance of understanding how PAUD educators collectively negotiate the adoption of AI music generators within their community contexts. A netnographic approach is most appropriate for addressing this gap because, as Kozinets (2020) formulated, netnography adapts ethnographic methods to the online environment, enabling researchers to examine digital communities and cultures in depth while preserving the contextual complexity of every interaction. Three research questions guided this study: RQ1: What forms of practice do PAUD educators in Indonesia demonstrate when utilizing AI music generators within digital communities? RQ2: How do PAUD educators construct perceptions of AI music generators, and what opportunities and concerns do they identify through their digital community interactions? RQ3: What patterns of role differentiation and interaction dynamics characterize PAUD educators' digital communities organized around the adoption of AI music generators?

■ METHOD

Research Design and Approach

This study adopted a qualitative approach using a netnographic research design. Netnography, as formulated by Kozinets (2020), is an adaptation of ethnographic procedures for the online environment aimed at studying digital communities and cultures as distinctive social phenomena. This design was selected because the phenomena under investigation, namely educator practices, perceptions, and community interactions regarding AI music generators, are interpretive, contextual, and socially constructed rather than reducible to numerical measurement alone. Kozinets and Gretzel (2023) affirmed that netnography preserves the contextual complexity of digital interactions, enabling holistic cultural understanding of the phenomena under study. Discetti and Anderson (2023), in a methodological review of netnography in professional learning research, identified the particular fitness of netnographic inquiry for investigating online professional development contexts where knowledge is constructed through digital participation, establishing a methodological precedent for the application of netnography in educational professional communities such as those examined in the present study. A netnographic design is particularly suited to this study because AI music generator adoption among PAUD educators is mediated primarily through digital community discourse rather than through formal institutional channels, making online field sites the most direct arena for observing the phenomena as they naturally occur.

The first author is a faculty member at UIN Salatiga with a background in music education and educational technology who was familiar with generative AI tools prior to data collection. This positionality provided emic access to PAUD educator discourse but required systematic reflexive management to contain interpretive bias. The researcher's disciplinary familiarity with music pedagogy sharpened attention to culturally salient themes such as algorithmic bias and Indonesian musical identity. These predispositions were

monitored throughout the study via weekly peer debriefings with the second author and member-checking procedures described in the Trustworthiness subsection.

Informants and Field Sites

Three primary digital field sites were selected based on three criteria: relevance to music education and AI technology in PAUD, an adequate activity level, evidenced by at least three relevant posts per week, and public accessibility that permits ethical observation. The field sites were: (a) two Facebook Groups of Indonesian PAUD teacher communities with more than 10,000 active members each; (b) TikTok communities organized around hashtags including #musikpaud, #gurukukreatif, #AImusikanak, and #laguanak; and (c) YouTube channels of PAUD educators that explicitly discuss or demonstrate AI music generators in teaching contexts.

To document the empirical scale of the circulation of AI music-related discourse among PAUD educators, Figure 1 presents an anonymized screenshot of the TikTok hashtag index for the #AImusikanak hashtag. The screenshot shows the public hashtag structure, view-count metric, and related educator hashtags used to trace the visibility and circulation of AI-generated music content within digital teacher communities.

As shown in Figure 1, the hashtag index provides contextual evidence that AI music-related content is not confined to isolated individual experimentation but circulates

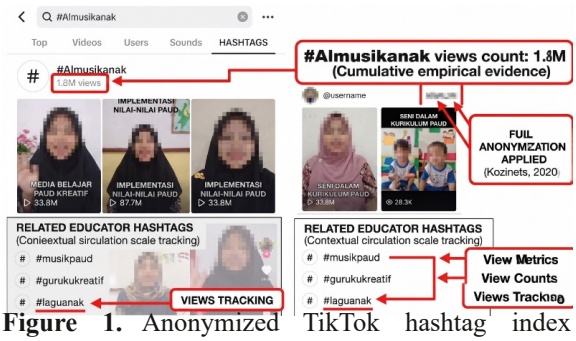

Figure 1. Anonymized TikTok hashtag index showing the circulation scale of #AImusikanak and related educator hashtags.

through broader educator-facing hashtag networks. The related hashtags, including #musikpaud, #gurukukreatif, and #laguanak, further indicate that AI-generated music practices are embedded within wider PAUD pedagogical content-sharing ecosystems on TikTok. Table 1 presents the distribution of the 286 relevant digital interactions documented across the three primary field sites during the observation period.

Ten key informants were selected purposively based on four criteria: active engagement with AI music generator content during the observation period; diversity of interaction patterns representing the three functionally distinct community roles whose provisional configurations were first observed during the two-week Investigation stage and subsequently confirmed and refined through the Interaction and Immersion stages (Months 1-10); willingness to participate in asynchronous

Table 1. Distribution of Digital Interactions Across Netnographic Field Sites

Platform	Community Characteristics	n (%)	Primary Data Type	Observation Method
Facebook Groups	Bounded, membership-based discussion communities; text-rich threaded exchanges; two groups with more than 10,000 active members each	142 (49.7%)	Posts, comments, discussion threads	Passive observation, then active engagement from Month 3
TikTok	Short-form video with algorithmic recommendation; reach extends beyond established follower networks	89 (31.1%)	Video captions, hashtag communities, comment threads	Passive observation with researcher profile disclosure
YouTube	Long-form tutorial content; persistently searchable and accessible	55 (19.2%)	Video descriptions, comment sections, tutorial walkthroughs	Passive observation with pinned comment disclosure
Total		286 (100%)		

online interviews; and geographical and institutional variation representing different PAUD contexts across Indonesia. Informant selection was therefore implemented as a progressive, two-phase process: an initial selection of six informants was conducted at the end of Month 2 based on preliminary role indicators observed during passive monitoring, and four additional informants were recruited at Month 6 after the three-role typology had been sufficiently stabilized through sustained immersive observation to permit purposive sampling with confidence. The informant distribution was four participants from Facebook Groups, three from TikTok, and three from YouTube. Informant profiles ranged from a one-year beginning teacher to a twelve-year veteran educator, and from urban institutional PAUD settings to rural community-based PAUD groups in East Java and Central Java.

Data Collection

Data collection drew on three complementary sources. First, digital archival data comprising posts, comments, video captions, hashtag communities, discussion threads, and video content published across the three field sites during the twelve-month observation period from January to December 2024. This period was deliberately selected because it spans the first full calendar year following the public launches of Suno AI in December 2023 and Udio in April 2024, capturing the complete initial adoption cycle from early experimentation through community norm formation and the emergence of critical discourse. Second, asynchronous online interviews with ten informants were conducted through direct messaging and email between June and September 2024. Third, the researcher maintained reflective field notes throughout the study to document contextual observations, analytical reflections, and epistemological positioning.

Although WhatsApp was excluded as a primary field site due to its closed-group, encrypted architecture, which precludes the systematic archival observation central to netnographic protocol, its role as a redistribution channel was nonetheless documented through two complementary pathways. First, all ten informants were asked explicitly during online interviews about their practices of sharing AI-generated content beyond the three primary platforms; eight of the ten (P1, P2, P3, P4, P5, P7, P8, P9) reported WhatsApp group chats as their primary channel for redistributing content created or discovered on Facebook, TikTok, or YouTube. Second, cross-platform references to WhatsApp redistribution were documented in 21 of the 63 distribution-oriented archival interactions, in which educators explicitly described or invited others to share content to WhatsApp groups. WhatsApp activity reported in this study therefore derives entirely from these two indirect evidentiary pathways rather than from direct systematic observation of WhatsApp communities.

Data collection followed the five-stage netnographic framework of Kozinets (2020): Investigation, Interaction, Immersion, Integration, and Incarnation. During the Investigation stage, a two-week preliminary exploration identified and documented the three field sites. During the Interaction stage (Months 1 to 2), the researcher engaged in passive observation, spending approximately two to three hours per day across the three platforms to understand community norms, identify key participants, and map interaction patterns without active participation. During the Immersion stage (Months 3 to 10), observation intensified to 1 to 2 hours of systematic daily monitoring, with concurrent documentation of relevant interactions. The researcher disclosed

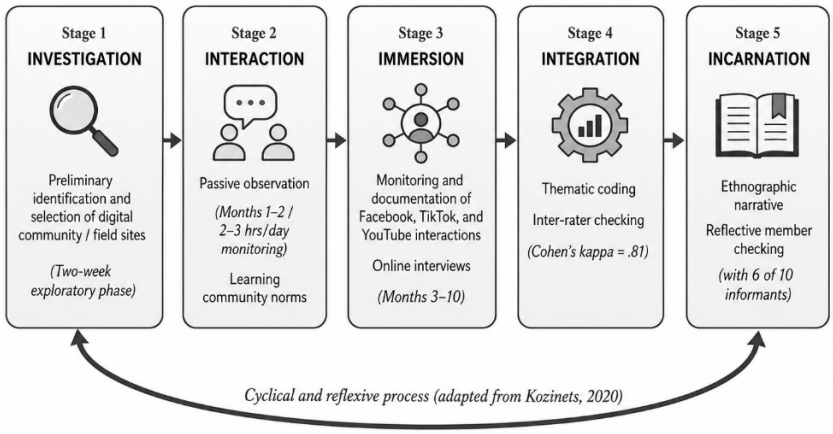

Figure 2. Stages of the netnographic research process.

their research role through three channels: a direct message to administrators of both Facebook Groups, a pinned researcher-disclosure comment on each observed YouTube channel, and a researcher identity statement in the TikTok profile biography maintained throughout the observation period. Online interviews were conducted during Months 6 to 9. During the Integration stage, all collected data were coded and analyzed. During the Incarnation stage, findings were presented in ethnographic narrative form and subjected to member checking. The five-stage process and its cyclical relationships are illustrated in Figure 2.

Data Analysis

The collected data were analyzed using inductive thematic analysis following Braun and Clarke (2006, 2019). The six-phase analytical process moved from familiarization through repeated reading and memoing; systematic initial code generation applied to 286 archived interactions and ten interview transcripts; grouping of codes into provisional themes; reviewing and refining themes against the full dataset; defining and naming final themes; and producing the analytical report.

To assess inter-rater reliability, a codebook was first developed in full by the first author through iterative engagement with an initial reading of the complete dataset, without any prior input from the second author. Upon codebook completion, the second author received the finalized codebook documentation and independently coded a stratified random subsample of 60 interactions, representing 21 percent of the corpus, stratified across the three platforms in proportion to their representation in the corpus, without any prior discussion of substantive coding decisions with the first author. The two coders' results were compared only after the second author had completed independent coding, yielding a Cohen's kappa coefficient of $k = .81$, indicating substantial inter-rater agreement (Landis & Koch, 1977). This procedural sequence, in which full codebook development by one coder precedes independent application by the second coder followed by post-hoc comparison, preserved the independence assumption required for kappa to constitute a valid reliability indicator (Braun & Clarke, 2019). The 18 disagreements identified in the subsample were resolved through consensus discussion, and the codebook was revised accordingly before the first author applied the final coding scheme to the remaining 226 interactions.

Trustworthiness

Trustworthiness was established through four procedures. Credibility was supported through data source triangulation across digital archival interactions, interview transcripts, and researcher field notes, ensuring that findings were grounded in convergent evidence from multiple data types. Member checking was conducted with six of the ten informants, who reviewed the researcher's interpretations of the three major themes and proposed refinements to the interpretations of copyright-related concerns; these refinements were incorporated into the final analysis. Transferability was supported through purposive variation in informant selection representing diverse PAUD contexts, geographical locations, and interaction patterns. Dependability was supported through the systematic maintenance of a researcher-reflective journal and the documentation of all codebook revisions, which together constitute an audit trail available for external scrutiny.

Research Ethics

This study received ethical clearance from the Research Ethics Committee of Universitas Islam Negeri Salatiga (Ethical Clearance No. B-0285/Un.23/III/PP.00.9/05/2025). All informants received a written explanation of the study's purposes and provided informed consent before the interview commenced. All informants were anonymized using participant codes (P1 through P10). Because the three field sites are publicly accessible digital communities, data collection from public posts is consistent with established digital research ethics as outlined by Kozinets (2020). The researcher disclosed their identity and research purpose to all communities through the three channels described above.

■ RESULTS AND DISCUSSION

Netnographic analysis of PAUD educators' communities across three digital platforms over 12 months yielded a corpus of 286 relevant digital interactions, complemented by 10 online interviews and systematic researcher field notes. Inductive thematic analysis of this dataset yielded four interrelated major themes: forms and varieties of AI music generator practices (addressing RQ1); educators' constructions of perceptions, opportunities, and concerns (addressing RQ2); dynamics and interaction patterns in digital communities (addressing RQ3); and pedagogical implications for early childhood music stimulation.

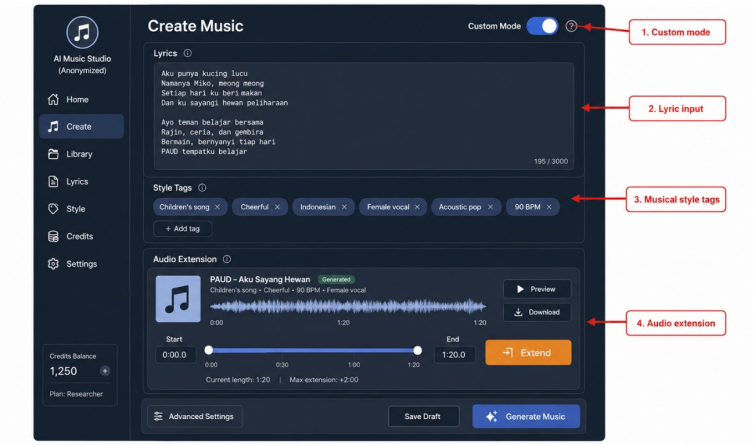

Figure 3. Anonymized screenshot of an AI music generator dashboard showing custom mode, lyric input, musical style tags, and audio extension features used for creating PAUD thematic songs.

Theme 1: Forms and Varieties of AI Music Generator Practices

Thematic coding identified three dominant practice patterns within the 286-interaction corpus. Each interaction was assigned to a single dominant practice category based on its primary communicative orientation, that is, the most prominent function the interaction served within its observable community context. Where an interaction contained elements of more than one practice pattern, the coder assigned the category reflecting the interaction's dominant purpose, as discernible from its full context, including the caption, comments, and associated media. This single-assignment rule accounts for the fact that the three proportional figures sum to exactly 100 percent of the 286-interaction corpus (155 + 68 + 63 = 286), reflecting mutually exclusive categorical assignment. The proportional figures below represent the distribution of interaction categories within the analyzed corpus. They should be read as indicators of the emphasis in community discourse rather than as precise population-level measurements.

The most prevalent pattern is the creation of thematic songs, documented in 155 interactions (54.2%). Educators used text-to-music platforms, primarily Suno AI and to a lesser extent Udio, to generate original songs aligned with specific thematic units in the PAUD curriculum, covering topics such as animals, personal hygiene, environmental awareness, family relationships, and Indonesian national identity. The following archival post from Facebook Group A (March 2024) illustrates a representative instance:

> *"Teman-teman, saya coba buat lagu tentang hewan untuk tema minggu ini pakai Suno AI. Hasilnya lumayan bagus dan anak-anak langsung suka. Ini promptnya: lagu anak-anak ceria tentang hewan peliharaan, bahasa Indonesia, melodi pop, tempo 90 BPM. Silakan dicoba!" [Friends, I tried making a song about animals for this week's theme using Suno AI. The result was quite good, and the children immediately liked it. The prompt I used was: cheerful children's song about pets, Indonesian language, pop melody, tempo 90 BPM. Feel free to try it!]*

To provide visual evidence of how PAUD educators interact with AI music generator interfaces, Figure 3 presents an anonymized dashboard screenshot illustrating the use of custom mode, lyric input, style-tag prompting, and the audio extension feature. The screenshot demonstrates that AI music generation practices are not limited to simple text prompting, but also involve teacher decisions regarding lyrical content, musical style, vocal character, and duration control.

As shown in Figure 3, the creation process involves several layers of teacher input: writing or inserting lyrics, specifying the desired musical style, selecting vocal characteristics, and extending the audio duration when the initial output is considered too short for classroom use. This interface structure supports the finding that PAUD educators engage with AI music generators not only as automatic content producers, but also as semi-structured creative tools that allow pedagogical customization.

This post generated 47 replies within 72 hours. To contextualize this figure, systematic observation of Facebook Group A during the same calendar month recorded a median reply

count of 14 per post across all content types and 9 per post for non-AI pedagogical content, as documented in researcher field notes. The 47-reply post therefore generated engagement approximately 3.4 times the monthly median and 5.2 times the median for comparable non-AI posts, a differential consistent with what Rowe et al. (2025) described as cascade dynamics of practical pedagogical knowledge sharing, wherein demonstrative content with immediately applicable value generates disproportionate peer engagement relative to its prevalence in community discourse. Informant P2, a PAUD teacher with twelve years of classroom experience and an active TikTok following of approximately 3,400 educators, stated: "Before using AI, I had to search for songs with the right theme, and sometimes I could not find any. Now I can create my own according to this week's theme within ten minutes." (P2, interview, July 2024). This finding aligns with Choi and Chang (2025), who identified thematic flexibility and reduced production time as the primary advantages reported by teachers who use AI music generators.

The second pattern, adaptation and reimagination of existing children's songs, was documented in 68 interactions (23.8%). Educators used AI to modify established repertoire by changing genre, tempo, instrumentation, and vocal style. Informant P5, who maintains a YouTube channel of PAUD music teaching resources, explained: "The children already know Balonku Ada Lima by heart, but if it is played repeatedly they lose interest. I tried modifying the arrangement using Udio into a jazz version that is still cheerful. The children became even more attentive." (P5, interview, August 2024). This practice reflects what Cheng (2025) described as pedagogical creativity through technological mediation, where familiar content is recontextualized to renew learner engagement without abandoning cultural anchoring.

The third pattern, active distribution of AI-generated content, was observed in 63 interactions (22.0%). This pattern is distinguished by its primary orientation toward community sharing rather than content creation. Educators disseminated AI-generated music via platform-sharing features and group-chat redistribution, often accompanied by pedagogical endorsements and usage suggestions. While content creation and initial sharing occurred predominantly within the three primary field sites, eight of the ten informants identified WhatsApp group chats as a significant downstream redistribution channel through which AI-generated content circulated beyond the original platform community. This redistribution pattern was additionally corroborated by cross-platform references in 21 of the 63 distribution-oriented archival interactions. Because WhatsApp's closed-group architecture precluded direct systematic observation, these findings are reported as informant-derived and cross-platform-referenced evidence rather than as directly archived netnographic data. This sharing behavior reflects the community knowledge ecosystem function identified by Kim (2025), in which digitally connected educators reduce redundant effort by pooling pedagogical resources in shared platform spaces. Pan and Chen (2023), in a survey-based study of networked learning communities among 226 teachers, demonstrated that participation in such communities significantly mediates teachers' receptivity to pedagogical change by fostering professional learning beliefs and horizontal knowledge-sharing behaviors, a structural dynamic directly analogous to the adopter majority observed in the present study.

The platform-differentiated distribution of practice patterns documented in Table 2 reflects the distinctive communicative affordances of each field site rather than differences in educator intent or content type alone. Thematic song creation predominated on Facebook Groups because the platform's text-rich, threaded discussion architecture facilitates the sharing of detailed prompts, iterative feedback, and methodological commentary that accompanies the creation process. TikTok's short-form video format supported both thematic creation and adaptation practices simultaneously, as the platform enables side-by-side audio comparison and process demonstration within a sixty-second frame. Adaptation and reimagination practices were most concentrated on YouTube, where the platform's long-form tutorial architecture accommodates detailed explanations of multi-step arrangement processes that brief video formats cannot adequately convey. This platform-practice alignment is consistent with Rowe et al.'s (2025) observation that social media platform architectures differentially shape the kinds of professional knowledge that can be effectively communicated within each environment. Table 2 summarizes the three dominant utilization patterns.

To strengthen the technological-audio dimension of the analysis, one AI-generated children’s song sample was further examined using open-source audio analysis software and compared with a conventionally recorded children’s song. Figure 4 presents the waveform and spectrogram comparison,

Table 2. Patterns of AI Music Generator Utilization by PAUD Educators in Digital Communities

Practice Pattern	Description	Dominant Platform	n (%)	Primary Tool
Thematic song creation	Educators generate original songs aligned with PAUD curriculum themes (animals, hygiene, family, nature) using text-to-music prompting.	Facebook Groups, TikTok	155 (54.2%)	Suno AI
Adaptation and reimagination	Existing children's songs are re-arranged with different genres, tempos, or instrumentation to renew learner engagement	YouTube, TikTok	68 (23.8%)	Udio
AI content distribution	AI-generated music is shared among educators through platform features, direct messages, and group chat redistribution	Facebook Groups (primary observed platform); WhatsApp (secondary redistribution channel, documented via informant reports and cross-platform references)	63 (22.0%)	Suno AI, Udio

showing differences in dynamic range, harmonic definition, and high-frequency artifacts between AI-generated and conventionally recorded audio.

As shown in Figure 4, the AI-generated audio sample exhibits a relatively low dynamic range and more pronounced high-frequency artifacts above 8 kHz. In contrast, the conventional children's music sample shows greater dynamic variance and more clearly defined harmonic structures. This comparison does not position one format as pedagogically superior to the other; rather, it demonstrates that AI-generated music has identifiable technical-audio characteristics that teachers need to understand when selecting or adapting songs for use in early childhood classrooms.

To address the technical dimension of AI music generation, the analysis further examined the anatomy of prompt components that PAUD educators repeatedly use when interacting with

Figure 4. Waveform and spectrogram comparison between an AI-generated children's song sample and a conventional recorded children's song.

text-to-music platforms. These components included thematic specification, language input, tempo or BPM instruction, musical style tags, vocal direction, instrumentation, duration control, and lyric constraints. The prompt components did not merely serve as textual instructions; they shaped the resulting audio output by altering tempo, timbre, lyrical structure, genre approximation, vocal texture, and classroom suitability. Table 3 summarizes the relationship between prompt components, common variations, technical audio responses, and pedagogical implications.

Theme 2: Educators' Perceptions, Opportunities, and Concerns

Thematic analysis of narratives, comments, and interview data showed that educators' perceptions of AI music generators are characterized by persistent bipolarity: simultaneous appreciation for the tools' pedagogical potential and concern about their long-term implications for musical culture, educator competence, and legal accountability. Across the 286 archived interactions, 475 perception-related coded units were identified and organized across five analytical dimensions, producing 293 positively oriented codes and 182 critically oriented codes (293 + 182 = 475). This figure exceeds the number of interactions (286) because perception coding operated at the unit-of-meaning level rather than the interaction level: a single interaction could contain multiple distinct perception-related statements addressing different

analytical dimensions simultaneously, and each such statement was coded independently to capture the bipolar and multidimensional character of educator perception. The average of 1.66 coded perception units per interaction reflects the compound nature of educator commentary, in which expressions of enthusiasm for efficiency were frequently accompanied within the same post or interview segment by caveats about copyright risk or cultural concerns. Positive and critical codes were therefore not mutually exclusive per interaction, as indicated in Table 4, and the aggregate counts of 293 and 182 represent the frequency distribution of perception orientations across all coded units rather than across all interactions. This distribution partly reflects the structural tendency of practical-demonstrative content to generate higher algorithmic amplification, a dynamic analyzed in detail under Theme 3.

Among positive perception categories, production efficiency generated the highest frequency (n = 74), followed by pedagogical creativity (n = 69) and accessibility for non-music-background educators (n = 63). Informant P7, a PAUD teacher from a remote district in East Java, stated: "I cannot play any musical instrument. Previously, if I wanted a new song, I had to ask a music teacher for help or purchase a recording. Now with Suno I can make my own songs with the right theme and in the Indonesian language." (P7, interview, August 2024). This perception of AI as an equalizing tool is consistent with Ulfa and Hina (2025), who documented AI technologies' capacity to reduce access disparities in PAUD service quality across Indonesia's

Table 3. Anatomy of Prompt Components Used by PAUD Educators in AI Music Generator Practices

Prompt Component	Common Variation	Example Prompt Element	Technical Effect on Audio	Pedagogical Function
Theme	Animals, hygiene, family, environment, local culture	“song about pets”	Directs lyrical topic and vocabulary	Aligns songs with PAUD learning themes
Language	Indonesian, Javanese, Sundanese, mixed language	“bahasa Jawa sederhana”	Affects lyric pronunciation and phonetic flow	Supports contextual and local-cultural learning
Tempo / BPM	80–100 BPM, 100–120 BPM, 120–140 BPM	“tempo 90 BPM”	Controls rhythmic speed and energy level	Matches songs with calm, transition, or movement activities
Musical Style	Children’s pop, acoustic, folk, dangdut, gamelan-inspired	“cheerful children’s pop”	Shapes timbre, genre, harmony, and instrumentation	Provides musical variety for classroom use
Vocal Direction	Female vocal, childlike voice, choir, call-and-response	“children's choir vocal.”	Influences vocal texture and interaction pattern	Encourages singing participation
Instrumentation	Piano, guitar, percussion, traditional percussion feel	“with piano and light percussion.”	Shapes arrangement and frequency texture	Makes songs age-appropriate and culturally relevant
Duration / Extension	Short jingle, one-minute song, extended version	“extend the chorus.”	Repeats or expands musical sections	Adjusts song length to classroom needs
Lyric Control	Simple words, repetition, children’s names	“use simple repeated lyrics.”	Produces predictable and memorable lyric patterns	Supports memorization and oral language stimulation

geographically diverse educational landscape. Within the Technology Acceptance Model (Davis, 1989), the convergence of perceived ease of use and perceived usefulness among educators without formal musical backgrounds constitutes a particularly favorable context for adoption. This finding is consistent with He and Ren (2025), who examined pre-service music teachers' acceptance of generative AI using the UTAUT2 framework and found that performance expectancy and the availability of facilitating conditions were the strongest predictors of adoption intention in music education contexts. The parallel between their findings and the present study's observation that efficiency and accessibility are the dominant positive perception categories among PAUD educators suggests that TAM-compatible adoption dynamics are operative in both formal pre-service music training and informal in-service early childhood professional communities.

Among critical concern categories, legal and copyright uncertainty generated the highest frequency (n = 57), constituting the most prominent discourse strand in community discussions. The copyright dimensions of AI music generation have been the subject of foundational scholarly scrutiny. Sturm et al. (2019) identified fundamental unresolved questions at the intersection of AI music production and copyright law, noting that existing legal frameworks were not designed to accommodate scenarios in which machine learning systems generate compositions trained on copyrighted datasets without explicit licensing agreements. These foundational ambiguities have since materialized into active legal contestation: in 2024, major record labels filed lawsuits against Suno AI and Udio alleging unauthorized use of copyrighted recordings in model training (U.S. Copyright Office, 2025), and in January 2025, GEMA, the German music rights organization representing over two million creators globally, initiated separate legal proceedings against Suno Inc. on equivalent grounds. The U.S. Copyright Office (2025), in its formal report on the copyrightability of AI-generated outputs, confirmed that musical works produced entirely by AI systems without substantial human creative contribution do not satisfy the

Table 4. Educators' Perceptions of AI Music Generators in Digital Communities

Dimension	Positive Perception	n	Critical Concern	n	Net Balance
Production efficiency	AI enables rapid creation of themed music materials without formal musical expertise	74	Technological over-reliance risks eroding educators' organic musical competencies	29	+45
Pedagogical creativity	Encourages diverse genres, tempos, and instructional approaches	69	AI output tends toward stylistic homogenization and rarely reflects Indonesian musical idioms	35	+34
Accessibility	Lowers technical barriers for non-music-background educators	63	Unequal access: educators in remote regions face limited digital infrastructure	22	+41
Legal and ethical dimensions	AI content for internal classroom use perceived as generally acceptable	41	Copyright status of publicly distributed AI music remains contested; legal risk widely recognized	57	-16
Cultural relevance	Can incorporate regional language lyrics and local cultural themes via prompting	46	Western-centric algorithmic patterns may displace children's musical preferences from local traditions	39	+7
Total coded interactions		293		182	

originality threshold required for copyright protection under United States law, a determination with direct implications for educators who distribute AI-generated content in public-facing digital contexts. Informant P8 stated: "I use it for classroom practice, but I would not upload it publicly because the legal status is still not clear." (P8, interview, September 2024).

Western-centric algorithmic bias generated 39 coded critical interactions. Informant P9, a music coordinator in a PAUD cluster in Central Java, observed: "Early childhood is when children are forming their cultural identity. If what they hear every day sounds like it comes from America, they will eventually not feel connected to their own musical heritage." (P9, interview, September 2024). This concern aligns with critical studies of algorithms demonstrating that AI systems trained on non-representative datasets reproduce and amplify the cultural biases embedded in their training corpora at scale (Benjamin, 2019; Noble, 2018). Berson et al. (2025), in a scoping review of ethical challenges across 42 studies on AI integration in early childhood education, specifically identified algorithmic bias arising from culturally non-representative training datasets as a systemic risk with particular severity in ECE contexts, where biased AI outputs may influence children's self-perception and identity formation during a uniquely formative developmental period. Table 4 presents the full comparative distribution of perception codes.

As shown in Table 4, the legal and ethical dimension is the only category in which critical concern codes (n = 57) exceed positive perception codes (n = 41), yielding a net balance of -16. This inversion indicates that while educators consistently acknowledge efficiency, creativity, and accessibility gains from AI music generators, they identify copyright and public distribution as the primary domain of unresolved professional risk. The pattern demonstrates that PAUD educators' adoption of these tools is not uncritical but proceeds alongside differentiated awareness in which enthusiasm and caution coexist across distinct dimensions of professional experience.

Theme 3: Dynamics and Interaction Patterns in Digital Communities

Sustained netnographic observation across the three platform communities revealed that educator membership was not interactionally uniform but rather organically differentiated into three functionally distinct role configurations. These roles were not formally assigned; they emerged empirically from observed patterns of participation frequency, content type, and discursive orientation. For this analysis, observable active membership was operationally defined as accounts whose participation was directly visible within the 286-interaction corpus, that is, accounts that produced original posts, submitted comments, shared content with accompanying captions, or engaged in documented discussion threads related to AI music generator use during the twelve-month observation period. Accounts whose platform presence was limited to passive content consumption were not observed in the netnographic corpus and are therefore excluded from this operational definition for methodological reasons. The proportional estimates of approximately 13 percent, 68 percent, and 19 percent were derived through qualitative participation pattern analysis during the Integration stage, in which the researcher systematically classified each of the 286 documented interactions by the originating account's predominant role configuration as observable across the full twelve-month corpus. These estimates are explicitly approximate and observational rather than census-precise quantitative measurements of total community membership, and should be interpreted as qualitative indicators of participation distribution within the documented corpus, a characterization consistent with netnographic research conventions as outlined by Kozinets (2020).

Active creators, constituting approximately 13 percent of observable active membership, consistently produced and shared AI-generated music content accompanied by methodological explanations and prompt specifications. This group exerted disproportionate influence on community discourse because their practical demonstrations attracted high engagement and prompted adopters to replicate them. Informant P1, who had been sharing Suno AI content on TikTok for approximately eight months at the time of interview, described the organic nature of her leadership role: "I did not intend to become a teacher in this community, but because I shared how to use it step by step, many people asked questions and requested further tutorials." (P1, interview, June 2024). This dynamic parallels the key opinion leader phenomenon documented by Rowe et al. (2025) in educator TikTok communities, where a small group of high-productivity creators shapes the knowledge landscape for a much larger audience of observer-practitioners. Vizcaíno-Verdú and Abidin (2023) similarly observed that teacher creators on TikTok

construct pedagogical authority through empathetic, resilient, and storytelling dynamics within algorithmically structured community spaces, a pattern that closely mirrors the active creator role identified in the present study's PAUD educator communities.

Adopters, constituting approximately 68 percent of observable active membership, engaged primarily in downloading, modifying, and implementing AI-generated content produced by creators, adapting circulating materials to their own classroom themes, regional languages, and student profiles. Critical curators, constituting approximately 19 percent, occupied a qualitatively distinct discursive space, engaging in evaluative and reflective responses to circulating content and raising concerns about pedagogical quality, cultural authenticity, copyright implications, and long-term effects of AI dependency on educators' own musical development. Informant P10 stated: "I am not opposed to AI, but we need to be more critical. If we rely on AI for all songs, we will eventually be unable to make music organically. Children also need to see their teachers singing, not only hearing voices from an application." (P10, interview, September 2024). Table 5 summarizes the three functional roles. Figure 5 illustrates the role differentiation and interaction dynamics within these communities.

Tutorial-style posts by active creators attracted a mean of 86 interactions per post (SD = 34.2), combining likes, comments, and shares, compared to a mean of 31 interactions per post (SD = 18.7) for reflective-critical discussions, a descriptive differential of approximately 64 percent in favor of practical-demonstrative content. Consistent with the qualitative netnographic design of this study, these figures are presented as descriptive observational indicators derived from the 286-interaction corpus rather than as outcomes of inferential statistical testing; the netnographic framework of Kozinets (2020) foregrounds contextual pattern interpretation rather than statistical generalization as the appropriate analytical mode for community engagement data of this type. The consistency of this differential across all three platforms, where tutorial content outperformed reflective content in engagement counts on Facebook Groups, TikTok, and YouTube independently, lends descriptive robustness to the observation and aligns with Rowe et al.'s (2025) finding that social media platform algorithms systematically amplify immediately applicable content over content requiring sustained interpretive engagement. The result for PAUD educator communities is a structurally embedded discourse hierarchy in which practical knowledge circulates efficiently. In contrast, critical and reflective knowledge occupies a peripheral position in community information flows.

Theme 4: Pedagogical Implications for Early Childhood Music Stimulation

The findings from the three empirical themes carry converging pedagogical implications for early childhood music stimulation. The prevalence of thematic song creation and the consistently reported improvements in children's engagement indicate that AI music generators can function as pedagogical amplifiers when deployed with clear curricular intention. Roldan-Cardona et al. (2025) documented that AI-assisted music education sessions produced measurable improvements in children's oral language

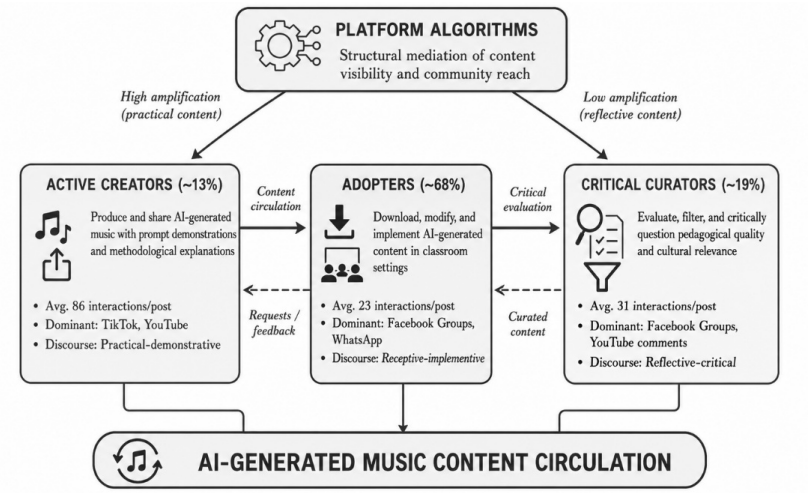

Figure 5. Role differentiation and interaction dynamics within PAUD educators' AI music generator communities. Source: Author's netnographic interpretation and thematic interaction mapping (2024).

Table 5. Functional Roles and Interaction Characteristics Within PAUD Educators' AI Music Generator Digital Communities

Role	Proportion	Primary Activity	Dominant Platform	Avg. Interactions/Post	Discourse Orientation
Active creators	approx. 13%	Produce and share AI-generated music content with prompt demonstrations and methodological explanations	TikTok, YouTube	86	Practical-demonstrative
Adopters	approx. 68%	Download, modify, and implement AI-generated content in classroom settings.	Facebook Groups, WhatsApp	23	Receptive-implementive
Critical curators	approx. 19%	Evaluate and critically question pedagogical quality and cultural relevance of circulating AI music content.	Facebook Groups, YouTube comments	31	Reflective-critical

development, with an average post-intervention improvement rate of 28 percent in oral vocabulary tasks compared to conventional instruction. Informant P3 captured this dynamic: "The song I create using AI can include the names of children in my class and the theme we are currently studying. The children feel that the song belongs to them, and their motivation is different from a song that was purchased." (P3, interview, July 2024). This capacity to embed children's names and real-time thematic relevance in AI-generated compositions aligns with Vygotsky's (1978) zone of proximal development, in which affective engagement with personally meaningful content amplifies instructional effectiveness.

The findings on Western-centric algorithmic bias have implications for early childhood cultural policy. As documented in Theme 2, educators identified the consistent tendency of AI-generated music to reflect Western harmonic and rhythmic conventions as a substantive concern grounded in awareness that early childhood is a critical period for cultural musical identity formation. Benjamin (2019) and Noble (2018) have established that AI systems trained on non-representative datasets amplify embedded cultural biases at scale, and the present study provides empirical evidence of how this concern manifests in the professional discourse of PAUD educators as they navigate adoption decisions. Berson et al. (2025) confirmed that the absence of culturally responsive design in AI systems constitutes a systemic risk whose consequences are especially consequential in early childhood settings, where exposure to algorithmically dominant cultural patterns may cumulatively shape children's musical preferences and cultural identifications before critical literacy has developed. Beyond musical content, Kurian (2023) cautioned that AI tools introduced in early childhood settings must prioritize child-safe design principles, as young children are particularly vulnerable to the risks posed by AI systems trained on adult-centric data that may be unresponsive to children's developmental, linguistic, and emotional needs.

The platform-algorithmic dynamics documented in Theme 3 have a specific implication for the design of professional development programs. Because practical-demonstrative content achieves substantially greater amplification than reflective-critical discourse, AI literacy programs that rely exclusively on critical or reflective modalities, without embedding that content in practically appealing formats, are likely to reach only the critical-curator minority rather than the adopter majority. Informant P6 described a deliberately integrated approach: "I know that if I only discuss copyright, no one will watch until the end. So I always show the creation process first, and then at the end I address the legal considerations." (P6, interview, August 2024). This design principle offers actionable guidance for program developers seeking to reach PAUD educator communities through the platform ecosystems where their professional learning already takes place.

Theoretically, this study extends Kozinets'

(2020) netnographic framework in two demonstrable ways within the context of professional educator communities. First, the layered participation dynamic observed during the Interaction and Immersion stages, in which the researcher's disclosed presence generated reflexive informant articulations qualitatively distinct from passively archived interactions, constitutes an analytically significant finding not systematically theorized in Kozinets' original framework, which was developed primarily in consumer and brand community contexts. Second, the three-role differentiation among active creators, adopters, and critical curators extends the original community typology beyond Kozinets' characterizations, offering a more empirically grounded typology suited specifically to professional digital communities organized around shared pedagogical technology adoption.

■ CONCLUSION

The collective weight of these findings carries significance that extends beyond the specific case of Indonesian PAUD educators and AI music generators. Theoretically, this study demonstrates that professional digital communities in non-Western educational contexts are not passive recipients of globally circulating AI technologies but rather active negotiation spaces in which adoption decisions are mediated by intersecting values of pedagogical pragmatism, cultural identity, and professional responsibility. The bipolar perceptual structure documented here, where efficiency and accessibility gains coexist with substantive cultural and legal concerns, challenges techno-optimist accounts of AI adoption that treat professional enthusiasm as straightforwardly indicative of unproblematic integration. Practically, the documented platform-algorithmic dynamics have direct implications for how AI literacy interventions are designed and delivered: if reflective-critical content is structurally disadvantaged by platform amplification mechanisms relative to practical-demonstrative content, then literacy programs that rely exclusively on critical modalities will, by design, reach only the minority of educators already disposed toward critical reflection. The findings therefore argue not merely for more AI literacy programming but for algorithmically informed program design, a distinction with meaningful consequences for policy and practice in early childhood education.

This netnographic study yields three principal conclusions responding directly to the three research questions. In response to RQ1, PAUD educators in digital communities demonstrate three distinctive patterns of AI music generator utilization: thematic song creation through text-to-music interfaces as the dominant pattern, followed by adaptation and reimagination of existing children's songs, and active distribution of AI-based musical content as the third pattern. These patterns reflect educators' creative and pragmatic responses to the genuine need for varied music materials in a professional context where formal musical expertise is not commonly held.

In response to RQ2, educators' perceptions of AI music generators are bipolar and dynamic. Community narratives reveal strong appreciation for production efficiency, pedagogical creativity, and democratized access to music production, particularly among educators without formal music backgrounds, alongside substantive concerns about technological dependency, cultural homogenization driven by Western-centric AI output, and legal uncertainty surrounding the copyright status of AI-generated music. The legal and ethical dimension is the sole category in which critical concern codes exceeded positive perception codes, with a net balance of -16, indicating that this remains the most actively contested domain in educators' professional experience with these tools.

In response to RQ3, PAUD educators' digital communities operate as horizontally structured knowledge ecosystems, organically differentiated into three distinct functional roles: active creators, the smallest but most influential group; adopters, the majority; and critical curators, a substantive, reflective minority. Platform algorithms demonstrably shape the visibility of discourse, structurally privileging practical-demonstrative content over reflective-critical engagement in ways that determine which forms of professional knowledge circulate efficiently and which remain peripheral, with direct consequences for the pace and depth of critical reflection that accompanies AI adoption.

Theoretically, this study extends Kozinets' (2020) netnographic framework by documenting the layered participation dynamic characteristic of professional educator communities and by proposing a three-role typology of active creators, adopters, and critical curators as a more empirically grounded model for analyzing technology adoption within professional digital communities in educational settings. Practically, three recommendations are offered. First, educational institutions should develop AI literacy programs for PAUD educators that address the pedagogical, ethical, legal, and cultural dimensions of AI music generator use,

incorporating critical content on copyright and algorithmic bias in practically engaging formats consistent with the platform-algorithmic dynamics identified in this study. Pan and Chen (2023) demonstrated that such programs achieve their greatest impact on professional behavior change when they operate through networked peer communities rather than through top-down institutional channels. This finding reinforces the recommendation that AI literacy initiatives for PAUD educators be designed to work within, rather than in parallel with, the digital community structures where professional learning already occurs organically. Second, systematic AI music content curation guidelines should incorporate Indonesian regional musical traditions as structural counterbalances to the documented dominance of Western musical patterns in current AI-generated output. Third, PAUD policy stakeholders should formulate operational and context-sensitive regulations governing the use of AI-generated educational content in early childhood settings, addressing copyright accountability and cultural appropriateness standards. This study has limitations: the field sites were restricted to three primary platforms; the findings reflect community conditions during a specific 12-month period; and the proportional role estimates are qualitative observational indicators rather than definitive quantitative measurements. Future research integrating netnography with broader survey methods is recommended to validate and quantify these findings across wider educational and cultural contexts.

■ DISCLOSURE OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this manuscript, the author(s) used Claude (Anthropic) for the following specific and limited purposes: language refinement and improvement of the academic register of English-language sections; enhancement of the clarity and logical flow of selected paragraphs; and structural reorganization of the Method section to align with qualitative research reporting standards. The generative AI tool was not used to produce, fabricate, or substitute any research data, field observations, interview transcripts, or netnographic analyses. All substantive intellectual contributions, including research design, field site selection, data collection, thematic coding, scholarly interpretation, and conclusions, were carried out entirely by the author(s). All AI-assisted content was thoroughly reviewed and revised by the author(s), who accept full responsibility for the final content of this article.

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