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Teachers' Understanding of Music Education and Early Childhood Learning Outcomes: Evidence from Arjasari District

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Abstract: Music education occupies a structurally marginal position in early childhood education (ECE), where cognitive-literacy objectives routinely displace aesthetic development in both curriculum design and everyday teaching practice. This study examined the relationship between ECE teachers' understanding of music education and the quality of early childhood learning in Arjasari District, West Java, Indonesia. A quantitative correlational design was applied to a sample of 78 kindergarten (Raudhatul Athfal) teachers drawn from a population of 103 through proportional random sampling, using a 28-item Likert questionnaire validated through Pearson product-moment correlation (all items $r > .223$) and Cronbach's alpha ($\alpha = .946$). Simple linear regression indicated a statistically significant association between teachers' musical understanding and reported learning quality ($\beta = 0.538$, $t = 11.187$, $p < .001$), with musical understanding accounting for 62.2% of variance in the outcome measure ($R^2 = .622$). Teachers scored higher on awareness of music's developmental importance than on knowledge of age-appropriate musical repertoire, while children's appreciative engagement with peers' work outstripped their productive, creative music-making. These findings extend the largely conceptual and qualitative literature on ECE music pedagogy by supplying region-specific quantitative estimates, and they expose the methodological ceiling that single-informant, cross-sectional designs impose on claims of directional influence. Teacher musical understanding functions here as a necessary but insufficient condition for quality music learning, one likely mediated by institutional resourcing, professional development access, and repertoire knowledge that the present design cannot disentangle. Implications for teacher preparation and future mixed-methods research in Indonesian ECE settings are discussed.
Keywords: music understanding; early childhood teachers; early childhood learning; teacher self-efficacy; pedagogical content knowledge

Abstrak: *Pendidikan musik menempati posisi yang secara struktural terpinggirkan dalam pendidikan anak usia dini (PAUD), di mana tujuan kognitif dan literasi secara rutin menggeser pengembangan estetika, baik dalam perancangan kurikulum maupun praktik pengajaran sehari-hari. Penelitian ini mengkaji hubungan antara pemahaman guru PAUD terhadap pendidikan musik dan kualitas pembelajaran anak usia dini di Kecamatan Arjasari, Jawa Barat, Indonesia. Desain korelasi kuantitatif diterapkan pada sampel 78 guru taman kanak-kanak (Raudhatul Athfal) yang diambil dari populasi sebanyak 103 orang melalui pengambilan sampel acak proporsional, menggunakan kuesioner Likert berisikan 28 item yang telah divalidasi melalui korelasi momen produk Pearson (semua item $r > .223$) dan koefisien Cronbach's alpha ($a = .946$). Regresi linier sederhana menunjukkan adanya hubungan yang signifikan secara statistik antara pemahaman musik guru dan kualitas pembelajaran yang dilaporkan ($\beta = 0{,}538$, $t = 11{,}187$, $p < 0{,}001$), dengan pemahaman musik menjelaskan 62,2% varians pada ukuran hasil ($R^2 = 0{,}622$). Guru memperoleh skor lebih tinggi pada kesadaran akan pentingnya musik bagi perkembangan anak dibandingkan pada pengetahuan tentang repertoar musik yang sesuai usia, sementara keterlibatan apresiatif anak-anak terhadap karya teman sebaya melampaui aktivitas pembuatan musik produktif dan kreatif mereka. Temuan ini memperluas literatur yang sebagian*

besar bersifat konseptual dan kualitatif mengenai pedagogi musik PAUD dengan menyediakan estimasi kuantitatif yang spesifik wilayah, serta mengungkap batasan metodologis yang ditimbulkan oleh desain cross-sectional dengan informan tunggal terhadap klaim pengaruh arah. Pemahaman musik guru berfungsi di sini sebagai syarat yang diperlukan namun tidak cukup untuk pembelajaran musik yang berkualitas, yang kemungkinan dimediasi oleh sumber daya institusional, akses terhadap pengembangan profesional, dan pengetahuan repertoar yang tidak dapat diuraikan oleh desain penelitian ini. Implikasi bagi persiapan guru dan penelitian campuran metode di masa depan dalam konteks PAUD di Indonesia dibahas.
Kata kunci: *pemahaman musik; guru pendidikan anak usia dini; pembelajaran anak usia dini; efikasi diri guru; pengetahuan konten pedagogis*

Introduction

Curriculum documents across jurisdictions describe music as integral to holistic early childhood development, yet enacted practice in most kindergartens treats it as decorative rather than developmental. Indonesian policy states the aspiration plainly: Law No. 20 of 2003 on the National Education System positions the teacher as a facilitator of enjoyable, developmentally appropriate learning experience across all domains, music included (Depdiknas, 2003). Perdana (2022) frames music education in early childhood as a vehicle for cognitive and talent development consistent with children's developmental interests. The distance between this aspiration and classroom reality is the empirical starting point of this study.

That distance is not a local peculiarity. A 2025 meta-narrative review synthesizing 249 studies on music-teaching competence among primary and early childhood generalist teachers found a persistent discrepancy between what teachers believe they know about music and what they can demonstrate in practice, a discrepancy replicated across national systems with very different teacher-training regimes (Frontiers meta-narrative review, 2025). Bautista and colleagues, working across Singapore, Hong Kong, and comparative Asian contexts, have documented that music consistently ranks among the learning areas kindergarten teachers feel least equipped to teach, behind literacy, numeracy, and even physical education, despite ranking it as developmentally important (Bautista et al., 2016; Bautista et al., 2018). The same research group's interview work with Hong Kong teachers found that professional development in music is treated as optional rather than structural, leaving teachers to improvise pedagogy from personal musical biography rather than trained competence (Bautista & Ho, 2021). Closer to the present setting, Julia, Hakim, and Fadlilah (2019) documented that Indonesian primary teachers frequently lack functional strategies for teaching songs, relying on rote repetition rather than structured pedagogical method, a finding their subsequent action-research work attempted to remedy through targeted training interventions.

Two theoretical accounts explain why a teacher's musical *understanding*, as distinct from formal musical training, should matter for classroom practice. The first is Bandura's (1997) theory of self-efficacy, which holds that a teacher's belief in their capacity to execute a specific instructional task shapes whether that task is attempted, how much effort is invested when it is attempted, and how persistent obstacles are met. A teacher who does not believe she understands music well enough to teach it avoids doing so, regardless of what curriculum

documents prescribe; efficacy belief precedes behavior. The second account is Shulman's (1986) construct of pedagogical content knowledge (PCK), which separates subject-matter knowledge from the specialized knowledge of how to represent that subject matter so that novice learners can grasp it. A teacher may know musical facts without possessing the pedagogical repertoire to translate those facts into activities suited to four- and five-year-olds; understanding, on Shulman's account, is inseparable from the capacity to teach what one understands. The meta-narrative review cited above formalizes this distinction by modeling music-teaching competence as the joint product of professional competence (content and pedagogical knowledge), teacher characteristics, and institutional context (Frontiers meta-narrative review, 2025), a framework more explanatorily demanding than the single-variable model this study ultimately tests, a tension addressed directly in the discussion below.

A third theoretical current runs through much of the Indonesian ECE literature on music and deserves explicit scrutiny rather than silent adoption: Gardner's theory of multiple intelligences, frequently invoked to justify musical intelligence as one domain among several that early childhood pedagogy ought to cultivate. The claim is contested territory, not settled science. Waterhouse (2006), reviewing the empirical base for multiple intelligences theory in *Educational Psychologist*, concluded that the theory lacks validating psychometric and neuroscientific evidence and should not by itself underwrite educational practice; Gardner and Moran (2006), responding in the same journal, argued that Waterhouse mischaracterized the theory's evidentiary claims and its intended use as a heuristic rather than a measurement model. Both factions remain active in the literature, and the present study does not require a resolution: the variables measured here are teacher musical understanding and reported learning behavior, not innate multiple-intelligence profiles, so the analysis proceeds independently of that unresolved dispute. Where earlier Indonesian studies on this topic lean on multiple-intelligence language as their sole theoretical anchor, that anchor is treated here as rhetorical scaffolding rather than as an empirical premise the present data could test or falsify.

Preliminary interviews and classroom observation conducted by the researchers in Arjasari District surfaced four concrete manifestations of the general problem: teachers weighting cognitive instruction (reading, writing, arithmetic) over musical activity in daily planning; parental demand for early literacy that further crowds out music from the timetable; limited teacher competence in delivering music instruction of demonstrable quality; and a self-reported gap in teachers' own understanding of music that constrains both their ability to develop children's musical capacity and their ability to construct an engaging learning atmosphere around it. Aulia, Diana, and Setiawan (2022) report a structurally similar pattern elsewhere in Indonesia, linking delayed and under-resourced music instruction to diminished learning outcomes; the RA teachers in Arjasari occupy the same structural position but had not, prior to this study, been measured.

Existing Indonesian scholarship on the value of music for early childhood development is extensive at the conceptual and qualitative level (Nasution, 2016; Sejati, 2018; Perdana, 2022) but thin at the level of quantified, region-specific measurement of the teacher-understanding-to-learning-quality pathway. The 2025 meta-narrative review's methodological finding, that the

field's quantitative literature is dominated by cross-sectional, self-report survey designs rather than observational or mixed methods work (Frontiers meta-narrative review, 2025), applies to the present study as much as to the gap it fills; the implications of that shared limitation are taken up explicitly in the methods and discussion sections rather than treated as an afterthought.

The institutional setting adds a dimension the existing literature on this topic, Indonesian or international, rarely addresses directly. Raudhatul Athfal (RA) institutions operate under the Ministry of Religious Affairs rather than the Ministry of Education and Culture, and their curricula integrate Islamic values formation alongside the general early-childhood developmental domains that structure Taman Kanak-Kanak (TK) curricula elsewhere in the national system. Music education inside an RA classroom therefore carries a double justificatory burden that a generic ECE music-pedagogy study does not: it must be defended not only on developmental grounds, the grounds this study measures, but also against a residual strand of conservative interpretation within some Indonesian Islamic educational communities that treats musical instruction with caution. Neither the theoretical framework built in Section 2 nor the instrument described in Section 3 was designed to capture this dimension, and that omission is itself informative: a study published in a journal of Islamic early childhood education that measures teachers' pedagogical understanding of music without measuring their normative or theological stance toward it has described only half of the belief structure that determines whether music is taught with confidence in an RA classroom. Bautista and Ho's (2021) finding that music professional development is treated as optional rather than structural in a secular Hong Kong kindergarten system takes on a sharper edge in an RA context, where "optional" may be reinforced by normative ambivalence rather than by resourcing constraints alone. This gap is flagged here as a direction for future instrument development rather than folded into the present analysis, since retrofitting a theological-attitude measure onto data already collected would misrepresent what this study's instrument was built to capture.

This study contributes a statistically estimated relationship between ECE teachers' musical understanding and early childhood learning quality in a setting, Arjasari District, not previously measured on this dimension, using a validated 28-item instrument and standard inferential procedures (Pearson correlation, simple linear regression, coefficient of determination). Three research questions organize the inquiry: first, what is the level of ECE teachers' understanding of music education in Arjasari District; second, what is the quality of early childhood learning in the same setting; and third, to what extent is teachers' musical understanding associated with early childhood learning quality. The remainder of the paper proceeds through a theoretical framework grounding the study's hypotheses, a methods section detailing design and instrumentation together with the methodological constraints those choices impose, a results section reporting descriptive and inferential findings, and a discussion that reads those findings against the international and Indonesian literature while foregrounding the interpretive limits a correlational, single-informant design necessarily carries.

Methods

Research Design

This study used a quantitative correlational design, appropriate for identifying and statistically estimating the strength of association between two measured variables without manipulating (Djali, 2020). The design tests whether variation in the independent variable, ECE teachers' musical understanding, covaries with variation in the dependent variable, early childhood learning quality as reported by those same teachers. A correlational design establishes covariation; it does not, by itself, establish that the independent variable causes change in the dependent variable, since a third, unmeasured factor could generate both, or the direction of influence could run opposite to the theoretical account motivating the study. This constraint is treated as a standing qualification on every inferential claim advanced in the results and discussion, not as a caveat confined to a closing limitations paragraph.

Variables

The independent variable (X), ECE teachers' understanding of music education, is operationalized as teachers' self-reported grasp of the concepts, elements, and classroom applications of music within early childhood pedagogy, measured across four indicators: the perceived importance of music for child development, knowledge of the basic elements of music, capacity to teach songs, and knowledge of age-appropriate musical genres and repertoire. The dependent variable (Y), early childhood learning quality, is operationalized, and this operationalization is stated explicitly because it bears on every causal claim that follows, as teachers' reports of children's musical learning behavior across three indicators: children's capacity to produce original musical work, children's capacity to perform simple artistic work, and children's capacity to appreciate the artistic work of peers. Both variables are therefore measured through the same instrument, completed by the same respondent, at the same point in time; Section 3.6 addresses the interpretive consequences of that design choice.

Setting, Population, and Sample

The study was conducted in Arjasari District, Bandung Regency, West Java, during the even semester of the 2023/2024 academic year. The population comprised all 103 Raudhatul Athfal (RA) teachers active in the district. Sample size was calculated using Slovin's formula at a 5% margin of error, yielding n = 78, and teachers were selected through proportional random sampling across the district's RA institutions so that each population member had an equal probability of selection.

Two qualifications on this sampling procedure deserve statement rather than omission. First, Slovin's formula supplies a minimum sample size sufficient for estimating a population proportion within a specified margin of error under simple random sampling from a homogeneous population; it does not by itself certify that a regression coefficient estimated from that sample generalizes with the same margin of error, since regression precision depends additionally on predictor variance, model specification, and residual variance, none of which the formula addresses. Second, because sampling proceeded proportionally across institutions (RA schools) rather than as an unclustered draw from the full teacher list, some design effect from within-school clustering, teachers at the same institution sharing supervision, resources,

and professional-development exposure, is plausible and was not modeled; the standard errors reported in Section 4 should accordingly be read as a lower bound on true sampling uncertainty rather than as a fully design-adjusted estimate. Both qualifications are consistent with common practice in regional education research but are stated here so that readers can weight the precision of the reported coefficients accordingly.

Instrumentation

Data were collected using a closed-ended, 28-item Likert questionnaire, distributed across the seven indicators described in Section 3.2 (four for the independent variable, three for the dependent variable, four items per indicator). Responses were scored on a five-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). The complete indicator structure is reported in Table 1.

Table 1. *Instrument Blueprint*

Variable	Indicator	Number of Items
Teachers' Understanding of Music Education (X)	Importance of music for child development	7
	Knowledge of the basic elements of music	7
	Capacity to teach songs	7
	Knowledge of age-appropriate musical repertoire	7
Early Childhood Learning Quality (Y)	Capacity to produce original musical work	7
	Capacity to perform simple artistic work	7
	Capacity to appreciate peers' artistic work	7
Total		**28**

Data collection proceeded offline through six sequential steps: submission of a formal research permit to relevant institutions; coordination with the principal of each participating RA; direct distribution of the questionnaire to teacher respondents; completion of the questionnaire within a specified window; retrieval of completed instruments; and verification of data completeness prior to analysis. Participation was voluntary and preceded by informed consent; respondent anonymity was preserved in the resulting dataset.

Validity and Reliability

Item validity was tested using Pearson product-moment correlation against a critical value of $r = .223$ ($n = 78$, $\alpha = .05$, two-tailed). All 28 items exceeded this threshold, ranging from $r = .445$ to $r = .701$ for the independent-variable items and from $r = .523$ to $r = .678$ for the dependent-variable items, and were retained without modification. Item-level correlation coefficients for all 28 items are available on request as supplementary material; Table 1 above reports the indicator structure rather than the full item matrix, consistent with standard reporting practice for instruments of this length.

Internal consistency was assessed using Cronbach's alpha, yielding $\alpha = .912$ for the independent-variable subscale (14 items), $\alpha = .889$ for the dependent-variable subscale (14 items), and $\alpha = .946$ for the full instrument, all in the very-high reliability range. High internal consistency here indicates that items within each indicator cluster elicited convergent responses; it does not by itself indicate that the construct measured corresponds to observable

classroom behavior rather than to teachers' self-concept, a distinction elaborated in Section 3.6.

Analytic Procedure and Explicit Threats to Inference

Data was analyzed in SPSS. Residual normality was assessed using the Kolmogorov-Smirnov test; the hypothesized relationship was tested using simple linear regression and an independent-samples t-test on the regression coefficient; the strength and direction of association was assessed using Pearson product-moment correlation; and the proportion of variance in Y accounted for by X was assessed using the coefficient of determination (R^2), following standard procedure for correlational survey research in the social sciences (Darma, 2021).

Because both the independent and dependent variables were measured through self-report by the same respondent within a single instrument administration, the resulting correlation is structurally vulnerable to common method bias: shared method variance, arising from consistency motifs, social desirability, or acquiescence in how a single respondent answers adjacent survey blocks, can inflate an observed correlation independently of any true relationship between the underlying constructs (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This is not a hypothetical concern specific to this study; the same meta-narrative review cited throughout this paper identifies self-report, single-source, cross-sectional survey design as the dominant and most methodologically constrained mode of inquiry in the music-teaching-competence literature as a whole (Frontiers meta-narrative review, 2025). No procedural remedy for common method bias, such as temporal separation of measurement or an independent second rater, was built into the present design; this constraint is carried forward explicitly into the interpretation of the regression results in Section 5.3 rather than deferred to a closing caveat.

Results and Discussion

Respondent Profile

Of the 78 respondents, 76 (97.44%) were female and two (2.56%) were male. Educational attainment was distributed as follows: senior secondary or equivalent, 23 respondents (29.49%); diploma (D3), 12 respondents (15.38%); bachelor's degree (S1), 40 respondents (51.28%); and master's degree (S2), three respondents (3.85%). Tenure was distributed as: under 2 years, 18 respondents (23.08%); 2 to 5 years, 27 respondents (34.62%); 6 to 10 years, 20 respondents (25.64%); and over 10 years, 13 respondents (16.66%). The sample is therefore predominantly female, holds a bachelor's degree as modal qualification, and clusters in early-to-mid career tenure, a profile broadly typical of the RA teaching workforce nationally and one that limits generalization to more senior or more male-representative teaching populations without further study.

Normality

The Kolmogorov-Smirnov test on the unstandardized regression residual returned a statistic of .075 (df = 78, p = .200), exceeding the .05 threshold and indicating that the residual distribution did not depart significantly from normality, satisfying the distributional assumption required for the subsequent linear regression.

Descriptive Results by Indicator

Table 2 reports mean scores for each indicator of teachers' musical understanding.

Table 2. *Descriptive Statistics: Teachers' Understanding of Music Education (X)*

Indicator	Mean	Category
Importance of music for child development	3.458	Moderately high
Knowledge of basic elements of music	3.397	Moderately high
Capacity to teach songs	3.416	Moderately high
Knowledge of age-appropriate musical repertoire	3.363	Moderately high
Overall mean	**3.408**	**Moderately high**

Note. Interpretation bands: 1.00-1.75 very low; 1.76-2.51 low; 2.52-3.27 moderate; 3.28-4.03 moderately high; 4.04-5.00 high.

Table 3 reports the corresponding results for early childhood learning quality.

Table 3. *Descriptive Statistics: Early Childhood Learning Quality (Y)*

Indicator	Mean	Category
Capacity to produce original musical work	3.259	Moderate
Capacity to perform simple artistic work	3.288	Moderately high
Capacity to appreciate peers' artistic work	3.314	Moderately high
Overall mean	**3.287**	**Moderately high**

Within the independent variable, teachers scored highest on recognizing music's developmental importance and lowest on knowledge of age-appropriate repertoire, a spread of 0.095 points across indicators nominally measuring the same underlying construct. Within the dependent variable, children's appreciative capacity scored highest and their productive, creative capacity scored lowest, a spread of 0.055 points. Both spreads are read against the theoretical framework in Section 5.

Hypothesis Test

Simple linear regression of Y on X produced the coefficients reported in Table 4.

Table 4. *Regression Coefficients*

Variable	B	SE	t	Sig.
Constant	10.627	2.628	4.043	.000
Musical understanding (X)	0.538	0.048	11.187	.000

At a critical value of $t(76) = 1.665$ ($\alpha = .05$, one-tailed), the obtained t of 11.187 for the X coefficient exceeds the critical value, and the associated significance level ($p < .001$) falls below .05. The null hypothesis of no association is rejected in favor of the alternative: teachers' musical understanding is significantly and positively associated with early childhood learning quality as measured in this sample.

The overall regression model was significant, $F(1, 76) = 125.156$, $p < .001$ (Table 5), indicating that the linear model fits the data significantly better than an intercept-only model.

Table 5. *Analysis of Variance*

Source	SS	df	MS	F	Sig.
Regression	851.243	1	851.243	125.156	.000
Residual	516.911	76	6.801		
Total	1368.154	77			

The resulting regression equation is:

$Y = 10.627 + 0.538X$

where Y denotes early childhood learning quality and X denotes teachers' understanding of music education. The constant (10.627) is the model-implied value of Y at X = 0, a value outside the observed range of the predictor and therefore not meaningfully interpretable as "learning quality in the absence of any musical understanding"; it functions as a regression intercept rather than a substantive baseline. The slope (0.538) indicates that each one-unit increase in measured musical understanding is associated with a 0.538-unit increase in measured learning quality, holding the single-predictor model's other terms constant, which is to say holding nothing else in the classroom constant at all.

Correlation and Coefficient of Determination

Pearson product-moment correlation between X and Y was $r = .789$ ($p < .001$, two-tailed), falling in the strong-relationship band (.60-.799). The coefficient of determination was $R^2 = .622$ (adjusted $R^2 = .617$), indicating that variation in teachers' musical understanding statistically accounts for 62.2% of variation in measured early childhood learning quality within this sample, with the remaining 37.8% attributable to factors outside the model.

Teachers' Understanding of Music: Awareness Without Repertoire

The overall mean of 3.408 places Arjasari RA teachers' musical understanding in the moderately high band, one step below the "high" category on the study's own interpretive scale. That teachers recognize music's developmental importance (the highest-scoring indicator, 3.458) while scoring lowest on knowledge of age-appropriate repertoire (3.363) reproduces, at regional scale, the belief-competence gap Barrett, Flynn, Brown, and Welch (2019) documented across practitioner populations more broadly: valuing music and being equipped to teach it are separable constructs, and survey instruments that aggregate across both risk masking exactly the gap that matters most for intervention design. Zahro (2015) attributes comparable gaps to incomplete teacher grasp of the task, function, and competence profile the ECE role formally requires; the present data localize that general claim to the specific domain of repertoire knowledge, the concrete "what to teach" that awareness of "why it matters" does not by itself supply.

The finding that teaching capacity for songs (3.416) scored below general awareness of music's importance (3.458) but above repertoire knowledge (3.363) sketches a plausible developmental sequence rather than a flat competence deficit: teachers appear to hold belief and general pedagogical willingness ahead of the specific content knowledge, in Shulman's (1986) sense, required to execute that willingness well. This is consistent with Aulia, Diana, and Setiawan's (2022) finding that low teacher understanding of music constrains teachers' capacity to construct an engaging learning atmosphere even when motivation to do so is present. It is also consistent with the international finding that music-teaching confidence is built less through comprehensive expertise than through structured, low-threshold participation in accessible musical activity (Springer IJEC study, 2025), which suggests that Arjasari's repertoire-knowledge gap is a plausible, addressable training target rather than evidence of an intractable competence ceiling.

Nasution (2016) frames music learning in ECE as spanning physical, linguistic, social, emotional, and cognitive development jointly, a multidimensional account against which the

present study's single-scale operationalization of "understanding" is comparatively coarse; the four-indicator structure used here captures breadth of self-reported knowledge but not depth within any one indicator, and does not distinguish declarative knowledge (knowing that a musical element exists) from procedural knowledge (knowing how to deploy it with four-year-olds), a distinction central to Shulman's (1986) original PCK formulation. Future instrumentation in this line of research would benefit from separating these knowledge types explicitly rather than folding them into a single Likert item.

Children's Learning: Appreciation Outpacing Creation

Early childhood learning quality, at an overall mean of 3.287, mirrors the moderately-high-but-not-high pattern found for teacher understanding. The internal ordering of its three indicators is the more informative result: children's capacity to appreciate peers' artistic work (3.314) scored highest, and their capacity to produce original musical work (3.259) scored lowest. Desyandri (2019) distinguishes three pedagogical approaches to music education: learning *about* art (knowledge), learning *with* art (appreciation), and learning *through* art (active creation). The Arjasari data suggest that the first two approaches dominate classroom practice while the third remains comparatively underdeveloped, a pattern that converges with Bautista, Moreno-Núñez, Bull, Amsah, and Koh's (2018) finding that arts pedagogy across Asian preschool classrooms tends toward reproductive, teacher-directed activity rather than creativity-generating practice. The convergence between an independently collected Southeast Asian comparative dataset and this single-district Indonesian sample strengthens confidence that the pattern reflects something structural about how music is taught in the region's ECE classrooms, rather than an artifact specific to Arjasari.

Sejati (2018) argues that music learning for young children should not be confined to receptive skill-building but should actively involve children with varied sound sources in generative musical activity. The lowest-scoring indicator in this study's dependent variable is precisely that generative dimension, suggesting a specific and addressable target for curricular intervention: increasing the proportion of instructional time devoted to child-directed musical production relative to time devoted to listening, performing pre-set material, and evaluating others' work. Hayati, Fatimaningrum, and Wulandari (2019) locate the ideal of ECE pedagogy in "learning while playing," in which knowledge is acquired through enjoyable, self-directed activity; an overall mean of 3.287 indicates that some version of playful musical engagement is occurring in Arjasari classrooms, but the low creative-production score indicates that this engagement remains closer to structured participation than to open-ended play in the domain of music specifically.

The Statistical Relationship and Its Interpretive Limits

The regression, correlation, and coefficient-of-determination results converge on a single empirical pattern: teachers' self-reported musical understanding and their reports of children's learning quality co-vary strongly ($r = .789$) and the model built on that covariation explains a substantial share of variance ($R^2 = .622$). This pattern is consistent with, and extends with region-specific quantitative estimates, the qualitative and conceptual literature linking teacher competence to music-learning quality (Aulia et al., 2022; Maghfiroh & Eliza, 2021; Nasution,

2016). It is not, on its own, evidence that improving teacher understanding would cause a 0.538-unit improvement in learning quality for every unit gained, and three distinct reasons for that caution deserve statement together rather than as a single generic disclaimer.

First, the design is correlational and cross-sectional: X and Y were measured at the same point in time, so the data are equally consistent with teacher understanding driving learning quality, with learning quality (or the classroom conditions that produce strong learning outcomes) shaping teachers' retrospective sense of their own understanding, or with both arising from a shared third factor, such as institutional resourcing or principal support, that the model does not measure. Bautista, Ng, Múñez, and Bull (2016) and Bautista, Moreno-Núñez, Bull, Amsah, and Koh (2018) both identify institutional and curricular context, not teacher knowledge alone, as a determinant of music-teaching quality; a design that measured only the teacher side of that equation cannot adjudicate between a teacher-driven and a context-driven account of the association found here.

Second, and directly following from Section 3.6, both variables were measured through self-report by the same respondent in the same administration, which creates structural vulnerability to common method bias (Podsakoff et al., 2003). An R^2 of .622 is high enough that shared method variance offers a plausible partial explanation for its magnitude, alongside a genuine substantive relationship; the present data cannot separate the two. This is not a defect unique to this study's execution, but a property shared with the majority of the quantitative literature this paper engages, which the 2025 meta-narrative review characterizes as dominated by exactly this design (Frontiers meta-narrative review, 2025). Reporting the coefficient without this qualification, as the original conceptualization of this study did, would overstate what a single-source cross-sectional correlation can support.

Third, the dependent variable as operationalized here is teachers' *report* of children's learning, not a direct assessment of children's musical capacity. Maghfiroh and Eliza's (2021) account of ECE teacher professionalism emphasizes that teachers manage the learning process toward defined outcomes, including in music, which supports treating teacher perception as a meaningful proxy for classroom quality; it does not establish that the proxy tracks independently observable child outcomes with high fidelity, since teachers who believe themselves musically competent may also, for reasons unrelated to actual classroom practice, rate their students' learning more favorably.

None of these three qualifications overturns the study's central finding that teacher musical understanding and reported learning quality are strongly and significantly associated in this sample. Together, they narrow what that finding can be taken to mean: teacher musical understanding is a necessary correlate, plausibly a contributing cause, of learning quality as measured, operating within an institutional and curricular context this design did not capture, and measured through an instrument that cannot on its own distinguish genuine improvement in children's musical capacity from improvement in teachers' confidence about reporting it.

Practical and Theoretical Implications

The practical implication of the indicator-level results is more specific than the aggregate correlation alone would suggest. An intervention aimed at raising the aggregate musical-

understanding score, without regard to which of its four indicators is weakest, would spend training resources on reinforcing what teachers already hold most strongly, awareness of music's developmental value, rather than on the indicator that both this study and Zahro (2015) identify as the binding constraint: concrete knowledge of age-appropriate repertoire. A Shulman-style (1986) reading of these results treats general awareness as closer to belief than to pedagogical content knowledge proper, and the regression's strong explanatory power does not distinguish which of the four indicators is doing the explanatory work, since the model as specified aggregates them into a single predictor. Disaggregated modeling, treating each of the four understanding indicators as a separate predictor in a multiple regression, is a direct and low-cost extension of this dataset that would let training resources be targeted rather than distributed evenly across a construct that these results show to be internally uneven.

The theoretical implication concerns which of the two frameworks introduced in Section 2, self-efficacy or pedagogical content knowledge, better accounts for the specific pattern of indicator scores observed here. Self-efficacy theory predicts that belief in music's importance should track a teacher's general willingness to attempt music instruction, consistent with the comparatively high scores on the importance and song-teaching indicators; it does not on its own predict that repertoire-specific knowledge should lag behind general willingness, since efficacy theory treats belief and competence as mutually reinforcing rather than as independently developing components. PCK theory, by contrast, explicitly separates content knowledge from the pedagogical translation of that knowledge, and predicts exactly the pattern found here: broad recognition of a domain's value can precede, sometimes by a considerable margin, the specific representational knowledge needed to teach that domain well. The Arjasari data therefore offer modest but real discriminating evidence in PCK's favor over a pure self-efficacy account, without requiring either framework to be discarded, since the two are not mutually exclusive and the meta-narrative review's integrated competence model (Frontiers meta-narrative review, 2025) treats them as complementary components of a single determinants-and-consequences structure rather than as competing explanations.

Limitations and Directions for Future Research

Five limitations bear directly on how these findings should be used, presented here as an integrated set rather than as a checklist appended after the substantive argument is complete.

The geographic scope is confined to a single district, Arjasari, and the findings should not be generalized to West Java or Indonesia more broadly without replication across regions with different institutional resourcing, teacher-training access, and urban-rural composition; extending the sampling frame to district or provincial level is a direct next step.

The single-instrument, self-report design carries the interpretive costs detailed in Section 5.3, most consequentially the exposure to common method bias when both predictor and outcome are drawn from the same respondent and administration (Podsakoff et al., 2003). Future studies in this line should separate data sources, for example by pairing teacher self-report of understanding with independent classroom observation of practice or direct assessment of children's musical output, following observational protocols already used in comparable international work (Bautista et al., 2018).

The model tests a single predictor against a background literature that models music-teaching quality as multiply determined (Frontiers meta-narrative review, 2025), leaving the unexplained 37.8% of variance unassigned to any specific mechanism. Candidate predictors worth testing directly, rather than left as residual variance, include availability of musical instruments and materials, principal and institutional support, teachers' prior music-specific professional development, and teachers' own musical training history.

The correlational design cannot establish directional causality; a quasi-experimental extension, comparing learning quality before and after a targeted music-pedagogy training intervention along the lines already piloted in Indonesian primary settings by Julia, Hakim, and Fadlilah (2019), would allow a substantially stronger causal claim than the present cross-sectional estimate supports.

Finally, the dependent variable relies on teacher perception rather than direct measurement of children's musical capacity; incorporating rhythm and pitch-discrimination tasks or structured observation of children's participation in musical activity, as recommended in the broader ECE assessment literature, would supply a outcome measure less entangled with the same respondent's report of the predictor.

Conclusion

Three findings anchor this study. Teachers' understanding of music education among RA teachers in Arjasari District sits in the moderately high band ($M = 3.408$), with awareness of music's developmental importance outpacing concrete knowledge of age-appropriate repertoire, indicating a belief that has not yet been matched by specific pedagogical content knowledge. Early childhood learning quality, also moderately high ($M = 3.287$), shows children's appreciative engagement with others' artistic work exceeding their own creative musical production, indicating that classroom practice in this setting currently emphasizes receptive over generative musical activity. Teachers' musical understanding is significantly and strongly associated with reported learning quality ($r = .789$, $R^2 = .622$, $p < .001$), a relationship consistent with self-efficacy and pedagogical-content-knowledge accounts of teacher influence on instructional outcomes, though the cross-sectional, single-informant design of this study restricts that association to a statistical relationship rather than a demonstrated causal mechanism.

These results carry a direct implication for teacher preparation: strengthening RA teachers' specific knowledge of age-appropriate musical repertoire, the lowest-scoring indicator measured, is a more targeted intervention than general exhortation toward the value of music, since teachers in this sample already hold that value with some conviction. They also carry a direct implication for research design in this domain: the field's reliance on single-source, cross-sectional survey measurement, documented at scale in the broader music-teaching-competence literature (Frontiers meta-narrative review, 2025) and reproduced in this study's own methodology, constrains what any individual study in this tradition, including this one, can claim about the direction and mechanism of the relationships it detects. Future work pairing this study's regional estimate with observational or quasi-experimental evidence would

convert a statistically robust association into a more actionable, and more defensible, causal account.

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