

The Influence of Digital Leadership, Pedagogical Competence, and Teachers' Digital Literacy on The Quality of Learning at Raudhatul Athfal in Jambi

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Abstract

This study aims to analyze the influence of digital leadership of Raudhatul Athfal (RA) principals, teachers' pedagogical competence, and teachers' digital literacy on the quality of RA learning in Jambi, while explaining the contextual mechanism connecting these capacities in early childhood learning transformation. The research problem arises from a gap between the growing need to use technology in learning and the uneven capacity of RA institutions and teachers to integrate technology pedagogically, safely, contextually, and developmentally appropriately. The study uses a quantitative explanatory design. The independent variables are digital leadership (X1), pedagogical competence (X2), and teachers' digital literacy (X3), while learning quality is the dependent variable (Y). Data are designed to be collected through Likert-scale questionnaires, structured observations, and documentation in RA institutions in Jambi and analyzed using descriptive statistics, assumption testing, and multiple linear regression. Preliminary findings from four RA institutions in Bungo Regency indicate that 50% of teachers were categorized as good in understanding children's unique needs; frequent use of basic digital devices was only 15.38%; consistent selection of appropriate digital applications for preschool children was reported by 26.92%; a learning environment supporting exploration and collaboration was reported by 34.62%; and creative digital technology use reached 46.15%. The source manuscript does not provide the main research dataset or regression output; therefore, coefficients, significance values, and R^2 are not filled in or presented as empirical findings. At this stage, the defensible main finding is the strong empirical need to test an integrated model of digital leadership, pedagogical competence, and digital literacy as explanatory factors of RA learning quality in Jambi.

Keywords: digital leadership; pedagogical competence; digital literacy; learning quality; Raudhatul Athfal;

INTRODUCTION

Early Childhood Education (ECE) serves as a critical foundation for children's cognitive, social, emotional, moral, and language development (Center on the Developing Child, 2007; Richter et al., 2017). Within the framework of Sustainable Development Goal (SDG) 4.2, global attention to quality preschool services extends beyond mere access to encompass the quality of the learning process and educator capacity (UNESCO, 2024; World Bank, 2022). In the context of Raudhatul Athfal (RA) units in Indonesia, these demands carry distinctive characteristics; learning must be child-centered, play-based, concrete, contextual, safe, and closely aligned with Islamic educational values (Fadlillah & Ratri, 2020) ; Rahman et al., 2022). The research document underlying this revision positions the quality of RA learning as the result of the integration of teacher capabilities, technology utilization, and institutional support (Hidayat & Pratama, 2023).

Digital transformation adds a new layer of complexity to these demands. Teachers are not only required to operate devices but also need to select, evaluate, produce, and use digital resources critically and ethically (Selwyn, 2011; Zhao, 2018). Concurrently, RA principals play a pivotal role as drivers of institutional

change. Digital leadership in this study is conceptualized through five dimensions: digital vision, digital innovation culture, technology support, digital capacity development, and data-based decision-making (Fullan, 2023; Shen et al., 2021). These five dimensions position RA principals not merely as technology users, but as facilitators of organizational change and teacher professional development (García-Morales et al., 2021).

Digital leadership is intrinsically relevant to learning quality because leadership support directly influences teachers' opportunities to learn, experiment, obtain resources, and cultivate a culture of innovation (Tian & Huber, 2019). Empirical studies on digital leadership among school principals demonstrate that digital vision, teacher capacity development, innovation culture, and technology support are critical elements associated with learning transformation (Hallinger & Heck, 1999). Furthermore, quantitative research in the Indonesian context has established a significant relationship between principals' technology leadership, school digital culture, and teachers' professional digital competence (Hidayat & Pratama, 2023; Ridho et al., 2022). These findings broaden the focus of RA research, which has historically positioned teachers as the primary, isolated unit of analysis.

On the teacher side, pedagogical competence remains the fundamental bedrock of learning quality. This competence encompasses understanding children's characteristics, planning play-based learning, selecting strategies and media, implementing active learning, and authentically assessing development (Maulana et al., 2021; Strong et al., 2022). The theoretical perspective of Pedagogical Content Knowledge (PCK) emphasizes that teaching quality depends not only on the mastery of content or pedagogy in isolation but on the ability to integrate both into representations and strategies that are comprehensible and meaningful to learners (Dejaeghere et al., 2023; Depaepe et al., 2010).

Digital literacy complements this pedagogical competence. In the RA context, digital literacy must not be reduced to the mere technical ability to use applications. Teachers must be capable of selecting child-friendly content, assessing the suitability of media for specific developmental stages, integrating technology with play and direct interaction, protecting children's data security, and guiding the use of digital media (Chaudron et al., 2015; Yildiz Durak, 2021). The Technological Pedagogical Content Knowledge (TPACK) framework provides a robust explanation for this, positing that effective technology integration occurs when technological, pedagogical, and content knowledge are seamlessly combined in a contextually appropriate manner (Chai et al., 2013; Koh et al., 2014).

The empirical phenomenon observed in four RAs in Bungo Regency reveals a significant gap between these theoretical demands and actual classroom practice. The initial survey indicated that while 50% of teachers were categorized as proficient in understanding children's unique needs, the adaptation of teaching methods to multilingual and multicultural contexts was consistently implemented by only 3.85% of respondents. In the digital domain, the frequent use of basic digital devices was recorded at merely 15.38%, and the consistent selection of appropriate digital applications for preschool learners stood at only 26.92%. Regarding learning quality, an environment supporting exploration and collaboration was observed in 34.62% of cases, creative use of digital technology in 46.15%, and children's active participation as users or creators of digital content was consistently achieved by only 3.85%. These preliminary data strongly indicate that the mere presence of technology does not automatically translate into high-quality learning experiences.

A critical research gap emerges from previous studies. Prior literature has largely examined pedagogical competence and digital literacy as isolated constructs, while studies on digital leadership have predominantly been conducted at the general primary or secondary school levels. For instance, Putra et al. (2022) demonstrated a positive relationship between digital literacy and pedagogical competence among early childhood education teachers; however, their context and research design did not elucidate an integrated model of three factors affecting RA learning quality. Similarly, while studies on digital leadership have highlighted the importance of vision, innovation culture, and teacher capacity development (Fullan, 2023;

Shen et al., 2021), they have not specifically tested these constructs in conjunction with pedagogical competence and digital literacy within the unique context of RAs in Jambi.

Therefore, this research possesses distinct characteristics and novelty at two levels. First, substantively, the study positions RA principals and teachers within a single, cohesive framework that connects digital leadership, pedagogical competence, and digital literacy with learning quality. Second, contextually, the research is specifically directed at RAs in Jambi, which possess unique characteristics as Islamic early childhood education services with technology integration demands that differ significantly from elementary or secondary schools. Thus, this research does not merely introduce a new variable; rather, it tests the hypothesis that learning quality is the result of a holistic ecosystem: supportive leadership, pedagogically competent teachers, and digitally literate educators (Fullan et al., 2017; Hargreaves & Shirley, 2021).

Based on the identified empirical and theoretical gaps, the specific research objectives are: (1) to analyze the effect of RA principals' digital leadership on learning quality; (2) to analyze the effect of teachers' pedagogical competence on learning quality; (3) to analyze the effect of teachers' digital literacy on learning quality; and (4) to analyze the simultaneous effect of all three variables on the quality of RA learning in Jambi.

METHOD

Research Design and Approach

This study employs a quantitative approach with an explanatory design. This design was selected to test causal relationships and numerically explain the effects among variables (Creswell & Creswell, 2017). The independent variables consist of the digital leadership of RA principals (X1), teachers' pedagogical competence (X2), and teachers' digital literacy (X3), while the dependent variable is the quality of RA learning (Y).

Research Location

The research was conducted at Raudhatul Athfal (RA) institutions located in Bungo Regency, Jambi Province. Based on preliminary studies, the research locations were focused on four RAs: RA Nurul Huda (Jl. Danau Towuti), RA Nurul Huda (Jl. Jakarta), RA Darussalam (Dusun Lubuk), and RA Miftahul Huda (Jl. Batang Hari).

Population and Sample

The population of this study comprises all teachers and RA principals at the four researched institutions. Based on preliminary data, there are 35 teachers and 4 RA principals. Because the population size is less than 100, the sampling technique used is *total sampling* (census), where all members of the population are included as the research sample (Sekaran & Bougie, 2016; Sugiyono, 2022). Thus, the total sample in this study is 39 respondents.

Operational Definitions and Variable Indicators

Variable measurement was conducted through operational definitions translated into measurable indicators (DeVellis & Thorpe, 2021):

1. Digital Leadership of RA Principals (X1): Digital vision, digital innovation culture, technology support, digital capacity development, and data-based decision-making.
2. Teachers' Pedagogical Competence (X2): Understanding children's characteristics, presenting material according to developmental levels, play-based learning, PCK integration, active learning, and authentic assessment.
3. Teachers' Digital Literacy (X3): Devices/applications, digital sources and media, selection of child-friendly content, play-based learning, technology integration, developmental stimulation, digital ethics, and child guidance.

4. Quality of RA Learning (Y): Developmentally appropriate planning, child-centered learning, humanistic educational interaction, learning methods/media/environment, and continuous assessment.

Instruments and Data Collection Techniques

Data were collected using closed-ended questionnaires with a 1–5 Likert scale (Strongly Disagree to Strongly Agree), structured observation sheets, and documentation studies (Creswell & Creswell, 2017).

Instrument Validity and Reliability Testing

Prior to the main data collection, the instrument was pilot-tested.

1. Content Validity: Conducted through *expert judgment* to ensure the alignment of indicators.
2. Empirical Validity: Tested using the Pearson Product Moment correlation (*item-total correlation*). An item is considered valid if $r_{count} > r_{table}$ (Ghozali, 2021).
3. Reliability: Tested using *Cronbach's Alpha*. The instrument is considered reliable if the Alpha value ≥ 0.70 (Hair et al., 2019).

Research Implementation Procedures

To ensure the orderliness and validity of the research process, the following step-by-step procedures were applied:

1. Pre-Research Stage: Conducting initial observations at the 4 RAs in Bungo Regency to identify problems and collect population demographic data.
2. Instrument Development Stage: Developing the instrument grid based on indicators, drafting the questionnaire, conducting *expert judgment*, and pilot-testing the instrument for validity and reliability.
3. Data Collection Stage: Distributing the final questionnaire to 35 teachers and 4 RA principals (total sampling), as well as conducting structured observations and collecting school documents.
4. Data Analysis Stage: Performing scoring, coding, and data entry into IBM SPSS Statistics 25, followed by classical assumption tests and hypothesis testing.
5. Reporting Stage: Interpreting the statistical analysis results and drafting the discussion and conclusion chapters.

Data Analysis Techniques

Data analysis was conducted using IBM SPSS Statistics 25 with the following stages (Field, 2024; Ghozali, 2021):

1. Descriptive Analysis

Used to describe respondent characteristics and variable scores through mean, standard deviation, minimum, and maximum values.

2. Classical Assumption Tests

Before conducting regression, the data must meet the following assumptions:

- 1). Normality Test: Conducted using the *Kolmogorov-Smirnov* test. Data is normally distributed if the significance value > 0.05 .
- 2). Linearity Test: Conducted using the *Deviation from Linearity* test. A linear relationship exists if the significance value > 0.05 .
- 3). Multicollinearity Test: Assessed using *Tolerance* and VIF (*Variance Inflation Factor*) values. Free from multicollinearity if *Tolerance* > 0.10 and VIF < 10 .

- 4). Heteroscedasticity Test: Tested using the *Glejser* method. Free from heteroscedasticity if the significance value $>0.05 > 0.05$.

3. Multiple Linear Regression Analysis

To test the effect of the independent variables on the dependent variable, the following regression equation was used: $Y = a + b_1X_1 + b_2X_2 + b_3X_3$ Where: Y = Quality of Learning; a = Constant; b_1, b_2, b_3 = Regression coefficients; X_1, X_2, X_3 = Independent variables.

Hypothesis Testing

1. Partial Test (t-test): Tests the effect of each independent variable individually. Criteria: significance $<0.05 < 0.05$ and $t_{count} > t_{table}$.
2. Simultaneous Test (F-test): Tests the effect of all independent variables simultaneously. Criteria: significance $<0.05 < 0.05$.
3. Coefficient of Determination (R^2): Measures the extent to which the model can explain the variation in the dependent variable.

RESULTS AND DISCUSSION

Pre-Research Findings

A preliminary study was conducted across four Raudhatul Athfal (RA) institutions in Bungo Regency to identify empirical gaps and justify the research model. The observational and initial survey results are summarized in Table 1.

Table 1. Summary of Pre-Research Findings on Pedagogical and Digital Practices

Indicator	Percentage	Interpretation / Category
Understanding children's unique needs	50.00%	Adequate
Designing activities according to development (<i>Always</i>)	23.08%	Low
Designing activities according to development (<i>Often</i>)	61.54%	High
Adapting methods for multilingual/multicultural contexts (<i>Always</i>)	3.85%	Very Low
Using basic digital devices (<i>Often</i>)	15.38%	Low
Searching and filtering digital information (<i>Often</i>)	50.00%	Moderate
Choosing appropriate digital apps for preschool (<i>Always</i>)	26.92%	Suboptimal
Environment supporting exploration and collaboration	34.62%	Inconsistent
Creative use of digital technology	46.15%	Emerging but uneven
Children's participation as users/content creators (<i>Always</i>)	3.85%	Very Limited
Students' enthusiasm for learning with technology	26.92%	Limited

Note. Percentages represent the proportion of respondents/observations meeting the specific indicator criteria.

The pre-research findings reveal a critical dichotomy in early childhood education (ECE) practices. Basic pedagogical foundations are present, yet their implementation remains uneven, particularly in adapting to diverse cultural and linguistic contexts (only 3.85%). Furthermore, while digital technology is present, its integration is superficial; basic device usage is low (15.38%), and the selection of developmentally appropriate applications is suboptimal (26.92%). Crucially, children's active participation as digital content creators is severely limited (3.85%), indicating that technology is predominantly used for one-way instruction rather than interactive, exploration-based learning. These empirical gaps substantiate the necessity of examining digital leadership (X_1), pedagogical competence (X_2), and digital literacy (X_3) as interconnected drivers of learning quality (Y).

Hypothesis Testing Status

To maintain methodological transparency and prevent the fabrication of empirical claims, the status of the hypothesis testing is explicitly documented. The inferential statistics cannot be reported at this stage as the primary dataset has not yet been processed through IBM SPSS Statistics 25.

Table 2. *Status of Hypothesis Testing and Required Statistical Outputs*

Hypothesis	Required Statistical Analysis	Current Status in Manuscript
H1: $X_1 \rightarrow Y$ (Digital Leadership $\rightarrow$ Learning Quality)	Partial test (t -test), regression coefficient (b_1b_1), p -value	<i>Pending primary data output</i>
H2: $X_2 \rightarrow Y$ (Pedagogical Competence $\rightarrow$ Learning Quality)	Partial test (t -test), regression coefficient (b_2b_2), p -value	<i>Pending primary data output</i>
H3: $X_3 \rightarrow Y$ (Digital Literacy $\rightarrow$ Learning Quality)	Partial test (t -test), regression coefficient (b_3b_3), p -value	<i>Pending primary data output</i>
H4: $X_1, X_2, X_3 \rightarrow Y$ (Simultaneous effect)	Simultaneous test (F-test), Coefficient of Determination (R^2R^2), p -value	<i>Pending primary data output</i>

Note. Once the primary data collection and processing are complete, this table will be replaced with the actual SPSS output, including coefficients, t -values, F-values, significance levels, and R^2R^2 .

DISCUSSION

The discussion is structured to hierarchically connect preliminary field findings with established theories and recent empirical literature. The flow progresses from empirical observations to theoretical meaning, contextualizing the findings within the RA environment, and outlining the anticipated empirical interpretations pending the final regression output.

Digital Leadership and Learning Quality

Conceptually, a principal's digital leadership influences learning quality by establishing a strategic vision, fostering an innovation culture, and providing targeted capacity building (Fullan, 2023). The pre-research data highlights that technology issues in RA extend beyond mere device availability; low frequencies in digital device usage (15.38%) and suboptimal application selection (26.92%) indicate a lack of organizational direction. Teachers require institutional scaffolding to transform technological access into meaningful pedagogical practices.

Recent studies by Timan et al. (2021) and Ridho et al. (2022) demonstrate that digital leadership is intrinsically linked to teacher performance and serves as a catalyst for technology-based educational transformation. However, applying this to the RA context requires nuance, as early childhood education demands highly selective, developmentally appropriate technology use rather than ubiquitous integration.

Anticipated Empirical Interpretation: If the regression output confirms H1, the discussion will emphasize that digital leadership functions as an *enabling condition* that empowers teachers, rather than replacing their instructional agency. If H1 is not supported, the discussion will investigate whether the variance in digital leadership is sufficient, or if mediating factors such as infrastructural constraints or entrenched school cultures dilute the leadership effect.

Pedagogical Competence and Learning Quality

The pre-research indicates that while 50% of teachers adequately understand children's unique needs and 84.62% frequently design developmentally appropriate activities, only 3.85% consistently adapt methods

for multilingual and multicultural contexts. This disparity suggests that pedagogical competence is not a monolithic construct; its dimensions vary significantly in execution.

This pattern is best explained through the lens of Pedagogical Content Knowledge (PCK). Teachers may possess general pedagogical knowledge but struggle to adapt their instructional representations to accommodate diverse learner profiles (Grossman et al., 2009). Veliz et al. (2025) and Oliver-Barceló et al. (2026) emphasize that pedagogical competence in ECE must be continuously developed through contextually appropriate learning resources.

Anticipated Empirical Interpretation: Should the inferential results support H2, the discussion will highlight that the quality of pedagogical implementation specifically play-based planning, differentiated interaction, and authentic assessment drives learning quality more than mere competency test scores. The study contributes to the literature by linking these foundational pedagogical competencies directly to digital integration within the RA ecosystem.

Digital Literacy and Learning Quality

While basic digital device usage remains low (15.38%), the ability to search and filter digital information is moderate (50.00%). This indicates that teachers possess foundational information literacy but struggle to translate these skills into developmentally appropriate learning designs. The selection of appropriate applications (26.92%) and children's active participation as content creators (3.85%) remain critically low.

Khotimah and Reza (2023) position digital literacy as a critical capacity that underpins both the pedagogical and professional competencies of ECE teachers. Furthermore, the Technological Pedagogical Content Knowledge (TPACK) framework asserts that technology only yields pedagogical value when seamlessly integrated with pedagogical and content knowledge (Koh et al., 2014). Therefore, digital literacy in this context must be interpreted as the capacity to design meaningful learning experiences, not merely the frequency of device operation.

Anticipated Empirical Interpretation: If H3 is supported, the discussion will argue that mature digital literacy shifts the paradigm from "consuming media" to "co-constructing knowledge." The significant gap between creative technology use by teachers (46.15%) and children's active participation (3.85%) will be highlighted as a critical area for intervention, emphasizing the need for age-appropriate, interactive digital pedagogies.

Simultaneous Influences: The Leadership Teacher Technology Ecosystem

The proposed research model conceptualizes digital leadership, pedagogical competence, and digital literacy as complementary, multi-layered constructs. Drawing on Ecological Systems Theory applied to education (Edwards et al., 2021), digital leadership operates at the macro-organizational level, while pedagogical competence and digital literacy operate at the micro-teacher level. Learning quality is the resultant manifestation of classroom practices.

Research in the Indonesian context indicates that leadership support is a prerequisite for cultivating a digital culture and enhancing teacher competence (Ridho et al., 2022). In the RA context, this relationship is symbiotic: the principal provides the strategic direction and resources, which teachers translate into practice through their pedagogical and digital competencies. This ecosystem model explains why isolated interventions, such as providing hardware without leadership or training, fail to improve learning quality.

Anticipated Empirical Interpretation: Once the F-test and R² values are available, the discussion will quantify the model's explanatory power. The variance in learning quality explained by the model will be related to the dominant indicators of each variable. Unexplained variance will be theoretically attributed to external ecological factors (e.g., parental involvement, infrastructure, community culture) rather than methodological error.

Existing literature consistently affirms that pedagogical competence is vital for ECE quality, digital literacy is essential for educational transformation, and digital leadership drives organizational change. However, the integration of these three constructs within the specific context of Islamic early childhood education (RA) remains underexplored. This study bridges this gap by testing a comprehensive model that links organizational leadership and teacher capacity to a singular outcome: the quality of RA learning in Jambi.

Theoretically, this research shifts the discourse on RA learning quality from an isolated, individual-competency perspective to a holistic, ecosystem perspective. Practically, it provides an evidence-based framework for differentiated interventions, demonstrating that leadership vision, pedagogical training, and digital literacy must be synergized rather than treated as standalone programs

Implications of the Research

The findings of this study have implications for institutional leadership, teacher professional development, educational policy, and the implementation of developmentally appropriate practices in early childhood education. At the institutional level, digital leadership development should extend beyond the procurement of technological devices. Principals of Raudhatul Athfal (RA) institutions need to develop a clear digital vision, foster a culture that supports safe pedagogical experimentation, and utilize relevant data to inform reflective decision-making. Accordingly, institutional attention should shift from increasing the quantity of technological resources toward ensuring that technology is meaningfully aligned with children's developmental needs and early childhood educational goals.

The findings also highlight the importance of continuous professional development (CPD) for RA teachers. Professional development programs should integrate early childhood education pedagogy with relevant digital competencies, enabling teachers to design technology-assisted play-based learning activities, evaluate age-appropriate and child-friendly digital content, protect children's digital privacy, and use technology to support authentic and formative assessment. At the policy and supervision level, educational authorities and foundation boards may consider leadership, pedagogical practice, and digital literacy as complementary dimensions for institutional monitoring, accreditation, and professional support. Such a framework could facilitate more targeted interventions that reflect the contextual conditions of individual RA institutions rather than relying exclusively on uniform technology-oriented mandates.

A further implication concerns the principle of developmentally appropriate practice (DAP). Technology integration in early childhood education should remain selective and complementary rather than replacing fundamental developmental experiences. Unstructured play, physical exploration, manipulation of real-world objects, and meaningful human interaction remain essential components of early childhood learning. Therefore, digital technology should be positioned as a supplementary pedagogical resource that enhances learning opportunities while preserving the developmental, social, emotional, and physical dimensions of early childhood education.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the primary dataset and corresponding regression outputs were not yet available at the preliminary stage of the research; therefore, definitive inferential conclusions regarding the proposed relationships could not be established until the complete empirical analysis was conducted. Second, the contextual scope of the preliminary investigation was limited to four RA institutions in Bungo Regency. Consequently, the findings should not be generalized to all RA institutions in Jambi Province or to the broader national context without further empirical evidence from more diverse settings.

Third, the study relied substantially on self-report questionnaires, which may introduce perceptual and social desirability biases. Although structured observations and documentary evidence were incorporated

to provide additional information, self-reported responses may still reflect respondents' subjective perceptions. Fourth, the cross-sectional explanatory design provides evidence concerning statistical relationships within a specific period but does not permit strong conclusions regarding long-term causal mechanisms or changes in digital leadership and pedagogical practices over time. Finally, the analytical model did not incorporate several potentially relevant contextual factors, including the quality of digital infrastructure, parental involvement in children's digital experiences, the intensity and quality of previous professional development, and institution-specific policies. These omitted factors may contribute to the unexplained variation in learning quality and should therefore be considered in subsequent investigations.

Future Research Directions

Future research can extend the present study through methodological, contextual, and theoretical development. Longitudinal research would be particularly useful for examining whether improvements in digital leadership and teacher digital competency are sustained over time and whether they are accompanied by changes in educational practices and learning quality. Future studies may also employ Structural Equation Modeling (SEM), including covariance-based SEM or partial least squares SEM, when the research model and sample characteristics adequately support such analyses. Such approaches could be used to examine more complex relationships, including potential mediating or moderating roles of variables such as school culture and teacher self-efficacy.

Future investigations should also broaden the geographical and institutional scope of the research by involving RA institutions from different settings within Jambi Province and other regions. Comparative studies involving urban, semi-urban, and rural institutions could provide greater insight into context-specific differences in technological access and digital implementation. In addition, qualitative and mixed-methods approaches could provide deeper explanations of why institutions with relatively similar technological resources may demonstrate different patterns of digital pedagogical practice. Direct classroom observations, video-based analysis, and validated learning-quality rubrics could further reduce dependence on self-reported data. Finally, future research should consider emerging dimensions of digital integration in early childhood education, including children's digital safety and well-being, ethical and developmentally appropriate uses of artificial intelligence, and the development of institutional cultures that support responsible educational innovation.

CONCLUSION

This study developed a model to examine the influence of RA principals' digital leadership, teachers' pedagogical competence, and teachers' digital literacy on the quality of RA learning in Jambi. Pre-research findings indicate a gap between digital learning demands and actual practices, particularly in the use of digital devices, the selection of child-appropriate applications, exploratory-collaborative environments, and children's participation in digital activities. This gap in previous research also indicates that these three factors have not been extensively tested in an integrated manner in the RA context.

Inferential conclusions regarding significance and effect size cannot be established from the available files because the primary research regression output has not been included. After the primary data have been analyzed, the final conclusion should include the coefficients of each variable, *t*- and *p*-values, the model's *F*-value, *R*², and implications based on the strongest and weakest indicators. This reporting principle is maintained to prevent the inclusion of figures that are not derived from the research data.

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