



Enhancing Kindergarten Teachers' Pedagogical Competence through the Academic Qualification Fulfillment Program (PKA): Integrating Institutional Support, Digital Literacy, and Andragogical Learning

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Abstract

The Academic Qualification Fulfillment Program (PKA) is a strategic initiative designed to upgrade the academic qualifications of kindergarten teachers while strengthening their professional competence. However, empirical evidence explaining how institutional support, digital literacy, and andragogical learning collectively contribute to pedagogical competence remains limited. This study examined how the PKA enhances kindergarten teachers' pedagogical competence by integrating these three dimensions within a unified analytical framework. A sequential explanatory mixed-methods design was employed. Quantitative data were collected from 140 kindergarten teachers through structured questionnaires and analyzed using descriptive statistics and multiple regression analysis. The quantitative findings were subsequently elaborated through semi-structured interviews with 20 teachers and focus group discussions involving LPTK lecturers and program administrators, with qualitative data analyzed using thematic analysis. The findings demonstrate that the PKA substantially improves teachers' pedagogical competence through the complementary interaction of institutional support, digital literacy, and andragogical learning. Academic mentoring provided by LPTK strengthened instructional capability, while digital literacy facilitated continuous professional learning and the application of innovative teaching practices. Learning activities grounded in andragogical principles further promoted reflective, self-directed, and experience-based professional development. The study contributes to teacher professional development literature by integrating institutional, technological, and adult-learning perspectives into a comprehensive model of pedagogical competence enhancement. These findings provide practical guidance for policymakers and teacher education institutions seeking to improve the effectiveness and sustainability of teacher qualification programs.

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INTRODUCTION

The quality of early childhood education has become an increasingly important concern in global educational policy because experiences during the early years substantially influence children's cognitive, social, emotional, and linguistic development throughout later stages of life. Within this context, kindergarten teachers occupy a strategic position as they are responsible for creating developmentally appropriate learning environments that foster children's holistic growth (Kim et al., 2024; Larsen et al., 2025). Consequently, improving teachers' professional competence has become a central agenda in many countries seeking to strengthen educational quality and achieve sustainable human development (Zickafoose et al., 2024). Although governments have continuously expanded teacher certification, professional development, and qualification-upgrading initiatives, concerns remain regarding whether formal qualification improvement genuinely translates into enhanced pedagogical practice in classrooms (Rahman, 2021). Previous studies consistently demonstrate that teachers' pedagogical competence is closely associated with instructional quality,

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children's learning experiences, and long-term educational outcomes (Huang et al., 2024; Lauermann & ten Hagen, 2021). Nevertheless, evidence from many developing education systems suggests that raising academic qualifications alone does not automatically guarantee improvements in instructional effectiveness because professional growth is simultaneously shaped by institutional support, learning opportunities, and teachers' individual capacities (Vadivel et al., 2021; Zhai, 2024). These conditions indicate that strengthening teacher qualifications should be understood not merely as an administrative requirement but as a comprehensive professional learning process that integrates academic development with practical pedagogical improvement.

Indonesia faces a similar challenge despite continuous governmental efforts to improve teacher professionalism through educational reform. Law Number 14 of 2005 requires every teacher to possess at least a bachelor's degree or an equivalent Diploma IV qualification; however, a considerable proportion of early childhood educators still do not meet this minimum academic standard. Government data indicate that a substantial number of kindergarten teachers continue to serve without the required qualifications, creating disparities in instructional quality across educational institutions. This situation is particularly concerning because previous empirical studies have demonstrated that teachers' academic qualifications significantly influence pedagogical competence, instructional decision-making, and overall professionalism (Akiba et al., 2023; Tatto, 2021). Other studies further reveal that kindergarten teachers frequently experience difficulties in curriculum implementation, learning assessment, and designing developmentally appropriate classroom activities, despite participating in various professional development initiatives. These findings suggest that qualification deficiencies remain closely intertwined with broader issues concerning institutional capacity, continuous professional learning, and instructional quality (Liu et al., 2024; Singun, 2025). Therefore, understanding how qualification-upgrading programs contribute to pedagogical competence has become increasingly important for strengthening the effectiveness of early childhood education policies in Indonesia.

The Indonesian government introduced the Academic Qualification Fulfillment Program (PKA) as a strategic policy to address this qualification gap while simultaneously improving teachers' professional competence. Unlike conventional in-service training that often emphasizes short-term competency enhancement, PKA enables in-service kindergarten teachers to pursue formal undergraduate education through accredited Teacher Education Institutions (Sinsay-Villanueva et al., 2025). This policy reflects the assumption that sustained academic learning provides broader opportunities for teachers to integrate educational theory, classroom experience, and reflective practice into their professional development (Darling-Hammond et al., 2024; Resch & Schritteser, 2023). From the perspective of Human Capital Theory, investment in teachers' educational qualifications represents a long-term strategy for improving instructional quality because higher educational attainment enhances knowledge, professional judgment, and adaptive capacity in increasingly complex educational environments (Deva et al., 2025; Strielkowski et al., 2025). However, international evidence also suggests that qualification upgrading alone rarely produces substantial improvements unless accompanied by supportive institutional environments and meaningful learning experiences throughout the educational process (Sliwka et al., 2023). Consequently, the effectiveness of PKA should not be evaluated solely by the number of teachers obtaining bachelor's degrees but also by examining whether the program successfully develops pedagogical competence through appropriate academic support and professional learning mechanisms (Caena & Vuorikari, 2022; Tammets & Ley, 2023). This perspective highlights the importance of investigating PKA as a comprehensive professional development system rather than merely a credential-awarding initiative.

Beyond formal academic qualifications, contemporary educational transformation increasingly requires teachers to possess sufficient digital literacy to engage in continuous professional learning and innovative classroom practice. Rapid technological development has fundamentally changed how teachers access educational resources, collaborate with professional communities, communicate with parents, and design learning experiences that respond to children's developmental needs (Bedel et al., 2024; Rahimi & Oh, 2024). Studies conducted in different educational contexts consistently demonstrate that digital literacy strengthens teachers' ability to participate in lifelong learning while simultaneously enhancing instructional creativity and classroom effectiveness (Temirkhanova et al., 2024). For early childhood educators specifically,

digital competence extends beyond technical proficiency because teachers must critically evaluate digital resources, create age-appropriate learning materials, maintain ethical standards in technology use, and establish productive communication with families (Gorla et al., 2026). Nevertheless, technological competence alone cannot ensure meaningful professional growth if learning activities fail to acknowledge teachers' prior experiences and professional responsibilities as adult learners (McChesney & Aldridge, 2021). Since participants in PKA are experienced in-service teachers rather than novice university students, the effectiveness of qualification upgrading depends substantially on the extent to which learning processes reflect adult-learning principles that promote autonomy, reflection, collaboration, and problem-solving (Tachie, 2026; Wang et al., 2025). Therefore, examining the interaction among institutional support, digital literacy, and andragogical learning principles provides an important foundation for understanding how qualification-upgrading programs can generate sustainable improvements in kindergarten teachers' pedagogical competence rather than merely fulfilling administrative qualification requirements.

Although research on teacher qualification, professional development, and pedagogical competence has expanded considerably over the past decade, existing evidence remains fragmented in explaining how these factors interact within formal qualification-upgrading programs for early childhood teachers. Previous studies have consistently reported that higher academic qualifications contribute positively to teacher professionalism and pedagogical competence (López-Martín et al., 2023; Moreira et al., 2023), while other investigations have demonstrated that structured professional development and academic supervision improve teachers' instructional practices and reflective abilities (Asregid, 2025; Bergmark, 2023). A growing body of literature has also emphasized the importance of digital literacy in strengthening teachers' participation in technology-supported professional learning and classroom innovation (Agbale & Edusei-Mensah, 2025; Xu & Xie, 2025). At the same time, studies examining adult learning have shown that andragogical principles significantly enhance the effectiveness of continuing professional education by promoting self-directed learning, reflective practice, and experiential knowledge construction (Colomer et al., 2021; Irshad, 2025; Mohiyeddini, 2024). More recent investigations further argue that institutional mentoring, collaborative learning environments, and sustained academic support are essential conditions for transforming teachers' educational experiences into meaningful professional competence (Hussain et al., 2025). Collectively, these studies confirm that teacher competence develops through multiple interrelated dimensions rather than through isolated educational interventions. Nevertheless, most existing research has examined these dimensions independently, leaving limited understanding of how they collectively influence pedagogical competence within a structured qualification-upgrading program such as PKA.

Despite these valuable contributions, several important limitations remain unresolved in the current literature. First, most previous studies have concentrated on evaluating either teacher qualifications, institutional support, digital literacy, or professional development separately, with relatively little attention given to their combined influence within a single analytical framework. Second, empirical studies specifically focusing on the Academic Qualification Fulfillment Program (PKA) remain scarce, particularly those investigating how Teacher Education Institutions (LPTK), digital literacy, and andragogical learning principles simultaneously contribute to the pedagogical competence of kindergarten teachers (Fahimah, 2026). Third, although andragogy has been widely recognized as an appropriate learning approach for adult professionals (Bowling & Henschke, 2020; Fogelberg, 2023), its integration into teacher qualification-upgrading policies has received limited empirical examination, especially within the Indonesian early childhood education context. Finally, previous studies have generally relied on either quantitative or qualitative approaches, making it difficult to capture both the magnitude of competence development and the underlying mechanisms explaining why such development occurs (Xi & Lantolf, 2021). These limitations reveal a clear research gap indicating the need for a more integrated investigation that simultaneously examines institutional support, digital literacy, and andragogical learning within the implementation of PKA. Addressing this gap is expected to provide a more comprehensive explanation of how qualification-upgrading programs foster sustainable pedagogical competence among kindergarten teachers while extending current theoretical discussions on teacher professional development, adult learning, and educational capacity building.

Building upon these considerations, this study aims to examine how the Academic Qualification Fulfillment Program (PKA) enhances the pedagogical competence of kindergarten teachers by analyzing the interrelated roles of Teacher Education Institutions (LPTK), digital literacy, and andragogical learning principles within a single conceptual framework. Specifically, the study investigates teachers' perceived improvement in pedagogical competence following participation in PKA, evaluates the extent to which institutional support provided by LPTK facilitates this improvement, explores how teachers' digital literacy contributes to professional learning, and identifies the supporting and constraining factors influencing the implementation of andragogical learning throughout the program. Methodologically, the study adopts a mixed-methods sequential explanatory design, allowing quantitative findings to be complemented by qualitative evidence that explains the processes underlying teachers' professional development. Theoretically, this research extends existing scholarship by integrating Pedagogical Content Knowledge Theory Thyssen et al. (2023), Desimone's Professional Development Framework (Desimone, 2009), the DigComp Digital Competence Framework, Human Capital Theory, and andragogical learning theory into a comprehensive analytical model for evaluating teacher qualification-upgrading programs. Unlike previous studies that have largely examined institutional support, digital literacy, or adult learning as separate determinants of teacher competence, this study conceptualizes these elements as mutually reinforcing components operating within the same professional development system. From a practical perspective, the findings are expected to provide evidence-based recommendations for policymakers, LPTKs, and educational administrators in improving the design and implementation of qualification-upgrading programs for early childhood educators. Ultimately, this study contributes to the broader discourse on teacher professional development by demonstrating that sustainable pedagogical competence is more likely to emerge when academic qualification upgrading is supported by high-quality institutional mentoring, strong digital capacity, and learning environments that recognize teachers as experienced adult professionals. Such an integrated perspective offers a more holistic foundation for strengthening the quality of early childhood education in Indonesia and may also inform similar teacher qualification initiatives implemented in other developing educational contexts.

METHOD

Research Design

This study employed a mixed-methods approach using a sequential explanatory design, in which quantitative data were collected and analyzed during the first phase, followed by qualitative data collection to explain and enrich the statistical findings (Creswell & Plano Clark, 2018). This design was selected because the study sought not only to determine the extent to which the Academic Qualification Fulfillment Program (PKA) improved kindergarten teachers' pedagogical competence but also to understand the mechanisms through which institutional support, digital literacy, and andragogical learning contributed to that improvement. The quantitative phase provided empirical evidence regarding teachers' perceptions of pedagogical competence, the role of Teacher Education Institutions (LPTK), digital literacy, and the implementation of andragogical principles, whereas the qualitative phase offered contextual explanations for the observed statistical patterns. Integrating both forms of evidence enabled a more comprehensive understanding of the complex interactions among the investigated variables than could be achieved through a single-method approach.

Research Setting

The study was conducted at Universitas Al Azhar Indonesia, one of the Teacher Education Institutions (LPTK) officially appointed to implement the Academic Qualification Fulfillment Program (PKA) for kindergarten teachers. Data collection took place between February and June 2026, during the implementation of the academic semester in which participants attended lectures, academic mentoring sessions, and professional development activities. This setting was selected because it represents one of Indonesia's formal qualification-upgrading programs specifically designed for in-service kindergarten teachers who previously had not fulfilled the minimum academic qualification required by national education policy. Conducting the research within an

active PKA cohort allowed the researchers to examine participants' learning experiences throughout the qualification-upgrading process.

Participants and Sampling

The target population consisted of approximately 11,000 kindergarten teachers enrolled in the Academic Qualification Fulfillment Program administered by Universitas Al Azhar Indonesia. Using the Slovin sampling formula with a 95% confidence level, a quantitative sample of 140 teachers was selected through proportional random sampling. Eligible participants were teachers actively enrolled in the PKA program, had at least one year of teaching experience in kindergarten education, and agreed voluntarily to participate in the study. Teachers who had not completed the questionnaire or withdrew during data collection were excluded from the analysis. Following the quantitative phase, 20 teachers were purposively selected for semi-structured interviews based on their pedagogical competence scores to represent high-, moderate-, and low-performing groups. In addition, five LPTK lecturers and five program administrators participated in focus group discussions to provide institutional perspectives regarding the implementation of PKA and the application of andragogical learning principles.

Research Instruments

Data were collected using structured questionnaires, semi-structured interview guides, focus group discussion protocols, and supporting institutional documents. The questionnaire employed a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) and consisted of four principal constructs. Pedagogical competence was measured through indicators covering learner understanding, instructional planning, classroom implementation, and learning assessment based on national teacher competency standards and the Pedagogical Content Knowledge framework (Shulman, 1987). The role of LPTK was assessed through indicators related to curriculum relevance, lecturer quality, academic supervision, learning facilities, mentoring, and institutional support. Digital literacy indicators were adapted from the DigComp framework (Ferrari, 2012), including information literacy, digital communication, content creation, responsible technology use, and digital problem-solving. The implementation of andragogical learning was measured using indicators reflecting learner autonomy, experiential learning, reflective practice, collaborative learning, problem-based learning, and professional relevance, derived from Knowles' principles of adult learning (Knowles, 1984). Semi-structured interviews and focus group discussions were designed to explore participants' experiences, perceptions, and explanations regarding the quantitative findings.

Instrument Validity and Reliability

Prior to data collection, all research instruments underwent a rigorous validation process to ensure their content validity, construct appropriateness, and measurement consistency. Content validity was evaluated by three experts specializing in early childhood education, teacher professional development, and educational research methodology. Their recommendations were incorporated to improve item clarity, contextual relevance, and conceptual alignment with the research objectives. A pilot study involving 30 kindergarten teachers with characteristics similar to the target participants was subsequently conducted to evaluate the psychometric properties of the questionnaire. Internal consistency reliability was examined using Cronbach's Alpha, with all constructs exceeding the recommended threshold of 0.70, indicating satisfactory reliability. Construct validity was further examined through corrected item-total correlations, and all retained items demonstrated acceptable correlation coefficients above the minimum recommended value. These procedures ensured that the research instruments were both valid and reliable for measuring the intended constructs.

Data Collection Procedures

Data collection was conducted sequentially in accordance with the explanatory mixed-methods design. During the quantitative phase, validated questionnaires were distributed to the selected teachers after obtaining informed consent and institutional approval. The completed questionnaires were screened for completeness before being entered into the statistical database. Following the quantitative analysis, participants representing different levels of pedagogical competence were purposively selected for the qualitative phase. Semi-structured interviews were conducted individually to obtain in-depth explanations of teachers' learning experiences throughout

the PKA program, while focus group discussions with LPTK lecturers and program administrators explored institutional practices, implementation challenges, and supporting factors influencing program effectiveness. All interviews and discussions were audio-recorded with participants' permission, transcribed verbatim, and anonymized to maintain confidentiality.

Before the data collection process was initiated, a systematic research procedure was established to ensure methodological rigor, consistency, and transparency throughout the study. The procedure was designed in accordance with the sequential explanatory mixed-methods framework proposed by Creswell and Plano Clark (2018), in which the quantitative phase served as the primary strand and was subsequently elaborated through qualitative inquiry. Each stage was organized to facilitate the progressive development of evidence, beginning with research preparation and instrument validation, followed by quantitative and qualitative data collection, data integration, and interpretation. This structured procedure enhances the reproducibility of the study by clearly documenting the sequence of research activities undertaken. The overall research procedure is summarized in Table 1.

Table 1. Research Procedure

Phase	Activities	Expected Output
Phase 1. Research Preparation	Conducting an extensive literature review, identifying research gaps, developing the conceptual framework, designing research instruments, obtaining expert validation, revising the instruments, and securing ethical approval and research permission.	Validated research instruments and approved research protocol.
Phase 2. Quantitative Data Collection	Administering structured questionnaires to 140 kindergarten teachers participating in the Academic Qualification Fulfillment Program (PKA).	Complete quantitative dataset.
Phase 3. Quantitative Data Analysis	Performing data screening, descriptive statistics, assumption testing, and multiple regression analysis using SPSS.	Statistical findings identifying relationships among research variables.
Phase 4. Qualitative Participant Selection	Selecting interview participants purposively based on quantitative results to represent high-, moderate-, and low-pedagogical-competence groups.	Twenty information-rich participants.
Phase 5. Qualitative Data Collection	Conducting semi-structured interviews with selected teachers and focus group discussions involving LPTK lecturers and program administrators.	Interview and FGD transcripts.
Phase 6. Qualitative Data Analysis	Coding, categorizing, developing themes, and interpreting qualitative findings through thematic analysis.	Themes explaining quantitative findings.
Phase 7. Data Integration	Integrating quantitative and qualitative findings using the sequential explanatory mixed-methods approach to develop comprehensive interpretations.	Integrated explanation of the relationships among LPTK support, digital literacy, and pedagogical competence.
Phase 8. Interpretation and Reporting	Interpreting findings, formulating conclusions, discussing theoretical and practical implications, and preparing the manuscript for publication.	Final journal manuscript.

As presented in Table 1, the research followed a systematic sequence in which each methodological phase informed the subsequent stage. Quantitative findings served as the basis for participant selection and the development of interview questions during the qualitative phase, ensuring that qualitative evidence directly explained and enriched the statistical results. The integration of both datasets enabled a comprehensive understanding of how institutional support provided by LPTK, teachers' digital literacy, and the implementation of andragogical learning collectively contributed to improvements in pedagogical competence. This systematic procedure enhances the transparency, credibility, and replicability of the research while strengthening the overall validity of the study's conclusions.

Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics Version 27. The analysis began with data screening to identify missing values and outliers, followed by descriptive statistics to summarize participants' responses using means, standard deviations, frequencies, percentages, and agreement levels. Prior to inferential analysis, the assumptions of normality, multicollinearity, linearity, and homoscedasticity were examined to ensure the appropriateness of the regression model. Multiple linear regression analysis was subsequently performed to examine the influence of the role of LPTK and digital literacy on teachers' pedagogical competence. Statistical significance was determined at $p < .05$, with standardized regression coefficients used to evaluate the relative contribution of each independent variable. Qualitative data were analyzed using thematic analysis, following the stages of familiarization, open coding, category development, theme generation, interpretation, and verification. Finally, quantitative and qualitative findings were integrated through narrative comparison and triangulation in accordance with the principles of sequential explanatory mixed-methods research, enabling the qualitative evidence to explain, contextualize, and strengthen the interpretation of the statistical findings.

RESULTS AND DISCUSSION

Results

This study involved 140 kindergarten teacher respondents participating in the Academic Qualification Fulfillment Program (PKA) within the Early Childhood Education (PAUD) study program at Al Azhar University Indonesia in the 2025/2026 academic year. As outlined in the Method section, the research instrument was designed to capture four interrelated aspects of the PKA experience: teacher pedagogical competence, the role of Teacher Training Institutions (LPTK), teacher digital literacy, and the extent to which andragogy principles were implemented throughout the program. Each aspect was measured using a set of indicator items on a five-point Likert scale, ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). For the purpose of interpretation, an average score approaching or exceeding 4.0 is treated as reflecting a generally favorable teacher perception, while the agreement level, the combined percentage of respondents selecting Agree or Strongly Agree, is used as a complementary indicator of how widely that perception is shared across the sample. Presenting both the mean score and the agreement percentage allows the results to capture not only the central tendency of teachers' responses but also the degree of consensus behind it.

The pedagogical competence aspect recorded an average score of 4.21, accompanied by an agreement level of 95.6 percent. This combination indicates that the overwhelming majority of respondents perceived a genuine improvement in their pedagogical capacities after participating in PKA, and that this perception was consistent rather than concentrated among a small subgroup of high-performing teachers. More specifically, participants reported gains across six interrelated indicators. First, they described an improved ability to identify children's individual learning needs, a foundational skill for differentiated instruction in early childhood settings. Second, they reported a deeper understanding of the developmental characteristics unique to early childhood, which underlies age-appropriate curriculum planning. Third, respondents indicated that they had become more capable of adapting learning activities to match students' developmental needs rather than applying a uniform instructional approach. Fourth, teachers reported greater competence in formulating learning goals that are properly aligned with children's developmental stages, reflecting more precise lesson planning. Fifth, participants noted an improved capacity to design meaningful, play-based learning activities, consistent with recognized best practice in kindergarten pedagogy. Sixth, teachers reported strengthened skills in conducting continuous, ongoing assessment of child development, rather than relying solely on periodic or end-of-term evaluation. Taken as a set, these six indicators span the full instructional cycle, from understanding learners, through planning and delivering instruction, to assessing outcomes, which is consistent with the way pedagogical competence was operationalized in the instrument described in the Method section.

The LPTK role aspect produced the highest average score among the four aspects measured, 4.41, with an agreement level of 98.3 percent. This was the strongest and most consistent result in the entire dataset. Respondents' evaluation of LPTK's academic functions was similarly built from

several component indicators. Teachers rated favorably the relevance of the course materials provided to their specific needs as kindergarten educators, suggesting that the LPTK curriculum was perceived as practical rather than purely theoretical. They also rated positively their lecturers' ability to connect academic theory with real classroom practice, an aspect directly tied to the applied nature of in-service teacher education. In addition, respondents reported that academic guidance was consistently available throughout the program, that consulting services could be accessed when needed, and that LPTK provided broader support for their ongoing professional development beyond the immediate coursework. Because this aspect scored higher than pedagogical competence itself, the results suggest that teachers' confidence in the institutional support surrounding PKA was, if anything, even stronger than their confidence in their own competence gains.

The digital literacy aspect recorded an average score of 4.23, with an agreement level of 94.7 percent, placing it close to, though marginally below, the LPTK role result. Respondents evaluated their own digital capabilities across six indicators. They reported being able to search effectively for educational information online, and, importantly, to exercise judgment in selecting credible digital sources rather than accepting all online information uncritically. Teachers also reported using digital platforms for independent, self-directed study outside of formal coursework, and applying technology directly within their classroom teaching practice. Beyond instructional use, respondents indicated that they used digital media to communicate with parents, reflecting an extension of digital competence into the broader school-family relationship. Finally, teachers reported an understanding of data ethics and security considerations when using technology, indicating that their digital literacy extended beyond functional skill to include an awareness of responsible use. Collectively, these six indicators show that digital literacy in this sample was not confined to basic technical operation but encompassed information evaluation, independent learning, classroom application, communication, and ethical awareness.

The andragogy aspect recorded an average score of 4.36, with an agreement level of 97.7 percent, the second-highest result after the LPTK role aspect. Respondents indicated that PKA's learning design incorporated recognizable adult-learning practices across six indicators. Teachers reported that their existing teaching experience was actively drawn upon as a learning resource during the program, rather than being treated as irrelevant to new coursework. They also reported having opportunities to share good practices with fellow participants, supporting peer-to-peer as well as instructor-led learning. Structured reflection on teaching experience was likewise reported as a recurring feature of the learning process. In terms of learning design, respondents indicated that the program supported their independence as learners, incorporated problem-based learning grounded in real situations encountered in their own schools, and assigned tasks that were directly relevant to their day-to-day professional practice rather than abstract or generic exercises.

Viewed together, all four aspects, pedagogical competence, LPTK role, digital literacy, and andragogy, recorded average scores above 4.20 and agreement levels above 94 percent, indicating a broadly consistent and favorable pattern of teacher perception across every dimension measured by the instrument. Among the four, the LPTK role aspect scored highest, followed closely by andragogy, then digital literacy, with pedagogical competence recording the lowest, though still strongly positive, average score. This ordering suggests that, within this sample, teachers perceived the institutional and pedagogical design elements surrounding PKA, namely LPTK support and the andragogical approach applied in its delivery, as marginally stronger than the competence gains those elements were intended to produce, a pattern that is examined further in the Discussion section that follows.

Discussion

The findings demonstrate that participation in the Academic Qualification Fulfillment Program (PKA) substantially strengthened kindergarten teachers' pedagogical competence, as reflected in the consistently high mean score ($M = 4.21$) and the strong level of agreement among respondents. Rather than merely indicating participants' satisfaction with the program, this result suggests that PKA functions as a structured professional learning environment capable of improving teachers' capacity to understand children's developmental characteristics, design developmentally appropriate instruction, implement learner-centered pedagogical strategies, and conduct continuous assessment. These competencies represent the core dimensions of effective early childhood

pedagogy and illustrate that pedagogical improvement extends beyond acquiring theoretical knowledge toward strengthening teachers' instructional decision-making in authentic classroom contexts. Such findings reinforce the argument that professional competence develops through sustained engagement in meaningful learning experiences rather than through the attainment of academic credentials alone. Consequently, the positive perception reported by participants should be interpreted as evidence that qualification-upgrading initiatives can become effective instruments for educational quality improvement when they are intentionally designed as comprehensive professional development systems.

From a theoretical perspective, these findings strongly support Human Capital Theory, which posits that investment in educational qualifications enhances individuals' productive capabilities by expanding knowledge, professional judgment, and adaptive expertise. As argued by Deva et al. (2025) and Strielkowski et al. (2025), advanced educational experiences enable professionals to respond more effectively to increasingly complex work environments, particularly when learning promotes higher-order thinking and reflective practice. The present study extends this theoretical proposition by demonstrating that human capital development among kindergarten teachers is not generated solely through formal degree attainment but through the integration of academic learning with practical pedagogical experiences embedded within the PKA. This interpretation is also consistent with Pedagogical Content Knowledge (PCK) Theory, which emphasizes that effective teaching emerges from the interaction between disciplinary knowledge, pedagogical reasoning, and contextual understanding rather than from subject knowledge in isolation. The observed improvements across lesson planning, learner analysis, instructional adaptation, and assessment therefore indicate that PKA contributes to the development of integrated pedagogical expertise instead of simply increasing teachers' academic qualifications.

These findings are also closely aligned with Desimone's Professional Development Framework, which argues that sustainable improvements in teaching quality occur when professional development is content-focused, collaborative, active, and sufficiently sustained over time. Unlike many short-term training programs that emphasize procedural compliance, the PKA appears to provide continuous academic engagement that allows teachers to connect theoretical concepts with their own classroom experiences. Such sustained engagement likely explains why participants reported improvements across multiple dimensions of pedagogical competence rather than isolated instructional skills. This interpretation supports the view of McChesney and Aldridge (2021) that meaningful professional development follows a developmental trajectory in which institutional learning opportunities gradually influence teachers' beliefs, instructional practices, and professional competence. Accordingly, the effectiveness of PKA may be understood as the outcome of an integrated professional learning process that promotes reflective knowledge construction instead of temporary skill acquisition.

The present findings are broadly consistent with recent international research demonstrating that teacher qualification improvement contributes positively to instructional quality and professional competence. López-Martín et al. (2023), through their meta-analysis, concluded that teacher competencies significantly influence educational quality, while Moreira et al. (2023) identified pedagogical competence as a multidimensional construct requiring continuous professional learning rather than isolated training interventions. Similarly, Huang et al. (2024) reported that sustained professional development programs significantly enhanced instructional effectiveness, whereas Darling-Hammond et al. (2024) emphasized that teacher education should integrate scientific knowledge with authentic teaching practice to generate meaningful professional growth. Within the Indonesian context, the present findings also extend Rahman (2021), who argued that many professional development initiatives have produced limited classroom impact because they often prioritize participation over learning quality. In contrast, the consistently positive perceptions observed in this study suggest that PKA has greater potential to generate meaningful pedagogical development because qualification upgrading is accompanied by systematic academic mentoring, contextualized learning experiences, and sustained institutional support throughout the program.

Nevertheless, the findings also provide a broader conceptual contribution that extends existing scholarship on teacher professional development. Previous studies have generally examined teacher qualifications, pedagogical competence, institutional support, or professional learning as separate

constructs, making it difficult to explain how competence develops through the interaction of multiple professional learning mechanisms. The present study indicates that pedagogical competence should instead be understood as the cumulative outcome of interconnected institutional, cognitive, and experiential processes operating simultaneously within qualification-upgrading programs. This integrated perspective helps address an important gap in the global literature by demonstrating that the effectiveness of teacher qualification policies depends not merely on raising formal educational attainment but on creating learning environments that continuously connect academic knowledge with professional practice. Consequently, the contribution of this study lies not only in confirming the importance of teacher qualification upgrading but also in expanding current theoretical understanding by positioning pedagogical competence as the product of a comprehensive professional development ecosystem that integrates institutional support, adult learning principles, and teachers' active engagement in reflective professional practice.

Another important finding of this study is that institutional support provided by the Teacher Education Institution (LPTK) received the highest evaluation among all measured dimensions ($M = 4.41$), indicating that participants regarded institutional assistance as the strongest contributor to the success of the Academic Qualification Fulfillment Program (PKA). This finding suggests that improvements in pedagogical competence cannot be explained solely by teachers' individual motivation or participation in formal higher education but are strongly influenced by the quality of the professional learning environment established by the institution. The consistently positive perceptions regarding curriculum relevance, lecturer expertise, academic supervision, mentoring, and professional support indicate that LPTKs function not merely as providers of academic credentials but as facilitators of sustained professional learning. Such an environment enables teachers to critically connect educational theories with classroom realities while continuously receiving feedback that supports instructional improvement. Consequently, the effectiveness of qualification-upgrading initiatives appears to depend on the institutional capacity to provide coherent academic guidance rather than simply delivering university coursework.

This finding strongly supports Desimone's Professional Development Framework, which argues that effective teacher professional development requires coherent program design, active participation, sustained duration, expert guidance, and meaningful opportunities for reflection and collaboration. The high evaluation of LPTK support indicates that these essential components were successfully embedded within the implementation of the PKA. Rather than functioning as isolated academic activities, mentoring sessions, consultations, and lecturer guidance appear to have created a continuous learning cycle through which teachers refined their instructional practices while integrating newly acquired knowledge into their professional contexts. This interpretation also aligns with Human Capital Theory, which emphasizes that educational investment yields meaningful returns only when learning occurs within environments that facilitate knowledge acquisition, practical application, and continuous capability development. Therefore, institutional support should be viewed not as an external administrative factor but as a strategic mechanism that transforms academic learning into sustainable pedagogical competence.

The present findings are also consistent with recent international evidence emphasizing the decisive role of institutional mentoring in teacher professional growth. Bergmark (2023) demonstrated that collaborative and research-based professional development is substantially more effective when teachers are supported by institutional structures that encourage reflection and collective learning. Similarly, Hussain et al. (2025) reported that sustained mentoring significantly strengthens teachers' professional confidence, instructional innovation, and long-term competence development, particularly in environments where continuous academic support is available. Darling-Hammond et al. (2024) further argued that high-quality teacher education programs must bridge educational theory and classroom practice through systematic guidance rather than relying exclusively on formal instruction. Likewise, Caena and Vuorikari (2022) emphasized that institutional learning ecosystems promote lifelong professional development by enabling teachers to integrate formal learning with collaborative knowledge construction. Collectively, these studies reinforce the present finding that institutional support represents a fundamental driver of sustainable professional competence rather than a supplementary component of teacher education.

Although the present findings generally corroborate previous research, they also provide an important extension to the existing literature. Most earlier studies have examined institutional

support primarily within conventional professional development programs or short-term in-service training, where mentoring is often separated from formal academic qualification processes. In contrast, the PKA integrates institutional mentoring directly into a structured undergraduate qualification program, allowing professional guidance to accompany teachers throughout an extended period of academic study. This integration appears to strengthen the continuity between theoretical learning and classroom implementation, thereby reducing the well-documented disconnect between university-based teacher education and professional practice identified by Resch and Schrittmesser (2023). The stronger institutional role observed in this study may therefore be explained by the long-term nature of academic interaction, which provides repeated opportunities for feedback, reflection, and instructional refinement. Such characteristics distinguish the PKA from many qualification-upgrading initiatives that emphasize credential attainment while providing relatively limited pedagogical mentoring.

From a broader conceptual perspective, these findings suggest that institutional support should be reconsidered as a central component of teacher professional development rather than merely a contextual variable surrounding educational programs. The evidence indicates that professional competence emerges through dynamic interactions between teachers' individual learning processes and institutional structures that facilitate knowledge transfer, reflective practice, and collaborative learning. This perspective expands existing discussions within the global literature by demonstrating that the effectiveness of qualification-upgrading policies depends not only on increasing teachers' educational attainment but also on strengthening institutional capacity to sustain professional learning over time. Accordingly, the principal theoretical contribution of this study lies in positioning LPTK support as an enabling mechanism that operationalizes Human Capital Theory and Desimone's Professional Development Framework within formal qualification-upgrading programs, thereby offering a more integrated explanation of how institutional environments shape long-term pedagogical competence among kindergarten teachers.

CONCLUSION

This study demonstrates that the Academic Qualification Fulfillment Program (PKA) plays a significant role in strengthening the pedagogical competence of kindergarten teachers by integrating institutional support, digital literacy, and andragogical learning into a coherent professional development system. The findings indicate that improvements in pedagogical competence are not solely attributable to the acquisition of formal academic qualifications but emerge through the interaction of multiple complementary factors. Strong academic guidance provided by Teacher Education Institutions (LPTK), teachers' capacity to utilize digital technologies for continuous professional learning, and learning experiences designed according to adult-learning principles collectively create conditions that foster meaningful pedagogical development. These results reinforce the view that teacher qualification-upgrading initiatives should be understood as comprehensive learning processes rather than administrative mechanisms for obtaining academic credentials. The study also contributes to the literature by integrating Pedagogical Content Knowledge, Human Capital Theory, the DigComp framework, Desimone's professional development model, and andragogical learning into a unified analytical perspective for examining teacher professional growth. From a practical standpoint, the findings provide evidence that policymakers and teacher education institutions should strengthen institutional mentoring, systematically embed digital literacy within qualification programs, and adopt learner-centered approaches that acknowledge teachers' prior professional experience. Nevertheless, this study is limited by its reliance on self-reported data collected from participants within a single institutional context, which may restrict the generalizability of the findings and does not directly capture changes in classroom practice. Future studies should therefore incorporate classroom observations, longitudinal research designs, and multi-site investigations involving diverse teacher education institutions to examine whether the pedagogical improvements identified in this study are sustained over time and

transferable across different educational settings. Such efforts will contribute to a deeper understanding of how qualification-upgrading policies can generate lasting improvements in the quality of early childhood education.

AUTHOR CONTRIBUTIONS STATEMENT

Nila Fitria Conceptualization, methodology, investigation, data curation, formal analysis, visualization, writing original draft, and project administration. Fidesrinur Supervision, validation, methodology, formal analysis, writing review and editing. Zahrina Amelia: Investigation, resources, data curation, validation, writing review and editing. All authors contributed substantially to the interpretation of the findings, critically reviewed the manuscript, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

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