



Integrated Teacher Support Systems for Enhancing Behavioral and Cognitive Development in Preschool Institutions

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ABSTRACT

The quality of early childhood behavioral and cognitive development is strongly influenced by teacher capacity and institutional support, yet teacher support practices are often fragmented. This mixed-methods sequential explanatory study examines the impact of an integrated teacher support system on children's behavioral and cognitive development in early childhood education institutions. Quantitative data were collected from 50 teachers across nine institutions in Bogor Regency and assessments of 120 children, and analyzed using descriptive and inferential statistics. Qualitative data were obtained through in-depth interviews with six teachers and institutional leaders and analyzed thematically. The findings indicate that an integrated teacher support system positively enhances children's behavioral and cognitive development by strengthening teachers' pedagogical competence, ensuring consistency in learning practices, and providing sustained institutional support. The study contributes to early childhood education theory and offers practical guidance for designing integrated and sustainable teacher support systems.

INTRODUCTION

Early childhood education is a fundamental stage in forming the basis for children's behavioral and cognitive development which will affect learning readiness and academic success at the next level of education. In this phase, children experience rapid development in aspects of emotional regulation, thinking skills, language, and social interaction which are greatly influenced by the quality of the learning environment they receive. Teachers have a central role in creating this environment, as teacher-child interaction has been proven to be the main predictor of holistic early childhood development. International studies show that the quality of parenting and learning in preschools is highly dependent on teachers' professional capacity as well as the systemic support that underpins their pedagogic practices (OECD, 2023). Therefore, attention to the teacher support system is a strategic issue in improving the quality of early childhood education globally.

In practice, various countries have developed policies to strengthen the quality of early childhood education teachers through professional training, supervision, and ongoing mentoring. However, the implementation of such support is often still partial and not integrated into a single complete system framework. Cross-country research shows that uncoordinated professional development programs tend to have a limited impact on changes in classroom learning practices (Slot et al., 2020). As a result, teachers have difficulty in implementing pedagogic strategies that are consistent and responsive to children's developmental needs. This condition confirms that the quality of teacher support is not only determined by the existence of the program, but also by the level of integration and sustainability of the support system.

A number of previous studies have examined the relationship between teachers' professional support and the quality of learning in early childhood education, but most have focused on one specific aspect of support. For example, some studies have focused on the effectiveness of teacher training in improving classroom practice without considering the role of supervision and institutional support simultaneously (Markussen-Brown et al., 2021). Other studies have highlighted teacher well-being and workload as factors that affect the quality of interactions with children, but have not directly linked them to children's behavioral and cognitive development outcomes (Cumming et al., 2023). The fragmentation of the focus of this research shows that there is a limited understanding of how various forms of teacher support can work synergistically in one integrated system.

These limitations indicate a significant research gap, particularly related to the lack of empirical studies that comprehensively examine teacher support systems and their impact on early childhood development. Most studies still separate the study of teachers and the study of child development, so the causal relationship between the two has not been fully depicted (Urban et al., 2020). In addition, research with a mixed approach that combines quantitative and qualitative data to explain the working mechanisms of teacher support systems is still relatively limited, especially in the context of developing countries. In fact, this approach is considered to be able to provide a deeper and contextual

understanding of complex educational phenomena (Creswell & Plano Clark, 2021).

In the Indonesian context, especially in early childhood education institutions, similar challenges are still found. Early childhood teachers often face limited access to ongoing training, systematic pedagogic supervision, and adequate institutional support. This condition has the potential to affect the consistency of learning practices and the quality of stimulation of children's behavioral and cognitive development. Previous research in the Southeast Asian context has shown that strengthening teacher support systems is a key factor in improving the quality of early childhood education services, especially in regions with diverse characteristics of educational institutions (Haslip & Gullo, 2021). Therefore, studies that specifically examine integrated teacher support systems are becoming increasingly relevant and urgent.

Based on the background and gaps of the research, this study explicitly aims to analyze the influence of integrated teacher support systems on children's behavioral and cognitive development in early childhood education institutions. This research focuses on the relationship between professional training, pedagogic supervision, and institutional support with child development outcomes. A mixed methods approach with a sequential explanatory design is used to obtain a strong empirical picture through quantitative data, as well as an in-depth understanding of the implementation of the teacher support system through qualitative data. The focus of the research on the context of early childhood education institutions in Bogor Regency provides contextual contributions that are relevant to the reality of early childhood education in Indonesia.

The contribution of this research is theoretical and practical. Theoretically, this study enriches the study of early childhood education by offering a more comprehensive understanding of the role of integrated teacher support systems in supporting children's behavioral and cognitive development. Practically, the findings of this research are expected to be the basis for PAUD institutional managers and policymakers in designing a more structured, sustainable, and contextual teacher support system. Thus, this research not only contributes to the development of science, but also provides real implications for improving the quality of early childhood education in the field.

LITERATURE REVIEW

The Role of Teacher Professional Support in Early Childhood Education

Professional support for early childhood education teachers is an important factor in improving the quality of teacher-child interaction in the classroom as well as overall learning practices. Multi-country empirical studies show that organizational support through professional incentives and a supportive work climate is positively related to teachers' interest in participating in continuous professional development (Alvarez et al., 2025). These findings emphasize that support systems that provide access to structured training and embedded professional development can improve teacher motivation and competence in the context of early childhood education. However, the study also

noted that in many parts there are still limitations in the form of support available, feeling inadequate or institutionally unsustainable. These findings are relevant to strengthen the argument that teacher support must be integral and holistic to have a significant impact on children's educational practices and learning outcomes.

The Relationship between Teacher Support and Teacher-Child Interaction

Positive interaction between teachers and children is the basis for the success of early childhood education because this interaction affects optimal behavioral and cognitive development. Research in Ethiopia found that teacher-related factors such as professional confidence, self-efficacy, and teaching experience significantly correlated with the quality of teacher-child interactions, particularly in aspects of emotional support, classroom organization, and instructional support (Gebre et al., 2024). This shows that support for teachers, both in the form of training and strengthening professional beliefs, can strengthen learning practices that have a positive impact on children's development. Strong teacher efficacy encourages the use of learning strategies that are more responsive to the needs of children's behavioral and cognitive development. Thus, an effective support system not only enhances the teacher's technical abilities, but also strengthens the emotional aspects and interpersonal relationships that are beneficial to the child's developmental process.

Professional Development and Child Development

Well-designed teacher professional development can have a direct impact on the progress of social-emotional development and early childhood school readiness. A quasi-experimental study in Turkey showed that professional development programs that focus on children's social-emotional adjustment as well as school readiness have a positive impact on children's social-emotional and cognitive skills (Yilmaz et al., 2025). The program, which is implemented in a series of sessions before the school year, helps teachers adopt learning techniques that are more adaptive and responsive to children's developmental needs. These findings underscore the importance of the role of professional support not only in improving teacher skills but also in helping children navigate important transitional stages in their development. Therefore, a teacher support system that combines the development of pedagogical competencies with strategies for stimulating child development needs to be the main focus in early childhood education.

Components of an Effective Teacher Support System

The educational literature provides evidence that effective teacher support systems are multifaceted and systemically integrated. For example, the collaborative model of peer coaching in professional development has been shown to broaden teachers' understanding of technological tools and improve the application of these tools in daily learning practices (Bay & Konca, 2025). This approach shows that the integration of support both formally (structured training) and informal (coaching, mentoring) can create dynamic professional learning spaces for teachers. Support models like this also help overcome barriers

to new strategy implementation as ongoing support emerges from the collective work environment. Such an integrated support approach is relevant to the current research objectives because it emphasizes the need for support structures that are not only one-way, but also participatory and mutually reinforcing.

Challenges of Teacher Support Systems in Global and Local Contexts

Although the benefits of teacher support have been widely proven, some studies show that the support available is not always sufficient or effectively coordinated. Cross-country research shows that teachers often feel low support from the institutions they work for, so their interest in professional development is still limited (Alonso et al., 2024). These barriers can be a lack of incentives, limited resources, or a less supportive work climate. In many countries, especially in developing countries, these challenges are increasingly felt due to limited access to quality training and ongoing institutional support. This underscores the importance of designing a comprehensive teacher support system that is adaptive to local needs to produce a significant impact on early childhood development.

METHODOLOGY

Types and Approaches to Research

This study uses a mixed methods approach with a sequential explanatory design, which integrates quantitative and qualitative methods sequentially to obtain a comprehensive understanding of the influence of integrated teacher support systems on early childhood behavioral and cognitive development. This approach was chosen because it allows researchers to statistically test the relationships between variables at the quantitative stage, then deepen and explain the findings through contextual qualitative data (Creswell & Plano Clark, 2021). The quantitative stage serves as the main basis for identifying patterns and influences, while the qualitative stage is used to explore the mechanisms, experiences, and dynamics of the implementation of teacher support systems in early childhood education institutions. The sequential explanatory design is considered appropriate because the research focuses not only on the results, but also on the process and context of the implementation of teacher support in an integrated manner. This approach strengthens the validity of findings through triangulation of methods and data sources (Guetterman et al., 2023).

Population and Sampling Techniques

The research population at the quantitative stage is all teachers who teach in early childhood education institutions in Bogor Regency. The quantitative sample consisted of 50 teachers from 9 early childhood education institutions, which were selected using a non-probability sampling technique with a purposive sampling approach. This technique is used because respondents are selected based on certain criteria, namely active teachers who are directly involved in the learning process and the institutional support system in their institution. In addition, the study also involved 120 early childhood as a unit of behavioral and cognitive developmental analysis, which were assessed by the

teachers of each class using developmental assessment instruments. The number of samples was considered adequate for simple inferential analysis and reflected the variation in the characteristics of early childhood education institutions in the study area (Hair et al., 2021).

The qualitative stage involved 6 key informants who were purposively selected based on the results of quantitative analysis. The informants consisted of 4 early childhood education teachers and 2 heads of early childhood education institutions. Teachers are selected based on variations in teacher support system scores and child development outcomes, so that they can represent conditions with high and moderate levels of support. The head of the institution is involved to obtain policy and institutional perspectives related to the implementation of teacher support in an integrated manner. The selection of informants aims to explore direct experiences, perceptions, and real practices that cannot be fully explained through quantitative data (Tracy, 2020).

Data Collection Techniques and Instruments

Quantitative data were collected using an integrated teacher support system questionnaire that included the dimensions of professional training, pedagogical supervision, collaboration between teachers, and institutional support. This instrument was developed based on the conceptual adaptation of the teacher's professional support model in early childhood education and adapted to the local context. The assessment of children's behavioral and cognitive development was carried out using a developmental observation sheet filled out by the classroom teacher based on indicators of adaptive behavior, emotional control, basic thinking skills, and simple problem-solving. At the qualitative stage, data is collected through semi-structured in-depth interviews, which allow for flexible exploration of the experiences of teachers and heads of institutions related to teacher support system integration. All interviews were recorded and transcribed verbatim to maintain data accuracy (Braun & Clarke, 2021).

Instrument Validity and Reliability Test

The validity of the quantitative instrument was tested using the validity of the content through expert assessments in the field of early childhood education and research methodology. Furthermore, the empirical validity test was carried out by item-total correlation analysis, while the reliability of the instrument was tested using Cronbach's Alpha coefficient. The instrument is declared reliable if the alpha value is above 0.70, in accordance with social and educational research standards. This approach ensures that the instruments used are able to measure the construction of the teacher support system and child development consistently and accurately (Taber, 2020).

Research Implementation Procedure

The research is carried out through several systematic stages. The initial stage includes research licensing and coordination with early childhood education institutions. Furthermore, the quantitative stage was carried out by distributing questionnaires to teachers and collecting child development

assessment data. After the quantitative data is analyzed, the results are used as the basis for selecting qualitative informants. The qualitative stage is carried out through in-depth interviews to deepen understanding of quantitative findings. The entire research process is carried out ethically by maintaining the confidentiality of the identities of respondents and participants (Flick, 2022).

Data Analysis Techniques

Quantitative data were analyzed using descriptive statistics to describe respondent characteristics and research variables, as well as inferential statistics to test the influence of the teacher's support system on children's behavioral and cognitive development. The analysis was carried out using the Statistical Package for the Social Sciences (SPSS) software. Qualitative data were analyzed using thematic analysis, which included the initial coding process, theme grouping, and interpretation of meaning. This analysis was conducted systematically to identify patterns, key themes, and relationships between concepts that emerged from the interview data. The integration of quantitative and qualitative results is carried out at the interpretation stage to produce comprehensive and contextual conclusions (Guest et al., 2024).

RESEARCH RESULTS

Integrated Teacher Support Systems and the Enhancement of Pedagogical Competence

The results of the quantitative analysis show that the integrated teacher support system is at a high level with an average score **4.12** and standard deviation **0.48**, which indicates a positive and relatively homogeneous perception among teachers. The teacher's pedagogic competence also showed a high average score of **4.05** with standard deviation **0.52**, reflects the teacher's ability to design learning, understand children's characteristics, and manage the learning process effectively. The influence test shows the significance value **0.000**, which confirms that an integrated teacher support system has a statistically significant effect on improving teachers' pedagogic competence. These findings show that the better the integration of professional training, pedagogic supervision, and institutional support, the higher the pedagogic competence that teachers demonstrate in learning practice.

Table 1. Descriptive and Inferential Statistics of Integrated Teacher Support Systems and Pedagogical Competence

Variable	N	Minimum	Maximum	Mean	Standard Deviation	Significance (p-value)
Integrated Teacher Support System	50	3.20	4.80	4.12	0.48	0.000
Pedagogical Competence	50	3.10	4.75	4.05	0.52	

Qualitative findings show that the improvement of teachers' pedagogic competence does not occur instantaneously, but through an interconnected support process. Teachers described that the training they received became more meaningful when it was immediately followed up through classroom supervision. The process helps teachers recognize the strengths and weaknesses of their teaching practices in a concrete way. Support from the head of the institution also plays a role in creating a safe climate for teachers to develop and conduct sustainable reflection. The teacher said, "At first I felt like the training was just theory, but after supervising, I came to know how to apply it in the classroom." (G-01, October 10, 2025 interview). This experience was reinforced by other teachers who assessed that the continuity between training and mentoring made the professional learning process more directed. "Now the training doesn't just stop, because there's always a follow-up." (G-03, interview October 15, 2025). From the perspective of institutional leaders, the integration of support is indeed designed so that teachers do not run alone in improving their competence. "We deliberately link training with supervision so that teachers develop gradually and consistently." (K-01, October 20, 2025 interview).

Consistency of Teaching Practices and Children's Behavioral Development

The results of the quantitative analysis showed that the consistency of teachers' learning practices was in the high category with an average score **4.08** and standard deviation **0.50**. Early childhood behavioral development shows average scores **4.15** with standard deviation **0.46**, which indicates a level of adaptive behavior, emotional control, and adherence to good rules. The significance value of **0.002** shows that consistency of learning practices has a significant effect on the development of children's behavior. These findings confirm that integrated teacher support encourages uniformity of learning approaches, ultimately creating a stable learning environment for children.

Table 2. Relationship between Teaching Practice Consistency and Children's Behavioral Development

Variable	N	Minimum	Maximum	Mean	Standard Deviation	Significance (p-value)
Teaching Practice Consistency	50	3.30	4.70	4.08	0.50	0.002
Children's Behavioral Development	120	3.40	4.80	4.15	0.46	

The results of the interviews show that consistency in learning practices is the main key in forming stable children's behavior. The teacher explained that when rules and routines are applied consistently, children are easier to understand expectations and adjust. This is inseparable from the existence of a mutual agreement between teachers facilitated by the institution through supervision and internal discussions. The head of the institution emphasized that

this consistency is the result of a coordinated support system. A teacher said, "*Children become calmer because their routines are clear and uncluttered.*" (G-02, interview October 12, 2025). This view is in line with the experiences of other teachers who have seen gradual changes in children's behavior. "*If the teacher is consistent, the child is not confused and his behavior is more controlled.*" (G-04, interview October 18, 2025). In terms of institutional management, consistency is indeed the main focus. "*We equate the teacher's approach so that children get the same learning experience in all classes.*" (K-02, interview October 24, 2025).

Institutional Support and Its Contribution to Children’s Cognitive Development

Quantitative analysis shows that sustainable institutional support has an average score **4.10** with standard deviation **0.47**, which indicates that most teachers feel adequate institutional support. Early childhood cognitive development shows average scores **4.18** with standard deviation **0.44**, reflects basic thinking and good problem-solving skills. The significance value of **0.001** shows that institutional support has a strong effect on children's cognitive development. These findings confirm that institutional policies, facilities, and climate play an important role in strengthening the effectiveness of teacher learning.

Table 3. Institutional Support and Children’s Cognitive Development Outcomes

Variable	N	Minimum	Maximum	Mean	Standard Deviation	Significance (p-value)
Institutional Support	50	3.40	4.85	4.10	0.47	0.001
Children’s Cognitive Development	120	3.50	4.90	4.18	0.44	

Qualitative findings show that institutional support provides space for teachers to develop learning that stimulates children's thinking skills. Teachers feel more confident to design varied cognitive activities because of the facilities and policy support from the institution. The head of the institution emphasized that institutional support is directed so that teachers can focus on the quality of learning, not burdened by administrative aspects alone. One of the teachers revealed, "*With the support of the institution, I can make activities that are more challenging and in accordance with the children's abilities.*" (G-01, interview October 16, 2025). This experience was reinforced by other teachers who saw changes in the child. "*The children are now more active in asking questions and trying because the teachers are fully supported.*" (G-03, interview October 21, 2025). From the leadership side, the support is indeed designed to have a direct impact on children. "*We make sure that the institution's policies really support the child's learning process, not just the administration.*" (K-01, October 27, 2025 interview).

DISCUSSION

The results of this study show that an integrated teacher support system has a central role in improving early childhood behavioral and cognitive development in preschool institutions. These findings are in line with the framework of ecological systems theory that places teachers and educational institutions as part of the proximal environment that greatly determines the quality of child development (Bronfenbrenner & Morris, 2021). When teachers' professional support is designed in an integrated manner through training, supervision, and institutional policies, teachers not only improve their technical capacity, but also build consistency in pedagogical practices. Previous research has shown that the integration of professional support produces a stronger effect than interventions that are partial or temporary (Darling-Hammond et al., 2020). Thus, these findings reinforce the argument that the quality of early childhood learning is highly dependent on a sustainable and coordinated teacher support system.

The strengthening of teachers' pedagogic competence found in this study can be explained through the perspective of professional learning systems. According to Opfer & Pedder (2021), teacher competence develops optimally when professional learning takes place in an interconnected system of practical reflection, feedback, and institutional support. The quantitative results of this study show that teachers with a high level of integrated support have better pedagogic competency scores, which then has a direct impact on the quality of learning interactions. These findings are consistent with the research of Coe et al., (2020) which affirms that the effectiveness of teachers is not solely determined by teaching experience, but rather by the quality of professional support they receive. Therefore, this study emphasizes that investment in teacher support systems is a key strategy to improve the quality of early childhood learning.

In addition to pedagogic competence, consistency of learning practices has proven to be an important factor in supporting the development of children's behavior. These findings are in line with behavioral learning theory which emphasizes that children's adaptive behavior develops through repetitive and structured experiences (Skinner, 2020). When teachers implement consistent learning practices, children gain clarity of expectations and emotional stability that support self-control and positive social behavior. An international study by Mashburn et al., (2022) also showed that the consistency of classroom routines contributes to a decrease in problematic behaviors and an increase in child engagement. Thus, an integrated teacher support system not only increases the capacity of individual teachers, but also creates a stable learning environment conducive to the development of children's behavior.

From the aspect of cognitive development, the results of this study show that strong institutional support contributes significantly to basic thinking skills and early childhood problem-solving. These findings can be understood through the concept of instructional scaffolding, where structured support allows children to move from actual abilities to higher developmental potential (Vygotsky, 2021). Previous research has confirmed that teachers who are supported by institutional policies and adequate resources are better able to

design learning activities that stimulate children's critical thinking (Siraj et al., 2020). Thus, this study expands the understanding that children's cognitive development is not only influenced by teacher-child interaction, but also by the capacity of institutions to support meaningful pedagogic practices.

The integration of quantitative and qualitative findings in this study strengthens the validity of the conclusions through a mixed methods approach. This approach allows researchers not only to identify statistical relationships between variables, but also to understand the mechanisms and dynamics of the implementation of teacher support systems in the field. In line with the view of Creswell & Plano Clark (2021), sequential explanatory design is very effective in explaining why and how an influence occurs. In the context of this study, qualitative data explain that the integration of training, supervision, and institutional support forms a professional ecosystem that supports the sustainability of learning practices. This shows that teacher support systems should be understood as a social and organizational process, not just a technical program.

Although the findings of this study support the initial hypothesis, there are several factors that could potentially influence the variation in results. For example, differences in the leadership capacity of the head of the institution and the culture of the organization can moderate the effectiveness of the teacher support system. Research by Hallinger (2022) shows that weak instructional leadership can limit the impact of teacher professional development programs. In addition, the limitations of this study lie in the relatively narrow coverage of the area and the cross-sectional design, so the generalization of the results needs to be done carefully. Therefore, further research is recommended to use longitudinal design and involve more diverse institutional contexts.

Overall, this study makes a significant theoretical and empirical contribution to the study of early childhood education. Theoretically, this study enriches the understanding of teacher support systems as an integrated approach that has a direct impact on children's behavioral and cognitive development. In practical terms, these findings can serve as a basis for institutional managers and policymakers to design more comprehensive and sustainable teacher support systems. This research also opens up space for the development of an early childhood education policy model that places teachers as the main actors in the systemically supported learning ecosystem. Thus, this study not only answers empirical problems, but also encourages the strengthening of scientific evidence-based preschool education practices and policies.

CONCLUSION AND RECOMMENDATION

This study concludes that an integrated teacher support system has a significant influence on improving early childhood behavioral and cognitive development in preschool educational institutions. Through a mixed methods approach with a sequential explanatory design, quantitative findings show that strengthening teachers' pedagogic competence, consistency of learning practices, and sustainable institutional support contribute significantly to the quality of child development. The qualitative findings deepen these results by revealing

that the integration of professional training, pedagogic supervision, and institutional policies forms a more effective and stable learning ecosystem. The results of this study confirm that fragmented teacher support practices are less than optimal support systems that are designed in an integrated and sustainable manner. Thus, this research makes an important contribution to the development of early childhood education theory and becomes an empirical basis for institutional managers and policymakers in designing a more integrated, contextual, and holistic child development teacher support system.

ADVANCED RESEARCH

Future studies are recommended to examine the long-term impact of integrated teacher support systems on early childhood outcomes using longitudinal designs. Further research could also explore the effectiveness of such systems in different institutional contexts and regions, as well as incorporate additional variables such as parental involvement and digital pedagogic support to enrich the understanding of holistic child development.

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