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# Implementation of Educational Service Practices to Support Children's Literacy and Numeracy During the Transition from Early Childhood Education to Primary School

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**Abstract:** This study aims to analyze the implementation of educational service practices that support children's literacy and numeracy during the transition from Early Childhood Education (ECE) to Primary School, as well as to identify the supporting and inhibiting factors influencing this process. A descriptive qualitative approach was employed through classroom observations, in-depth interviews, and document analysis in schools implementing the *Joyful Transition from ECE to Primary School* program. The collected data were analyzed using the Miles, Huberman, and Saldaña interactive model. The results revealed three main themes. First, effective transition practices are supported by strong collaboration between ECE and primary school teachers, principal leadership, and active parental engagement. Second, play-based and science-integrated learning strategies enhance children's literacy, numeracy, and socio-emotional development through contextual and exploratory learning experiences. Third, several challenges were identified, including limited learning resources, inconsistent perceptions of children's academic readiness, and insufficient professional training related to transition policies. The discussion indicates that these challenges can be mitigated through reflective dialogue, peer mentoring, and the use of locally available learning materials. In conclusion, sustainable and joyful transition services require continuous teacher capacity building, pedagogical alignment between educational levels, and consistent policy support to ensure inclusive, meaningful, and developmentally appropriate learning experiences for all children.

**Keywords:** ECE–primary transition; Literacy; Numeracy; Teacher collaboration; Play-based learning.

## Introduction

The implementation of educational service practices during the transition from Early Childhood Education (ECE) to Primary School is essential in promoting children's readiness to learn and ensuring continuity in their educational experiences. This transition phase encompasses not only administrative adjustments but also a complex adaptation process involving children's social, emotional, cognitive, and academic readiness. Ineffective transition practices can lead to disruptions in learning continuity, early academic stress, and gaps in foundational literacy and numeracy skills. Effective educational services should be grounded in developmentally appropriate practices, aligning learning activities with children's developmental stages to provide meaningful and engaging experiences (Bredekamp & Copple, 2019). Educational services act as a bridging system between the play-based, exploratory learning approaches in ECE and the more structured, formal learning environment in primary school, with particular emphasis on literacy, numeracy, and basic science skills.

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The transition from ECE to Primary School is a critical and complex developmental phase influenced by broader social, cultural, and institutional contexts. Traditional transition practices may inadvertently reinforce inequities and marginalize the voices of children and families, especially those from disadvantaged backgrounds (Kurniati et al., 2025). Effective transition practices should move beyond academic readiness alone, considering children's agency, cultural inclusivity, and the social contexts they inhabit. Collaborative engagement between educators, families, and communities, as well as reflective and inclusive pedagogical approaches, are necessary to ensure equitable opportunities for all children to thrive academically, socially, and emotionally.

The Fun Transition from ECE to Primary School Policy (Kemendikbudristek, 2023), emphasizes that school readiness should not be measured solely by reading, writing, and arithmetic (calistung) abilities but by more holistic developmental aspects. This policy was formulated in response to the persistence of academically oriented transition practices that are not aligned with children's developmental needs. This policy places children at the center of the learning process and encourages the implementation of activities that foster curiosity, exploration, and understanding of basic life concepts. The adoption of a science-based learning approach during the transition period is essential, as it allows children to observe, experiment, and reason in simple ways skills that contribute to the development of both literacy and numeracy (Clements & Sarama, 2021; Suryadi, 2024)

Literacy and numeracy skills serve as fundamental pillars of learning readiness at the primary education level. These skills are widely recognized as predictors of later academic success and learning sustainability. Literacy involves understanding symbols and language, while numeracy relates to logical thinking, pattern recognition, and comprehension of number concepts (Neuman & Roskos, 2021) Effective educational service practices integrate literacy and numeracy through contextual and exploratory activities, such as reading picture books about natural phenomena, categorizing objects by size and shape, or counting simple observational data in science-related activities. Such learning experiences not only strengthen children's foundational academic skills but also nurture curiosity and scientific thinking from an early age.

The transition process from ECE to primary school requires the involvement of multiple stakeholders to ensure the continuity of children's learning experiences. Bronfenbrenner, 1979), through his ecological systems theory, explained that children's development is influenced by interactions among family, school, and community environments. Synergistic collaboration among teachers and parents is essential to prevent fragmentation of learning experiences during the transition period. Within the context of educational services, ECE teachers, primary school teachers, and parents must build synergy in providing learning activities that combine play, scientific exploration, and the gradual introduction of literacy and numeracy. Gusrayani & Rohmah, (2023) emphasized that cross-level teacher collaboration ensures pedagogical continuity and reduces learning gaps during the transition phase.

Vygotsky (1978) sociocultural approach also supports the implementation of science-based service practices in transitional education. Social interaction and guided learning enable children to internalize new concepts more effectively during periods of educational change. Through scaffolding and social interaction, teachers can help children understand natural phenomena in simple ways for instance, by observing plant growth, exploring water evaporation, or measuring everyday objects. These activities simultaneously strengthen literacy (through language use and written observations) and numeracy (through measurement and simple calculations). Hence, science-based learning serves as an effective medium for integrating cognitive, linguistic, and socio-emotional development in children.

Service practice disparities are still evident in many primary schools, including those in Tuban Regency, East Java. Unequal implementation of transition services contributes to variations in early-grade literacy and numeracy outcomes. Preliminary observations indicate significant variations in students' literacy and numeracy skills in early grades. Some schools have implemented transition programs such as zero-hour sessions and School Orientation Weeks (MPLS); however, the integration of science-based elements remains limited. Simple science activities have strong potential to support contextual learning but are not consistently incorporated into transition practices. In fact, simple science activities such as water experiments, weight-comparison games, or nature observation can effectively foster contextual literacy and numeracy understanding in children.

Previous studies have shown that transition programs combining science-based, literacy, and numeracy approaches can enhance children's learning readiness. Kumpulainen & Renshaw, (2021) found that scientific exploration-based learning in early grades improves logical thinking and problem-solving skills. In Indonesia, Wulandari and Priyanto (2023) demonstrated that integrating exploratory activities with literacy and numeracy strengthens children's participation in the learning process and improves basic learning outcomes. Empirical evidence focusing on science-based transition practices in rural contexts remains limited. Specific

studies examining the implementation of science-based educational service practices within the ECE–Primary School transition context remain limited, particularly in rural areas such as Tuban.

Based on the foregoing discussion, this study focuses on the implementation of educational service practices that integrate science, literacy, and numeracy approaches to support children's learning readiness during the transition from ECE to primary school. This research is conducted to address gaps between policy expectations and actual classroom practices. The study aims to analyze the forms of services, implementation strategies, and challenges faced by teachers in applying these practices. The findings are expected to strengthen theoretical understanding of transition services and inform practical improvements in school-level implementation. The findings are expected to contribute theoretically to the development of a science-based transition service model and provide practical recommendations for schools in creating enjoyable, continuous, and developmentally appropriate learning adaptation processes.

## Method

descriptive design, focusing on an in-depth understanding of the implementation of educational service practices that support children's literacy and numeracy during the transition from Early Childhood Education (ECE) to Primary School. This approach was chosen to provide a comprehensive description of the experiences, strategies, and dynamics involved in the implementation of science-based educational services in primary education institutions. According to Creswell (2018), qualitative research allows researchers to explore the meanings constructed by participants toward a phenomenon within its natural context. In this study, the researcher acted as the main instrument, directly involved in the processes of observation, interviews, and documentation to understand the real practices of transitional services integrating literacy, numeracy, and simple science exploration activities.

The research subjects consisted of ECE teachers, early-grade primary school teachers, school principals, and parents from several educational institutions in Tuban Regency, East Java. Participants were selected using a purposive sampling technique, based on the consideration that they had direct experience in implementing ECE–Primary School transition programs and science-based learning activities. The research site was determined in a school cluster actively implementing the *Fun Transition from ECE to Primary School Program*, considering the presence of service practices such as *zero-hour sessions* (early literacy and numeracy habituation) and the *School Orientation Period (MPLS)*, which included children's exploratory scientific activities.

The data in this study were qualitative in nature and collected through three main techniques: observation, in-depth interviews, and document study. Observation was conducted to directly examine classroom learning practices containing literacy, numeracy, and science activities in early primary grades, such as reading storybooks about natural phenomena, counting concrete objects from exploration, and engaging in simple discussions about cause-and-effect relationships in daily life. Interviews were conducted with teachers and principals to explore the implementation forms, strategies, and challenges encountered in integrating science-based services into literacy and numeracy activities. Documentation, including lesson plans, activity photos, and children's progress records, was used to strengthen the findings from observations and interviews.

Data analysis was conducted interactively using the Miles et al (2018) model, which consists of data reduction, data display, and conclusion drawing. Data reduction involved selecting and categorizing information relevant to the research focus, such as patterns of service implementation, learning strategies, teacher collaboration, and supporting or inhibiting factors in the field. The reduced data were then presented in descriptive narratives, matrices, and direct quotations from informants to enhance the validity of the findings. Conclusions were derived through iterative verification and *member checking* with participants to ensure the accuracy of the researcher's interpretations.

Data validity was ensured through source and method triangulation, by comparing the results of observations, interviews, and documentation from multiple perspectives to obtain consistent information. Additionally, the researcher conducted *reflexivity* to minimize bias throughout the research process and maintained an *audit trail* as systematic evidence of the analytical procedures conducted. All research activities were carried out in accordance with ethical research principles, including obtaining participants' consent, ensuring data confidentiality, and respecting children's comfort and safety during all activities.

Overall, this research method aimed to obtain a comprehensive understanding of how science-based educational service practices are implemented to support children's literacy and numeracy during the transition from ECE to Primary School. The qualitative approach allowed the study to uncover the meanings, strategies, and values underlying these service practices while providing relevant recommendations for developing enjoyable, contextual, and sustainable transition learning models in primary education

settings. To provide a clearer overview of the research procedure, the stages of this study are illustrated in the research flowchart presented in Figure 1.


**Figure 1**. Flowchart of the Research Procedure

The flowchart summarizes the systematic steps undertaken in this study, from determining the research focus to drawing conclusions, and ensures the coherence and rigor of the qualitative research process.

## Result and Discussion

*Overview of the Research Site*

The research was conducted in two early childhood education institutions (PAUD) and two primary schools (SD/MI) located in Tuban Regency, East Java. These institutions were selected because they had implemented transition programs supporting children's literacy and numeracy development at the beginning of primary education. Each institution had developed specific programs focusing on reading readiness, counting skills, and science-based exploration to support school readiness.

**Table 1.** Profile of Schools and Teachers Involved in the Study

| Institution | Level | Number of Teachers | Number of Students | Special Transition Program |
|---|---|---|---|---|
| PAUD Mawar Indah | PAUD | 5 | 48 | Storytelling, letter recognition games, counting with objects |
| PAUD Cendekia Tuban | PAUD | 6 | 52 | Literacy corner, science corner, parent reading day |
| SDN Tuban 03 | Primary | 12 | 164 | Zero-hour reading program, numeracy games |
| MI Al-Hidayah | Primary | 10 | 145 | Two-week school orientation with literacy and numeracy focus |

Teachers involved in the program were predominantly female, aged between 27 and 50 years, with an average teaching experience of 10–15 years. Most teachers had received training from the local education department related to the *Transition from PAUD to Primary School* policy.

*Implementation of Educational Service Practices*

The implementation of educational service practices to support children's literacy and numeracy during the transition period involved three main components: learning design, teaching implementation, and collaboration with parents. In the learning design phase, teachers developed activity-based lesson plans combining reading, writing, counting, and scientific observation. Teachers from PAUD and primary schools met twice a semester to align learning goals and share strategies to ensure continuity of learning.

During the implementation phase, classroom activities were observed for three weeks. The observed practices included daily reading sessions, interactive counting games, and simple science experiments such as observing seed germination and color mixing. Students showed enthusiasm and active participation during the sessions. Teachers used various learning media, including picture books, flashcards, natural materials

(leaves, stones, seeds), and recycled items to create concrete learning experiences.

The collaborative phase involved parents through the "Home Reading Log" and "Family Numeracy Challenge." Parents recorded children's reading activities and simple counting tasks at home. Teachers reviewed these records every Friday to monitor children's progress and motivate parents' involvement.

**Table 2.** Implementation of Educational Service Practices

| Type of Service | Learning Activity | Objective | Observation Findings |
|---|---|---|---|
| Literacy-based learning | Storytelling, phonics games, name writing | To improve recognition of letters and simple words | 85% of students could identify 15–20 letters correctly after three weeks |
| Numeracy-based learning | Counting everyday objects, comparing quantities, number puzzles | To develop understanding of numbers and patterns | 78% of students showed improved accuracy in counting and sorting tasks |
| Science-integrated learning | Mixing colors, planting seeds, observing evaporation | To connect literacy and numeracy through real-world exploration | Students became more curious and communicative during discussion |
| Collaborative learning | Group games, peer reading, shared story creation | To strengthen social interaction and communication | Students became more confident in expressing ideas verbally |
| Parental involvement | Reading log, numeracy at home | To enhance home–school collaboration | Parents reported more frequent home reading activities (3–4 times per week) |

*Impacts on Children's Literacy and Numeracy Development*

The implementation of transition service programs produced measurable outcomes. Based on pre- and post-observation assessments conducted over one month, the children's literacy and numeracy competencies improved significantly.

**Table 3.** Comparison of Children's Literacy and Numeracy Skills Before and After Program Implementation

| Competency | Before Implementation | After Implementation | Improvement (%) |
|---|---|---|---|
| Recognizing letters A–Z | 60% of children | 92% of children | +32 |
| Reading simple words | 48% of children | 81% of children | +33 |
| Counting objects up to 20 | 55% of children | 88% of children | +33 |
| Comparing sizes and quantities | 42% of children | 79% of children | +37 |
| Expressing ideas verbally | 50% of children | 85% of children | +35 |

Qualitative data from teacher interviews indicated that students who were initially shy became more confident during reading and counting activities. Teachers also reported increased student engagement and curiosity during science-based lessons. One PAUD teacher commented:

"*Children now ask more questions during activities. They like to count seeds or describe what they see. They are more active and not afraid to speak*."

Similarly, primary school teachers observed that children who attended PAUD transition programs adapted more smoothly to formal learning structures.

To ensure the credibility of the findings, data triangulation was conducted by comparing observation, interview, and documentation data. The results of the triangulation are presented in Table 4.

**Table 4**. Results of Data Triangulation

| Focus of Analysis | Observation Results | Interview Findings | Documentation Evidence | Triangulation Conclusion |
|---|---|---|---|---|
| Implementation of science-based transition services | Classroom observations showed the integration of literacy and numeracy through science activities such as storytelling about natural phenomena, counting observed objects, and simple experiments | Teachers stated that science-based activities help children understand literacy and numeracy concepts in a contextual and enjoyable way | Lesson plans, activity photos, and transition program documents indicated regular implementation of science-integrated activities | Data from all sources consistently confirm the implementation of science-based transition services |

| Focus of Analysis | Observation Results | Interview Findings | Documentation Evidence | Triangulation Conclusion |
|---|---|---|---|---|
| Children's literacy development | Most children demonstrated improved letter recognition and ability to read simple words during learning activities | Teachers reported increased confidence and verbal participation among children | Reading logs and student progress records showed consistent improvement over time | Observation, interview, and documentation data support the improvement of children's literacy skills |
| Children's numeracy development | Children showed increased accuracy in counting, comparing quantities, and sorting objects | Teachers noted better number sense and problem-solving abilities | Assessment sheets and activity records documented numeracy-related tasks | Triangulated data confirm improvement in children's numeracy skills |
| Student engagement and participation | High levels of enthusiasm and active participation were observed during science-based activities | Teachers reported increased curiosity and willingness to ask questions | Photographs and observation notes showed active classroom interaction | Consistent evidence indicates increased engagement and curiosity |
| Parental involvement in transition services | Parents regularly submitted home reading and numeracy tasks | Parents and teachers reported improved home–school collaboration | Home reading logs and communication records were available | Data triangulation confirms active parental involvement |

The triangulation results demonstrate consistency across data sources, indicating that the findings regarding science-based transition services are credible and well-supported.

*Challenges in Implementation*

Several challenges were identified during program implementation. First, there was a disparity in students' readiness, as some children could already read fluently while others were still recognizing letters. Second, schools had limited teaching aids and books, which affected activity variation. Third, teachers mentioned that not all parents consistently engaged in home activities due to work constraints.

Despite these issues, teachers showed creativity in using locally available materials and conducting regular communication with parents to sustain collaboration. Support from the Tuban Education Department through teacher workshops was also reported as helpful in maintaining program quality.

The findings of this study show that educational service practices in Tuban provide meaningful support for children's literacy and numeracy across the transition from early childhood education to primary school. This shift reflects the national policy on joyful transition, which encourages child-centered learning that respects developmental stages while reducing pressure on early reading and mathematics. Evidence from Indonesian research supports this direction, showing that playful and engaging literacy practices increase children's motivation and emotional comfort when entering primary school(Wulandari and Susanto 2022). International studies similarly emphasize the importance of developmentally appropriate learning for strengthening early foundational skills (Bredekamp and Copple 2019).

Continuity of pedagogy between PAUD and Grade 1 emerged as a major factor that contributes to a smooth transition. The Tuban teachers maintained familiar learning routines, such as storytelling, number games, and collaborative play, which helped children feel secure in a new environment. This is in line with global evidence showing that continuity supports emotional stability and reduces the stress commonly experienced during the first months of primary school (Margetts 2018). Indonesian evidence also echoes this pattern, showing that alignment of classroom routines significantly improves children's adaptive behavior and readiness during early primary schooling (Rahmawati and Yusuf 2021).

The integration of science-based exploration into literacy and numeracy practices represents one of the strongest contributions found in this study. Children were encouraged to observe natural objects, record quantities, make simple predictions, and describe their findings. This aligns with international evidence that inquiry-based and integrated learning enhance conceptual understanding and strengthen children's reasoning abilities (Chen and Lee, 2020; Fleer, 2020). National studies likewise support this approach, showing that contextual inquiry activities significantly increase early numeracy performance in Indonesian classrooms (Sari and Pramesti 2023).

Socio-emotional development also played a central role in supporting learning continuity. The use of group activities, songs, and collaborative tasks helped children express themselves and regulate their emotions, which contributed to smoother adaptation to academic routines. This is consistent with Bronfenbrenner's

ecological perspective and research emphasizing the influence of emotional security on learning engagement (Blair and Raver 2015; Yoshikawa et al. 2020). Indonesian evidence supports this link as well, showing that structured social play promotes emotional readiness and reduces behavioral challenges during the early months of school (Fitriani and Nirmala 2020).

Another key element emerging from this study is the importance of teacher collaboration between PAUD and primary school. The Tuban teachers regularly exchanged information about children, shared assessment insights, and coordinated learning strategies. International findings show that such collaboration helps sustain developmental continuity and reduces disparities in instructional expectations (Einarsdottir 2019; Petriwskyj 2020). Indonesian research also confirms that structured collaboration leads to better curriculum alignment and improved transition outcomes (E. Rahmawati and Siregar 2024).

Parental involvement was found to strengthen children's literacy and numeracy development during the transition. Teachers encouraged parents to participate in home reading activities, simple numeracy games, and observation-based science tasks. This aligns with Epstein's model of school-family-community partnerships, which emphasizes shared responsibility for children's learning (Epstein 2018). National studies further show that parental engagement improves children's readiness, motivation, and focus during early schooling (Trihapsari et al. 2024; Rahman and Lestari, 2022).

Despite these strengths, the study identified significant challenges related to differences in children's readiness levels. Some children entered Grade 1 with fluent reading skills, while others had difficulty recognizing letters or numbers. International evidence shows that such gaps are common in countries with varied access to early childhood education (OECD, 2022). In the Indonesian context, similar readiness disparities have been reported, where variations in early literacy and numeracy skills are closely associated with unequal access to quality early childhood education and differences in home learning environments (Asnawi et al., 2023; Lestari, 2020; Mariyana, 2025) These gaps highlight the need for targeted interventions and differentiated instruction to address diverse learning needs at the early primary level.

In Indonesia, readiness disparities are strongly linked to unequal access to quality PAUD and differences in family literacy environments (Suryadi 2024; Utami and Handayani, 2020). These gaps highlight the need for targeted interventions and differentiated instruction.

Resource limitations also hinder the full implementation of transition practices. Teachers in rural Tuban reported limited access to books, manipulatives, and science materials, which affected their ability to conduct exploratory learning. This finding is similar to national evidence documenting persistent disparities in educational resources in rural areas (Putri and Hardiyanti 2024). International studies also show that resource constraints reduce opportunities for hands-on learning and weaken early literacy and numeracy development (Darling-Hammond et al. 2020).

Continuous teacher professional development also emerged as an important need. Sustaining high-quality transition practices requires ongoing reflection, mentorship, and collaborative learning, which align with global evidence showing that professional communities improve teacher practices and student outcomes (Avalos, 2011; Darling-Hammond et al. 2020). In the Indonesian context, limited structured training opportunities prevent teachers from fully adopting innovative transition strategies (Gusrayani and Rohmah 2023).

Overall, the findings of this study highlight the importance of integrated, contextual, and child-centered practices in supporting early literacy and numeracy during the transition from PAUD to primary school. The evidence aligns with global research on constructivist, sociocultural, and ecological learning frameworks. At the same time, national findings reinforce the need to address resource disparities, strengthen teacher collaboration, and expand parental involvement. Sustainable improvement will require ongoing policy support, professional development, and systematic coordination across early childhood and primary education sectors.

## Conclusion

This study shows that science-based educational service practices during the transition from Early Childhood Education to Primary School effectively enhance children's literacy and numeracy development through contextual and play-based learning. The integration of literacy, numeracy, and simple science activities increases children's engagement, confidence, and understanding, supported by strong teacher collaboration, school leadership, and parental involvement. Despite challenges such as limited resources, differing perceptions of school readiness, and insufficient professional training, the findings underscore the importance of pedagogical alignment and continuous teacher capacity building. Overall, the study contributes evidence that developmentally appropriate, science-integrated transition services are essential for ensuring meaningful learning continuity and inclusive early-grade education.

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The authors declare no conflict of interest

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