International Journal of Language Education
Volume 9, Number 2, 2025, pp. 449-459
ISSN: 2548-8457 (Print) 2548-8465 (Online)
Doi: https://doi.org/10.26858/ijole.v1i2.75814

Enhancing Native Language Pedagogy in Preschool Education: Integrating Cultural Contexts and Sustainable Development Goals (SDGs)

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Received:4 December 2023
Reviewed:4 March 2025-25 May 2025
Accepted:10 June 2025
Published: 30 June 2025

Abstract

This study aims to enhance native language pedagogy in preschool by integrating interactive, digital, and culturally rooted methods in alignment with the Sustainable Development Goals (SDG 4 and SDG 11). A mixed-methods approach was employed, involving preschoolers and pre-service educators across various institutions. Quantitative data from vocabulary and comprehension tests, and qualitative insights from interviews and observations, showed that digital tools and cultural integration yielded greater language acquisition and engagement. Traditional methods underperformed in all indicators. Because language is deeply tied to identity and development, teaching practices that reflect culture and leverage innovation promote inclusivity, participation, and early literacy. These findings suggest that incorporating SDG-

aligned strategies into educator training can foster educational equity and cultural sustainability in early learning environments.

Keywords: Cultural integration; digital pedagogy; early childhood education; native language; SDG 4.

Introduction

Language serves as the foundation for communication, thought expression, and cognitive development in early childhood education. Many reports regarding language education have been well-documented (Fatawi et al., 2024; Ibrahim et al., 2023; Luckyardi et al., 2024a; Farida et al., 2024; Farida et al., 2023; Luckyardi et al., 2024b; Cardoso et al., 2023; Alek & Nguyen, 2023; Saadu, 2023; Damayanti & Santosa, 2024; Bangun et al., 2024; Suparto et al., 2023; Karmaker, 2025; Barbe et al., 2023; Meldawati, 2023).

Mastery of the native language not only facilitates social interaction but also plays a crucial role in building emotional intelligence and academic readiness. In preschool settings, language acquisition shapes a child's identity and fosters cultural continuity. However, in many early education institutions, language instruction remains heavily reliant on traditional pedagogies that emphasize rote memorization and lack meaningful engagement with children's lived experiences or sociocultural background. These approaches often disregard the diverse learning needs of children and the potential for language to act as a medium of both self-expression and cultural connection.

Contemporary educational psychology emphasizes interactive, constructivist, and multisensory learning, which aligns more closely with how young children naturally acquire language (Glushchenko, 2023). Current theories highlight the importance of experiential learning and multiple intelligences in shaping instructional practices that are inclusive and developmentally appropriate. Research also underscores the need for culturally responsive pedagogy, especially in linguistically diverse societies, where integrating folklore, traditional songs, and proverbs can increase emotional attachment and cognitive retention among learners (Kuzmina & Fominykh, 2021). In parallel, the global Sustainable Development Goals (SDGs), particularly SDG 4 on inclusive and equitable quality education and SDG 11 on sustainable communities, call for transformative educational practices that respect cultural heritage and promote lifelong learning from an early age.

This study aims to evaluate and compare four methodologies for teaching native language in preschool (traditional, interactive, digital, and culturally integrated) and determine their effectiveness in enhancing vocabulary acquisition (Suhardi, 2023), comprehension, and engagement. It contributes a novel perspective by connecting native language instruction with the broader educational and cultural objectives of the sustainable development goals (SDGs) (Ragadhita et al., 2026), a link that remains underexplored in early childhood pedagogy. The study also proposes methodological reforms in preschool teacher training, emphasizing the integration of innovation and cultural relevance in instructional strategies. By aligning early language education with global development goals and child-centered theories, this research offers a sustainable and context-sensitive model for improving educational equity and preserving linguistic identity

Theoretical background

The theoretical framework for this study is grounded in sociocultural, cognitive, and constructivist learning theories, all of which underscore the importance of context, interaction, and cultural relevance in early childhood language development. Theory of the Zone of Proximal

Development (ZPD) posits that children's learning is maximized when guided by more knowledgeable others within meaningful social contexts. In language education, this translates to dialogic instruction, shared storytelling, and collaborative tasks that scaffold linguistic abilities through authentic communication. Preschool educators thus play a vital role in supporting children's verbal growth by embedding language in socially interactive experiences.

Cognitive developmental theory, particularly the preoperational stage (ages 2–7), emphasizes symbolic thought and language as central to learning. At this stage, children benefit from instruction that integrates play, imagination, and sensory exploration. Some reports extended this by highlighting the importance of active discovery in learning environments where children construct knowledge through experiences. These theories advocate for instructional strategies such as role-play, music, and visual materials that allow children to internalize language through repeated and meaningful exposure.

Additionally, the theory of Multiple Intelligences supports the diversification of instructional techniques to accommodate children's varying learning styles (Husnia et al., 2023; Yunisah et al., 2023). For instance, musical intelligence can be activated through rhymes and songs, while bodily-kinesthetic intelligence may be engaged through movement-based language games. Importantly, integrating local culture into language instruction (through folklore, traditional proverbs, and heritage-based content) aligns with both pedagogical theory and global development aims. SDG 4 advocates for inclusive education that addresses cultural and linguistic diversity, while SDG 11 emphasizes the preservation of cultural identity in the pursuit of sustainable communities (Kuzmina & Fominykh, 2021).

Taken together, these theoretical models inform a pedagogical approach that is interactive, culturally rooted, and developmentally appropriate. They justify the shift from rote memorization to learner-centered methods that stimulate curiosity, engagement, and identity formation. This study builds upon these frameworks to explore how modern instructional strategies can be embedded into early childhood curricula and teacher training programs, not only to improve language outcomes but also to meet the broader targets of sustainable and inclusive education.

Research method

This study adopted a mixed-methods design to evaluate the effectiveness of four native language teaching methodologies in preschool education: traditional, interactive, digital, and culturally integrated. The research employed both quantitative and qualitative approaches to gain a comprehensive understanding of how various pedagogical strategies impact vocabulary acquisition, comprehension, and learner engagement. Detailed information regarding this method is reported elsewhere (Susilawati et al., 2025). The use of a quasi-experimental design enabled the comparison of pre- and post-intervention outcomes across different instructional models.

This study adopted a mixed-methods design to evaluate the effectiveness of four native language teaching methodologies in preschool education: traditional, interactive, digital, and culturally integrated. The research employed both quantitative and qualitative approaches to obtain a comprehensive understanding of how different pedagogical strategies affect vocabulary acquisition, comprehension, and learner engagement. The use of a quasi-experimental structure enabled the comparison of pre- and post-intervention outcomes across instructional models. Table 1 provides an overview of the participant groups involved in the study, including preschool children, pre-service educators, and participating institutions.

A total of 160 preschoolers (ages 4–6) participated, with balanced representation by age and gender. Twenty final-year pre-service educators from a pedagogical university were assigned as instructors across ten preschool education centers located in urban and suburban areas.

Participants were randomly distributed into four groups, each utilizing one of the teaching methodologies over a 12-week period. Prior to the intervention, all educators received targeted training to ensure consistency in delivery.

Table 1. Participant groups and descriptions

Group	Description
Children	160 preschoolers (ages 4–6), balanced by age and gender
Educators	20 final-year students at a pedagogical university (pre-service preschool teachers)
Institutions	10 preschool education centers in urban and suburban areas

The study employed several data collection instruments to evaluate vocabulary growth, comprehension improvement, and learner engagement. These included a picture-based vocabulary test, an oral comprehension assessment, an observation sheet for engagement, and an educator interview guide. Each instrument was designed with attention to developmental appropriateness and was reviewed by a panel of child psychology and linguistics experts. Table 2 summarizes the key instruments used for data collection, detailing their purpose and format as applied during the intervention period.

Table 2. Data collection instruments

Instrument	Purpose	Format
Vocabulary Test	Measure word acquisition	30-item picture-word test
Comprehension Test	Evaluate sentence understanding and usage	Oral test with visual prompts
Engagement Observation Sheet	Rate interest and participation	3 observers per group, 2x/week on 10-point scale
Educator Interview Guide	Collect qualitative feedback	Semi-structured interview

Statistical analysis was conducted using descriptive statistics and ANOVA to assess differences in language development outcomes across the groups. Detailed information regarding this statistical analysis is reported elsewhere (Fiandini et al., 2024; Rahayu et al., 2024; Afifah et al., 2022). Cohen's kappa coefficient (0.87) confirmed strong inter-rater reliability in the observational data. Thematic analysis of interview transcripts and triangulation with observation data enhanced the credibility and depth of qualitative findings.

In short, quantitative data were analyzed using descriptive statistics (mean, percentage gain) and ANOVA to test for significant differences across groups. Engagement scores were compiled from twice-weekly observations conducted by three trained raters, with high inter-rater reliability (Cohen's kappa = 0.87). Qualitative data from educator interviews were subjected to thematic analysis, and findings were triangulated with observation results to enhance validity and interpretation.

This methodological approach allowed for a multi-layered analysis of instructional practices, capturing not only measurable language gains but also the emotional and cultural dynamics that influence learning in early childhood. It aligns with global calls under SDG 4 for evidence-based educational reforms that promote equity and innovation in teacher training and early learning environments (shown in the National Association for the Education of Young Children in 2020 regarding *Developmentally appropriate practice in early childhood programs*).

Results and discussion

Table 3 presents the average vocabulary growth, comprehension improvement, and engagement scores across the four instructional methodologies tested in this study. Figure 1 is referenced in the results section to visualize comparative performance among the four teaching methods. This data supports current studies, as reported elsewhere regarding the issue in analyzing data using vocabulary impact (Kurniawati, 2022; Sidik & Masek, 2021; Salsabila & Setiana, 2025; Rusyani et al., 2022).

Table 3. Comparative results of teaching methodologies

Teaching Method	Avg Vocabulary Growth (%)	Comprehension Improvement (%)	Child Engagement Level (1–10)
Traditional	12	10	5.0
Interactive	28	25	8.0
Digital Tools	35	33	9.0
Cultural Integration	30	31	8.5

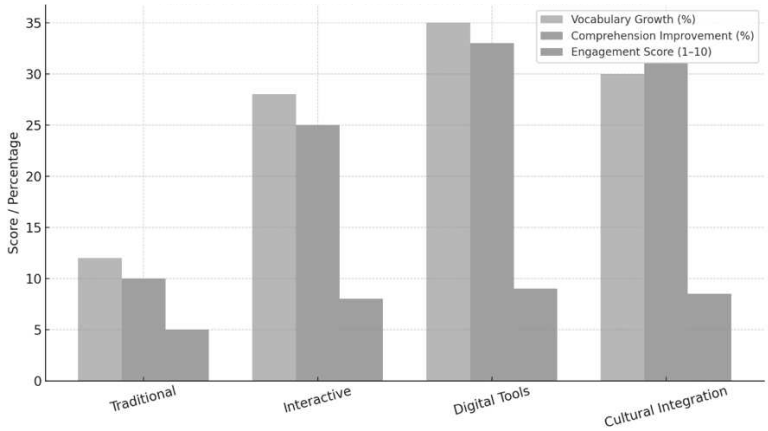

Figure 1. Performance comparison of teaching methods.

Children taught using digital tools exhibited the highest vocabulary growth (35%) and comprehension improvement (33%), followed closely by the culturally integrated group with 30 and 31%, respectively. The interactive method also showed strong outcomes, with vocabulary growth of 28% and comprehension improvement of 25%. The traditional approach lagged behind significantly, showing only 12% growth in vocabulary and 10% in comprehension. These results reflect how technology-enhanced and culturally contextual instruction better supports early language acquisition, possibly because it provides multimodal input and meaningful content that mirrors children's lived experiences (Kuzmina & Fominykh, 2021). A more compact view of the overall outcomes is presented in Table 4.

The engagement scores further reinforce the trend observed in vocabulary and comprehension results. Children in the digital group scored 9.0 on the engagement scale, while the cultural and interactive groups scored 8.5 and 8.0, respectively. The traditional group showed the lowest engagement at 5.0. This suggests that students are more likely to remain focused and participate actively when learning experiences are emotionally engaging, interactive, or technologically mediated. These findings align with constructivist views that learning should be child-centered and exploratory, and support SDG 4’s emphasis on inclusive, quality education through innovative practices.

Table 4. Vocabulary, comprehension, and engagement scores by teaching method

Teaching Method	Vocabulary Growth (%)	Comprehension Improvement (%)	Engagement Score (1–10)
Traditional	12	10	5.0
Interactive	28	25	8.0
Digital Tools	35	33	9.0
Cultural Integration	30	31	8.5

Statistical analysis using ANOVA confirmed that the differences between the traditional group and the other three groups were statistically significant ($p < 0.01$), especially in vocabulary and comprehension scores. However, no significant differences were found among the interactive, digital, and culturally integrated groups, suggesting comparable effectiveness when traditional constraints are removed. This reinforces the need to incorporate multiple strategies into teacher training programs rather than relying on a single methodology.

Interview responses provided further depth to these findings. A majority of educators reported that digital tools enhanced both student interest and lesson flexibility, while cultural elements fostered emotional resonance and classroom participation. Several teachers using traditional methods expressed frustration with students' low motivation and limited vocabulary retention. These qualitative insights validate the quantitative results and highlight the need for a paradigm shift in preschool language education.

By integrating innovative and culturally responsive methodologies, educators not only foster language development but also address the broader aims of sustainable and inclusive education. These findings support the inclusion of such strategies in preschool teacher training curricula as a means to strengthen early literacy, cultural identity, and learner engagement in alignment with the SDGs.

Figure 1 and Table 3 illustrate clear differences in effectiveness among the four teaching methods applied in preschool native language instruction. Digital tools yielded the highest outcomes across all dimensions: vocabulary growth (35%), comprehension improvement (33%), and learner engagement (9.0 on a 10-point scale). Culturally integrated methods and interactive approaches also demonstrated strong results, with only slight variation in percentage gains. In contrast, traditional methods showed significantly lower outcomes, indicating the limitations of passive, rote-based instruction in early childhood contexts.

These findings align closely with constructivist and sociocultural theories of learning (Babalola & Adedokun-Shittu, 2024). Language acquisition thrives in environments that promote social interaction and guided participation. The digital and interactive groups in this study benefited from dialogue, feedback, and multimodal stimuli that created dynamic learning experiences, conditions supported by the notion of scaffolding and discovery-based instruction. Moreover, the use of visual, auditory, and kinesthetic elements in the digital group reflects the multiple intelligences framework, which suggests that children learn best when instructional methods cater to diverse cognitive strengths.

Culturally integrated pedagogy, meanwhile, offered children meaningful exposure to language through familiar stories, songs, and proverbs (Nacionales & Calixto Jr, 2024; Organia et al., 2023; Arciosa et al., 2023). This approach not only improved comprehension but also fostered emotional connection and cultural identity (Kuzmina and Fominykh, 2021). Children's increased motivation and willingness to participate in culturally resonant lessons confirm that language is

not merely a cognitive tool, but also a carrier of social belonging and values (shown in the National Association for the Education of Young Children in 2020 regarding Developmentally appropriate practice in early childhood programs). That is why many reports regarding children education as reported elsewhere (Widiana & Harwanto, 2025; Menge et al., 2025; Khamsah & Nandiyanto, 2024; Sirodjoyna & Abdumalikovna, 2024; Azamkhulova et al., 2024; Sirodjovna & Abdumalikovna, 2024a; Sirodjovna & Abdumalikovna, 2024b; Syarifatunnisaa et al., 2023; Viyana et al., 2023; Riteshkarmaker, 2023).

The results also underscore the urgency of aligning early language instruction with Sustainable Development Goals. SDG 4 advocates for inclusive, equitable, and quality education, while SDG 11 calls for culturally inclusive practices that sustain community identity. By incorporating digital innovation and cultural elements into preschool pedagogy, educators address these goals in a practical, child-centered manner. Furthermore, the statistically significant differences observed in ANOVA ($p < 0.01$) confirm that modern, interactive, and contextually rich instruction is more effective than traditional methods, particularly in vocabulary and comprehension development. This discussion confirms that combining child-centered theory with SDG-driven practice results in substantial gains in early language learning. These insights should inform not only classroom strategies but also curriculum design and educator preparation programs to ensure linguistic equity and sustainable cultural education from the earliest years. This adds new information regarding SDGs as reported elsewhere (Djirong et al., 2024; Kerans et al., 2024; Namoussa et al., 2025; Glovatskii et al., 2025; Yustiarni et al., 2025; Merzouki et al., 2025).

Conclusion

This study confirms that interactive, digital, and culturally integrated methods significantly enhance vocabulary, comprehension, and engagement in preschool native language instruction. Compared to traditional methods, these approaches provide meaningful, inclusive, and developmentally appropriate experiences. Integrating such strategies into teacher training supports SDG 4 and SDG 11 by fostering educational equity and cultural sustainability. Reforming language pedagogy is essential not only for linguistic growth but also for shaping children's identity, participation, and future learning outcomes in a globally connected and culturally diverse society.

Declaration of conflicting interest
The authors declare that there is no conflict of interest in this work.

Funding acknowledgements
The research received no external funding.

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