Int. j. adv. multidisc. res. stud. 2026; 6(5):533-539

Received: 26-07-2026
Accepted: 06-09-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Effects of Teaching and Learning Materials in Early Childhood Education Set-Up: A Case of Four Primary Schools in Limulunga District, Western Province, Zambia

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DOI: https://doi.org/10.62225/2583049X.2026.6.5.6882
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Abstract
This study investigated the effects of teaching and learning materials on the implementation of the National Early Childhood Education (ECE) curriculum in Limulunga District, Western Province, Zambia. Guided by a descriptive research design and a mixed-methods approach, the study sampled 20 participants, including school managers, senior teachers, and ECE educators across four primary schools. Data were collected through structured questionnaires and semi-structured interviews and analysed using both descriptive statistics and thematic analysis. The findings revealed a critical shortage of durable, commercially produced educational resources, with most centres relying almost exclusively on improvised local materials. While teachers demonstrated significant resourcefulness, the study identified improvisation fatigue as a major professional challenge, leading to teacher burnout and reduced instructional time. Pedagogically, the scarcity of materials created a "pedagogical barrier," forcing a shift from the mandated play-based, child-centred approach to traditional, teacher-led rote learning. This shift stifled learner inquiry, limited social collaboration, and hindered the effective assessment of developmental milestones. Furthermore, the lack of diverse sensory aids resulted in an inequitable learning environment that failed to cater to various learning styles, particularly for visual and kinesthetic learners. The study concludes that the "implementation gap" between curriculum aspirations and classroom reality in rural Limulunga undermines the integrity of early childhood development. To address these challenges, the study recommends that the Ministry of Education introduce a dedicated ECE capitation grant and provide standardised "starter kits" of durable manipulatives. Additionally, school managements should formalise community-school partnerships to source raw materials, while teachers are encouraged to form professional teacher circles to share the burden of material creation. Ultimately, bridging the resource gap is essential to ensure that rural ECE learners receive a foundational education equal to their urban counterparts.

Keywords: Early Childhood Education, Material Scarcity, Play-Based Learning, Improvisation, Limulunga District, Curriculum Implementation

1. Introduction

1.1 Background

Early Childhood Education (ECE) is widely recognised as the foundation upon which lifelong learning and development are built, encompassing the critical period from birth to approximately eight years, with emphasis on the pre-primary years (ages 3–6). Quality ECE has been linked to improved cognitive development, better school readiness, higher academic achievement, and positive socio-emotional outcomes later in life (UNESCO, 2015 [44]; UNICEF, 2019). One of the most critical determinants of quality in ECE is the availability and appropriate use of teaching and learning materials, which support play-based learning and enable children to actively engage with their environment.

In Zambia, ECE has increasingly been integrated into the formal education system, with many public primary schools establishing ECE centres. While this expansion has improved access, concerns remain regarding the quality of provision, especially in rural districts such as Limulunga in Western Province, where the inadequacy of teaching and learning materials

undermines effective implementation of the ECE curriculum. This study is grounded in constructivist and ecological perspectives on learning, drawing on Piaget's (1952) theory of active knowledge construction, Vygotsky's (1978) sociocultural theory of mediated learning, and Bronfenbrenner's (1979) ecological systems theory, all of which underscore the necessity of rich, materially stimulating environments for early learning.

1.2 Statement of the Problem

Despite the acknowledged importance of ECE in supporting children's cognitive, social, and emotional development, the quality of ECE provision in many public primary schools in Zambia remains inadequate. A major challenge is the shortage of appropriate teaching and learning materials needed to support play-based and learner-centred instruction as prescribed by the Zambia Education Curriculum Framework (Ministry of Education, 2013). In rural districts such as Limulunga, this challenge is exacerbated by limited funding, poverty, and restricted access to educational resources, resulting in ECE classrooms that operate with minimal or improvised materials. There is limited context-specific empirical evidence on the effects of inadequate ECE materials in Limulunga District, creating a knowledge gap that constrains informed decision-making and targeted interventions.

1.3 Purpose and Objectives of the Study

The main aim of this study was to investigate the effects of teaching and learning materials in Early Childhood Education set-up in four selected primary schools in Limulunga District, Western Province. The specific objectives were to:

- Identify the types and availability of teaching and learning materials used in ECE classrooms in the selected primary schools.
- Assess the effects of teaching and learning materials on learners' participation and learning outcomes in ECE settings.
- Establish the challenges faced by ECE teachers in implementing the curriculum due to inadequate teaching and learning materials.
- Suggest practical strategies for improving the availability and use of teaching and learning materials in ECE classrooms.

1.4 Significance of the Study

The study provides evidence-based insights for policymakers and education planners, including the Ministry of Education, on the status and challenges of ECE provision in rural districts, which can guide resource allocation and policy formulation. It also helps ECE teachers understand how material shortages affect teaching practice and learner engagement, raises awareness among parents and community stakeholders about the importance of investing in ECE resources, and contributes context-specific empirical evidence to the academic literature on rural ECE challenges in Zambia.

2. Literature Review

2.1 Theoretical Framework

This study draws on four complementary theoretical perspectives. Bronfenbrenner's (1979) Ecological Systems Theory frames the effects of material inadequacy as a multilayered issue: at the microsystem level, the absence of manipulatives and visual aids directly limits hands-on learning in the classroom; at the mesosystem level, weak school–home communication reduces the potential for families to compensate for shortages; at the exosystem level, inadequate district and national funding mechanisms constrain the supply of materials; at the macrosystem level, cultural undervaluing of play-based learning reinforces resource neglect; and at the chronosystem level, cumulative exposure to poorly resourced classrooms produces lasting developmental disadvantage.

Vygotsky's (1978) Sociocultural Theory emphasises that cognitive development is mediated through cultural tools and social interaction. Within the Zone of Proximal Development, materials such as storybooks, manipulatives, and role-play resources enable scaffolding by more knowledgeable others; their absence forces a reversion to rote, teacher-centred instruction that undermines mediated, dialogic learning. Piaget's (1952) theory of cognitive development holds that children in the preoperational stage learn most effectively through direct interaction with concrete materials; without such materials, opportunities for problem-solving, spatial reasoning, and symbolic play are severely curtailed. Montessori's (1964) framework further stresses that self-correcting, purposefully designed materials are essential mediators of independent, self-directed learning; their absence forces increased teacher intervention and constrains autonomy, concentration, and confidence.

2.2 Global, Regional, and Local Perspectives

Globally, the effects of inadequate learning materials are evident across both high- and low-resource contexts. Research in North America links under-resourced classrooms to lower vocabulary and problem-solving outcomes (Barnett *et al*., 2017), while European evidence shows that Scandinavian countries invest heavily in resource-rich ECE, in contrast to shortages reported in parts of Southern and Eastern Europe (OECD, 2012; UNICEF, 2018). In Asia, urban centres in Japan, South Korea, and Singapore emphasise abundant learning materials, while rural South and Southeast Asia experience significant shortages that entrench reliance on rote memorisation (UNESCO, 2016; Lu & Rao, 2019).

Within Africa, material inadequacy is particularly acute. Studies in Ghana document a pervasive lack of visual aids and manipulatives that forces teacher-centred instruction (Frimpong, 2021), while South African research links scarcity to children entering primary school underprepared in foundational skills (Education Africa, 2025). Systemic underinvestment compounds the problem: in South Africa, for instance, less than one percent of the education budget is directed to early childhood development (IOL, 2025).

At the national level, the Zambia Enhancing Early Learning (ZEEL) Baseline Report (2023) found that 41% of public ECE centres lack basic teaching and learning materials such as toys, storybooks, and charts. Studies in Itezhi Tezhi, Nkeyema, Kasempa, Solwezi, Kitwe, and Chipata districts consistently report that material shortages undermine play-based pedagogy, constrain literacy development, and increase teacher workload (Chelebela, 2022; Zimba, 2012; Simasiku, 2025). However, most existing Zambian research has concentrated on urban and peri-urban districts, leaving a significant gap in context-specific evidence for rural districts such as Limulunga — a gap this study addresses.

3. Methodology

This study adopted a mixed-methods approach within a descriptive research design, integrating structured questionnaires for quantitative data with semi-structured interviews for qualitative insight. The study was conducted in Limulunga District, Western Province, Zambia, focusing on four primary schools: Ndiki Primary, Kasheke Primary, Nangula Secondary (ECE wing), and Maange Primary School.

The target population comprised ECE teachers, senior teachers, and school managers directly involved in curriculum implementation. A sample of 20 participants — 4 school managers, 4 senior teachers, and 12 teachers, drawn from each of the four schools — was selected using purposive sampling, supplemented by stratified random sampling within each school to ensure representation across staff categories.

Data were collected using structured questionnaires (for quantitative data on material availability, adequacy, and perceived effects) and semi-structured interview guides (for qualitative insight into professional experiences and coping strategies). Instrument validity was established through expert review and a pilot study, while reliability was assessed through internal consistency and a standardised interview protocol. Data collection took place over two weeks following ethical clearance and informed consent from all participants, with confidentiality maintained through anonymisation and coded identifiers (e.g., ST1, T2, SM1). Quantitative data were analysed using descriptive statistics (frequencies and percentages), while qualitative data were analysed thematically.

4. Findings

4.1 Demographic Characteristics of Participants

Table 1 presents the demographic profile of the 20 participants. The sample was predominantly female (70%), with the majority holding a Diploma (50%) or Certificate (40%) as their highest professional qualification, and only 10% holding a Degree. Most participants (40%) had 6–10 years of teaching experience in ECE, and all participants (100%) were drawn from government schools.

Table 1: Demographic Characteristics of Participants (n=20)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	6	30%
	Female	14	70%
Highest Qualification	Certificate	8	40%
	Diploma	10	50%
	Degree	2	10%
Teaching Experience	Less than 1 year	2	10%
	1–5 years	7	35%
	6–10 years	8	40%
	Above 10 years	3	15%
Type of School	Government	20	100%
	Private	0	0%

Source: Field data, 2026.

4.2 Types and Availability of ECE Materials

ECE classrooms in the district rely mainly on low-cost, teacher-made resources. As shown in Table 2, locally made materials (23.53%), charts/posters (17.65%), and flashcards (17.65%) together account for nearly 59% of all materials in use, confirming a heavy reliance on improvisation. In contrast, play materials (8.82%), storybooks (5.88%), manipulatives (5.88%), and digital materials (5.88%) remain scarce, limiting hands-on and interactive learning.

Table 2: Types of Teaching and Learning Materials Available in ECE Classrooms

Material	Frequency	Percentage
Textbooks	5	14.71%
Charts/posters	6	17.65%
Flashcards	6	17.65%
Storybooks	2	5.88%
Play materials/toys	3	8.82%
Manipulatives (blocks, puzzles, beads)	2	5.88%
Locally made materials	8	23.53%
Digital	2	5.88%
Total	34	100%

Source: Field data, 2026.

Qualitative accounts corroborate this pattern. Teachers described extensive reliance on natural and recycled items: one senior teacher explained that stones, sticks, and clay were used to teach counting because they were easy to find around the school grounds, while another described drawing charts on old sacks using charcoal to provide visual aids for the walls. School managers similarly noted that teachers actively collected plastic bottles and cartons to make toys for learners' play time. Printed literacy materials, play materials, and visual/audio aids (chalkboard drawings, songs, and rhymes) were present but in very limited supply, and participants most frequently identified literacy resources, durable manipulatives, modern audio-visual tools, and standard ECE-sized furniture as the categories most critically lacking.

4.3 Adequacy and Frequency of Use of Materials

Table 3 shows that 85% of respondents rated available materials as inadequate or very inadequate (50% "very inadequate" and 35% "inadequate"), with only 15% rating them as adequate and none as very adequate. Table 4 further shows that materials were used inconsistently: 75% of teachers reported using materials only "rarely/sometimes" during lessons, while 25% reported "always" using them, and no respondent selected "often" or "never."

Table 3: Adequacy of ECE Teaching and Learning Materials

Adequacy Rating	Frequency	Percentage
Very adequate	0	0%
Adequate	3	15%
Inadequate	7	35%
Very inadequate	10	50%
Total	20	100%

Source: Field data, 2026.

Table 4: Frequency of Use of Teaching and Learning Materials during Lessons

Frequency of Use	Frequency	Percentage
Always	5	25%
Often	0	0%
Rarely/Sometimes	15	75%
Never	0	0%
Total	20	100%

Source: Field data, 2026.

4.4 Effects of Inadequate Materials on Learners

As shown in Table 5, respondents expressed overwhelming agreement that material scarcity harms learners. Ninety-five

percent strongly agreed that learners understand better when materials are used, 90% agreed that inadequate materials reduce participation, 85% agreed materials scarcity affects creativity, 85% agreed it negatively affects outcomes, and 80% agreed learners lose interest without materials.

Table 5: Respondents' Views on the Effects of Inadequate Teaching and Learning Materials (N=20)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Inadequate materials reduce participation	17 (85%)	1 (5%)	2 (10%)	0 (0%)
Learners understand better when materials used	19 (95%)	0 (0%)	1 (5%)	0 (0%)
Lack of materials affects creativity	17 (85%)	0 (0%)	3 (15%)	0 (0%)
Inadequate materials negatively affect outcomes	12 (60%)	5 (25%)	3 (15%)	0 (0%)
Learners lose interest without materials	16 (80%)	0 (0%)	4 (20%)	0 (0%)

Source: Field data, 2026.

Thematic analysis of interview data identified five key effects on learner participation: increased passive learning and boredom; reduced peer interaction and collaboration; lack of hands-on engagement ("tactile deprivation"); reduced self-expression and creativity, with learners reduced to copying rather than creating original work; and distraction or disruptive behaviour arising from unoccupied energy and competition over scarce items. On interest and motivation, participants described diminished interest and early withdrawal from school, imitative rather than exploratory learning, reduced intrinsic motivation and dependency on the teacher, and negative emotional responses such as frustration and lowered self-esteem linked to an inability to complete tasks.

4.5 Challenges Faced by ECE Teachers in Curriculum Implementation

Table 6 summarises the challenges teachers identified. Insufficient funding was the most cited barrier (85%), followed by difficulty explaining concepts (75%), lack of training in material improvisation (70%), limited learner engagement (60%), and time constraints (50%). Overcrowded classrooms (10%) and lack of storage facilities (40%) were comparatively minor concerns.

Table 6: Challenges Faced by Teachers in Curriculum Implementation

Challenge	Frequency	Percentage
Difficulty explaining concepts	15	75%
Limited learner engagement	12	60%
Overcrowded classrooms	2	10%
Lack of storage facilities	8	40%
Insufficient funding	17	85%
Lack of training in material improvisation	14	70%
Time constraint	10	50%

Source: Field data, 2026.

Qualitative findings elaborated five thematic challenges: improvisation fatigue, where teachers described exhaustion from constantly sourcing, making, and repairing handmade materials; pedagogical struggles in explaining abstract curriculum concepts (such as the solar system, phonics, or mathematical operations) without visual or tactile aids; classroom management difficulties, as boredom from a lack of materials frequently escalated into disruptive behaviour; an inability to cater to diverse learning styles, disadvantaging visual and kinesthetic learners in particular; and difficulties in assessment and evaluation, since teachers lacked the practical tools needed to observe and record objective evidence of developmental milestones. Participants further reported that material scarcity forced a shift away from child-centred, play-based approaches toward teacher-led, rote instruction, eroding opportunities for discovery-based learning and collaborative, social play.

4.6 Strategies for Improving Material Availability

Participants proposed a prioritised set of strategies for addressing material shortages, summarised in Table 7. Increased direct government funding and grants for ECE received the strongest endorsement, followed by formalised workshops for teacher improvisation, strengthened community-school partnerships, sourcing of materials from local artisans and businesses, and partnerships with NGOs for specialised equipment.

Table 7: Analysis of Improvement Strategies

Proposed Strategy	Frequency (n=20)	Percentage	Rank
Increased direct government funding/grants for ECE	19	23%	1
Formalised workshops for teacher improvisation	18	22%	2
Strengthening community-school partnerships (PTA)	17	20%	3
Sourcing materials from local artisans and businesses	15	18%	4
Partnering with NGOs for specialised equipment	14	17%	5

Source: Field data, 2026.

5. Discussion

The findings reveal a pronounced imbalance in the distribution of ECE materials, with 58.83% of all classroom resources consisting of low-cost, teacher-produced items, while durable, commercially manufactured materials such as manipulatives, storybooks, and digital tools together account for only about 20.58%. This pattern, corroborated by studies such as Ngasike (2019) [41] in Kenya, reflects a broader failure to transition from teacher-centred to child-centred pedagogy in resource-poor rural settings. With 95% of participants affirming that learners understand better when materials are used, yet 85% describing the actual situation as very inadequate, the data suggest that known pedagogical best practice is being systematically undermined by resource poverty rather than by a lack of professional awareness.

The effects on learners align closely with theoretical expectations: the near-unanimous agreement that inadequate materials reduce participation (90%), diminish creativity (85%), and lower learning outcomes (85%) is consistent with Piagetian, Vygotskian, and Montessorian claims that concrete, manipulable materials are indispensable for active knowledge construction, mediated cognitive development, and self-directed mastery. Similar patterns of passive learning, reduced peer collaboration, and disruptive behaviour linked to material scarcity have been documented elsewhere in Sub-Saharan Africa (Oduolowu & Olitubera, 2017 [42]; Mtahabwa, 2019 [37]; Kuger & Kluczniok, 2018), suggesting that the Limulunga findings are part of a wider

regional pattern rather than an isolated local anomaly.

For teachers, the dominance of insufficient funding (85%) as the leading challenge, compounded by a lack of training in material improvisation (70%), indicates that the problem is structural rather than attitudinal. Teachers are not lacking in resourcefulness — indeed, their reliance on stones, clay, and recycled waste demonstrates considerable creativity — but this improvisation is neither a sustainable nor an adequate substitute for durable, curriculum-aligned materials. This mirrors findings from Uganda (Buluba, 2020) [18] and Zimbabwe (Mupa & Isaac, 2015) [38], where improvisation fatigue and pedagogical gaps were similarly linked to burnout and diluted curriculum delivery. The resulting shift toward teacher-led rote instruction, difficulty accommodating diverse learning styles, and reliance on speculative rather than evidence-based assessment collectively point to an "implementation gap" between the aspirations of the Zambia Education Curriculum Framework (2013) and the material reality of rural ECE classrooms.

The strategies prioritised by participants — dedicated government funding, formalised improvisation training, community-school partnerships, and NGO/private sector engagement — reflect an implicit hierarchy: while community resourcefulness and teacher training can mitigate shortages in the short term, participants view structural financial investment as the most effective long-term solution, consistent with evidence from Kenya (Onzere, 2022) [43] linking direct capitation grants to improved ECE curriculum implementation.

6. Conclusion and Recommendations

6.1 Conclusion

This study set out to investigate the effects of teaching and learning materials in Early Childhood Education set-up in four primary schools in Limulunga District. It found a critical shortage of commercially produced and durable educational resources, with 85% of participants describing the situation as very inadequate. While teachers show immense resourcefulness in improvising with stones, clay, and recycled waste, these materials lack the durability and precision required to meet curriculum objectives. This scarcity has led to significant tactile deprivation, transforming active learners into passive observers, increasing boredom, and fuelling disruptive behaviour, while teachers face severe improvisation fatigue and struggle to explain abstract concepts without visual or audio aids.

The study concludes that a profound implementation gap exists between the modern, play-based Zambian ECE curriculum and the physical reality of rural classrooms. While teacher creativity remains a vital survival mechanism, it is currently overstretched to the point of professional burnout. Without a dedicated budget for durable manipulatives, literacy resources, and basic infrastructure, the goal of quality, equitable early childhood education remains unattainable, and the current resource poverty in Limulunga is stifling the cognitive, social, and creative potential of learners before they even enter Grade One.

6.2 Recommendations

For ECE Teachers:

- Form zonal clusters to share improvisation ideas and co-create durable materials, reducing individual workloads and improvisation fatigue.
- Shift more science and mathematics lessons outdoors, using the natural environment (sand, trees, shadows) as free, high-quality instructional aids.
- Use recycled materials to create individual "progress envelopes" documenting each child's creative milestones for sharing with parents.

For School Management:

- Allocate a fair and consistent portion of the existing school grant specifically for ECE stationery and maintenance of play centres.
- Formally partner with local carpenters, tailors, and shops to collect "clean waste" (wood off-cuts, fabric, cartons) as a sustainable source of raw materials.
- Prioritise procurement of lockable cabinets or reinforced ECE classrooms to protect improvised and donated materials from pests and theft.

For the Ministry of Education:

- Distribute a minimum resource package to all rural centres, containing durable plastic blocks, puzzles, alphabet charts, and basic indoor play equipment.
- Create a direct funding line for ECE centres, independent of the primary school budget, to enable purchase of professional-grade literacy and digital tools.
- Formalise material production as a mandatory component of Continuous Professional Development (CPD) programmes, providing teachers with tools (glue, paint, cutters) to professionalise improvisation.

For Further Studies:

- Compare Grade One performance of learners from resource-rich versus resource-poor ECE centres in rural Zambia to measure the long-term cost of material scarcity.
- Examine the effectiveness of current pre-service teacher training in preparing educators for low-resource improvisation versus the demands of the new curriculum.
- Design an intervention study testing the effectiveness of school-based material production workshops on learner outcomes over one academic year.

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