

Teaching and Learning in Fragile Contexts (TLFC) Research Paper



Assessing the Feasibility of Introducing Playful Parenting Intervention for Enhancing School Readiness, Foundational Literacy and Numeracy in a Crisis Context in Uganda

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ACRONYMS

CHDC	Child Health and Development Centre
DEO	District Education Officer
ECCE	Early Childhood Care and Education
ECD	Early Childhood Development
ECE	Early Childhood Education
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
FGD	Focus Group Discussion
IDI	In-depth Interviews
KII	Key Informant Interviews
MOES	Ministry of Education and Sports
OPM	Office of the Prime Minister
RDO	Refugee Desk Officer
RELAP	Refugee Early Learning and Playful Parenting

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EXECUTIVE SUMMARY

Study background: Refugee contexts in Uganda experience several challenges associated with limited access to or provision of culturally sensitive and locally relevant teaching-learning materials. This impedes stakeholders, particularly parents, from engaging in the education of their children. Hence, teachers, school authorities, and parents would all benefit from resources and coordinated support to promote access to quality education and ensure that children stay in and complete school.

The RELAP study aims and objectives: This action research assessed the “Feasibility of Introducing Playful Parenting Intervention for Enhancing School Readiness, Foundational Literacy and Numeracy in a Crisis Context in Uganda,” to address the challenges of education for children in refugee and displacement settings.

Study setting and participants: The study was implemented in Palabek refugee settlement in Lamwo district (Uganda), reaching children (3 to 8 years), both in and out of school, parents, teachers, school leaders, and other education stakeholders. The learners were randomly sampled from one settlement-based and one host community school. The schools were identified in consultation with the District Education Officer (DEO).

Study activities: The study involved several strategic engagements with stakeholders in the sector to create awareness of the intervention. The team also adapted and developed training resources for the playful parenting training sessions.

Study design and methods: The study adopted an action research design with both quantitative and qualitative methods. The mixed methods approach generated data, which is culturally sensitive and locally relevant to the educational context of refugees in Uganda. Endline data was collected in April-May 2026 through learner assessments, parents' surveys, focus group discussions, and interviews, drawing in rich respondents' insights from the intervention.

Results: At endline, a total of 145 parent-child dyads were surveyed across two schools using the EGRA -EGMA, and ECCE tools. Results showed overall improvement in emergent numeracy and literacy scores at endline compared to baseline. The playful parenting intervention also indicated marked improvement in parental endorsement of play and improved parent-child interactions. Results also showed that the study population was largely composed of caregivers with limited educational levels, although levels varied between the two schools.

Conclusion and recommendations: The endline report has shown that low educational levels of caregivers do not necessarily predict their inability to support children's learning. Caregivers can still foster foundational learning through culturally appropriate play, everyday family activities, storytelling, songs, and responsive interactions, regardless of their literacy levels.

1.0 STUDY BACKGROUND

Studies show that most refugee settings in Uganda lack culturally sensitive and locally relevant materials to support early learning and school activities among children [1]. Hence, teachers, school authorities, and parents require skills, resources, and coordinated efforts to enhance access to quality education and completion. Globally, Early Childhood Care and Education (ECCE) is recommended for all children [1,2,3]. This led to increased pursuit of ECCE worldwide. The early years period determines children's learning and development through the life course [2]. In sub-Saharan Africa, the African Union (AU) emphasized the centrality of ECCE under the Africa ECCE initiative 2007, stressing the need for increased access to quality ECCE for all children on the continent [3,4]. Education for all is also part of the global response to education among refugees and all persons living in displacement or fragility. Current evidence further indicates that many children aged 3 to 8 years globally are not school-ready. In sub-Saharan Africa, 70% of children are not benefiting from pre-primary education [4,5]. This situation is especially concerning among children in refugee and displacement contexts [6].

In Uganda, there are efforts to expand access to quality ECCE [5,6]. In 2026, the government of Uganda launched the National Policy for Early Childhood Development and Education to expand access to and improve the quality of ECCE services and parental involvement. However, even with these commitments, active parental participation in ECCE in Uganda is still, at best, marginal [6,7]. This is also true for parents in both refugee and host communities [6,7,8]. There is growing evidence that a lack of parental involvement in early years education significantly impacts children's socio-emotional development [7,8,9,10,11]. Moreover, according to Cosso, von Suchodoletz, and Yoshikawa [7], parental participation in ECCE hugely boosts learning and development, particularly social-emotional skills among children. This created the need to examine the impact of parent involvement and play in early years' learning and socio-emotional development among children in fragility in Uganda. The study identified some factors that hinder and facilitate parental participation in ECCE, and explored strategies to enhance parental involvement as key partners in promoting early years learning [11,12,13,14]. The study investigated how playful parenting enhances school readiness and early competencies in literacy and numeracy among children caught up in crises, especially refugees.

1.1. Study Aims and Objectives

The action research, "Assessing the Feasibility of Introducing Playful Parenting Intervention for Enhancing School Readiness, Foundational Literacy and Numeracy in a Crisis Context in Uganda," addressed the challenges of providing education in refugee and displacement contexts in Uganda. *Hereafter, the study is referred to as RELAP in short.*

The study's specific objectives were to:

1. Examine the level of caregivers' and education stakeholders' knowledge of playful parenting practices, policies, and how they contribute to school readiness and early years education/learning;
2. Assess playful parenting and school readiness, as well as foundational numeracy and literacy levels among children;
3. Examine whether interactive play and parental guidance could improve school readiness, foundational literacy and numeracy competencies, and parent-child relationships, and socio-emotional skills and resilience in children; and
4. Identify facilitators and barriers to playful parenting, school readiness, and foundational literacy and numeracy among refugee learners and recommend alleviating strategies.

1.2. Study Setting and Participants

The study was implemented in Palabek refugee settlement in Lamwo district, targeting children aged 3 to 8 years, both in and out of school, caregivers, teachers, school management committees, parents' teachers' association, and other stakeholders. The learners were sampled from one settlement-based and one host community school in consultation with the District Education Officer (DEO). All children recruited for the study were randomly sampled, and their parents were invited to participate. The project engaged 207 parents/caregivers and their 207 children (boys and girls), for a total of 414. The project sites in Palabek were the following:

1. Worldview Nursery and Primary School (refugee settlement school)
2. Ayuu Anaka Primary school (host community school)
3. And immediate neighbouring communities (within a 200-meter radius)

1.3. The Playful Parenting Intervention

During implementation, parents were grouped into 6 groups of between 20 and 30 parents per group (with men and women). Each playful parenting group attended 1 training session per week for 2 hours only (for 10 weeks). Hence, sessions ran from December, 2025 to March 2026 (3.5 months) only. The number of sessions determined the length of implementation. Also, during the intervention sessions were suspended for about three weeks to allow participants time off for the Christmas break in December 2025 and political elections in January 2026. The intervention engaged one child per parent as long as they were living in the same household at the time of recruitment. However, children were identified directly from school and in the community. In total, 6 facilitators were recruited, and every 3 facilitators supported one parental group. Four of the facilitators were female early years teachers, and two were male community-based facilitators who could speak Arabic, Nuer, Dinka, Acholi, and other languages spoken in the refugee community. The facilitators were all recommended by local leaders, including the head teachers.

1.4. Strategic Pre-Intervention Engagements

The implementation was preceded by some strategic community inception engagements to create awareness and attract local support. The stakeholders engaged were: the MOES Commissioner for ECD and Primary Education, the Chief Administrative Officer (CAO), District Education Officer (DEO), and 2 project schools (Worldview Nursery & Primary School and Ayuu-Anaka Nursery & Primary Schools, the Regional Refugee Desk Officer (RDO), and Local partners, including refugee and host community leaders whose views contributed to community acceptance. Outcomes of these activities were captured in the project inception/launch report submitted in 2025.

1.5. Material Adaptation and RELAP Manual Development Process

The RELAP Literacy-Numeracy Facilitators Manual was designed as a guide to support parents in promoting family literacy and early learning, targeting refugee families and their hosts. The manual adaptation process took more than 12 months; a reiterative process that involved reviewing of several early learning literacy-numeracy materials in Uganda and beyond, and adaptation of content from tested resources such as the Parenting for Respectability (PfR) manual [15]. The review process identified the gaps and trends informing early literacy-numeracy education in Uganda. It also indicated that most existing resources were not designed for the Ugandan context, let alone for refugees. Such unfamiliar content usually does not support learners in relating the knowledge and information learned to objects and events in their everyday contexts. Additionally, most available materials do not prioritize parental engagement in play as an important aspect of ECE or parental support for education. A children's book illustrator was engaged to draw images resonating with the content in order to attract children and parents to read and learn together.

The RELAP facilitator's manual content represented play, parenting skills, local objects, life experiences, local names, and early learning using localized alphabet-based stories to enable children to associate topics and concepts with objects in their local environments and everyday lives. The stories were structured to encourage facilitators and parents to co-create by suggesting how to improve the manual in terms of content, structure, and methods. The literacy and numeracy concepts were woven around the alphabet and phonemic awareness to help learners gain competencies in emergent math and foundational language skills when interacting with parents through play. For example, in the illustration below, using the alphabet letter '**a**' and the short sound /**ae**/ we introduced a local food item (avocado), built an interactive story around it, and closed the story with the math concept, "**one avocado for mama, Abba, and me.**" The parent would then reflect on the activity after engaging with their child, and share their experience with other parents during their group sessions. This approach was taken with all the letters of the alphabet. *See the foundational storyboard in Table 1.*

Table 1. The storyboard

Letter hape	Sound Phoneme	Letter Name	Associated Local Object	Sentence story	Home Practice
a	/æ/	a	Avocado 	Achiro, and her Mama, walk to the garden. They see a big avocado under the tree. "Can I pick it, Mama?" Achiro asks. "Yes," Mama said. "Let's carry it home." At home, Abba cuts it open. "It's ripe!" he said. They eat it with salt and rice. "Ayiti, avocado is tasty," said Achiro. Achiro, claps her hands, "One avocado for mama, Abba and me!"	Parents: 1. What have you discovered about your child during this activity? 2. Together with your child, re-tell the word angel, like this: / a-CA-do/ 3. Create a song and actions to match the letter, sound and word. 4. Share experience with your child's teacher during the weekly meeting

1.6. Description of the RELAP Early Literacy and Parenting Manual

The manual has 10 modules woven around parenting skills and literacy-numeracy development, as listed below:

- Module 1: Introduction to the Parenting for Respectability (PfR) programme
- Module 1: Parenting in Emergencies
- Module 2: Playful Parenting
- Module 3: Parental Support for Education
- Module 4: Attachment and Bonding_ Child Development (0-17)
- Module 5: Sharing Child Care Responsibility
- Module 6: Positive and sensitive interaction with children
- Module 7: Meeting Nutritional Needs of the Family
- Module 8: Understanding Signs of Mental Health
- Module 9: Water, Sanitation, and Hygiene
- Module 10: Conclusion

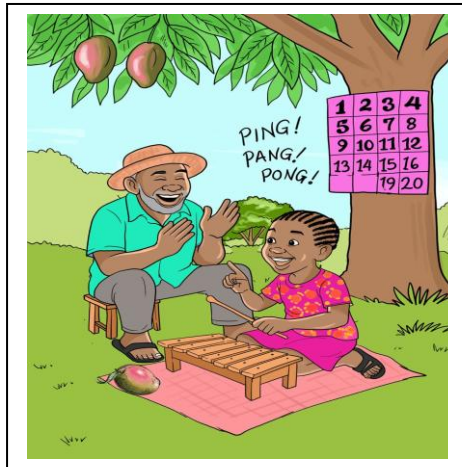
Manual structure and delivery approach

The manual is organized into modules, sessions, and activities, with objectives to guide facilitators in delivering consistent and effective parenting and play-based learning sessions. Each session is covered once a week for 2 to 3 hours only.

Content overview and learning topics

The manual provided content on the alphabet, phonemes, numeracy, and foundational stories aimed at letter recognition, phonemic awareness, number identification, and emergent literacy/numeracy skills. The manual guided parents to study alphabet stories with children at home.





The stories are set in familiar environments to facilitate play, and social and emotional learning. Every letter of the alphabet is associated with a story, sounds, objects, numbers, and activities to reinforce learning.

Family foundational stories and home practice

The foundational stories are meant to foster parent-guided play-based learning at home, linking literacy with numeracy and social and emotional skills and readiness for school. The main themes related to sharing, caring, problem-solving, and

family/community values. Parents are encouraged to role-play, draw, sing, dance, and create activities that reinforce the story concepts. The stories involve characters within the family and the child's environment. The home activities employ open-ended questions, role-plays, and creative exercises to deepen understanding and engagement.

2.0. STUDY DESIGN AND METHODS

This study adopted an action research design incorporating both quantitative and qualitative methods. Quantitative data were collected using a cross-sectional and pre-post quasi-experimental study design to assess the numeracy and literacy skills proficiency at baseline and the gains in numeracy and literacy skills proficiency post intervention, respectively. The study spanned a period of 24 months, and implementation only started after ethical clearance processes. The baseline data collection was executed between August and October, 2025, the action (intervention) was implemented from December 2025 to March 2026, and endline data was collected in April-May 2026. The field visits were aligned to the school calendar. Data was collected from two schools in Palabek refugee settlement, namely: Ayuu-Anaka and Worldview Nursery and Primary schools, and their neighbouring communities, respectively. This report is a synthesis of evidence from baseline, implementation stage, and endline.

Before the fieldwork, Research Assistants (RAs) were recruited and trained in research ethics, interview techniques, and electronic data capture using ODK/Kobo Collect software. After which, study tools were pre-tested, and participants were mobilized with the help of the head teachers. Overall, 207 (414) parent-child dyads were recruited in the study, including diverse community members as interview respondents.

2.1 Data Collection Methods and Tools

The following data collection methods and tools were used at baseline and endline (post-intervention):

Qualitative Methods

The qualitative technique investigated contextual insights and patterns of behaviour, knowledge, events, and experiences associated with parenting practices and play among families in displacement. It assessed school readiness, literacy, and numeracy levels among a sample of children and collected parent reports on the same. Participant observations, focus group discussions (FGDs), and interviews with a range of stakeholders, including teachers, parents, and community leaders, were conducted. The FGDs and interviews provided qualitative data regarding parenting practices, play, learning through play, and policy-level knowledge on education and learning in refugee contexts. This data was essential for understanding the gender inclusion challenges, access to culturally relevant reading materials, and the implications of teaching-learning practices in crisis settings.

Quantitative Methods

Quantitatively, the study evaluated school readiness, foundational literacy, and numeracy skills of children aged 3 to 8 years by measuring proficiency at baseline and endline (post intervention) to compare the gains following the intervention (at endline). Standardized assessment tools were used to measure children's readiness for school and their abilities in key areas such as early literacy and numeracy, providing a quantitative basis to inform the study's objectives. Additionally, the tools were embedded in ODK for ease of data management. The following were done quantitatively:

Parents Surveys

The parent surveys were conducted using a questionnaire with closed-ended questions. Surveys were conducted in the most preferred languages, and translators were engaged when necessary.

Learner Assessments

Learners aged 3 to 8 years were assessed on literacy and numeracy skills. Learners in the ECCE grades – aged 3 to 5 years – were assessed using the *International Development and Early Learning Assessment (IDELA)*, which is a performance-based tool that measures socio-emotional skills, emergent numeracy and literacy, executive function, fine motor skills, and gross motor skills. There were 24 items in this tool: 7 emergent numeracy items, 6 emergent literacy items, 5 social-emotional items, 3 fine motor items, 2 executive function items, and 1 gross motor item. Learners in lower primary – aged 6 to 8 years were assessed using *Early Grade Reading Assessment (EGRA)* and *Early Grade Mathematics Assessment (EGMA)* tools. Interactions and assessments with children were done in English and the common languages understood by the learners.

2.2. Summary of Data Collected

Table 2 shows that of the 207 parent-child dyads enrolled at baseline, 145 (70.0%) were successfully reached and interviewed at endline, including 70 of 99 participants (70.7%) from Ayuu-Anaka and 75 of 108 participants (69.4%) from Worldview. Consequently, 62 participants (30.0%) were lost to follow-up, with similar attrition observed in Ayuu-Anaka (29 participants, 29.3%) and Worldview (33 participants, 30.6%). The main reason for attrition was relocation to other schools or settlements, affecting 37 participants (17.9%), followed by distant farm work (21 participants, 10.1%), hospitalization or caregiving responsibilities (3 participants, 1.4%), and death (1 participant, 0.5%). Importantly, no participant who was successfully contacted refused to participate in the endline survey. These findings indicate a satisfactory retention rate of 70% across both schools and suggest that participant mobility, rather than refusal to participate, was the primary challenge affecting follow-up. The similar attrition rates between Ayuu-Anaka and Worldview further suggest that loss to follow-up was relatively balanced across the two study sites, reducing the likelihood of substantial attrition bias between schools.

Table 2. Endline reach by school

Reach	Total (N=207) n (%)	Ayuu- Anaka (N=99) n (%)	Worldview (N=108) n (%)
Endline	145 (70.0)	70 (70.7)	75 (69.4)
ATTRITION			
Surveyed/Reached (parent-child)	145 (70.0)	70 (70.7)	75 (69.4)
Lost to follow-up	62 (30.0)	29 (29.3)	33 (30.6)
ATTEMPTS TO LOCATE			
Located and interviewed	145 (70.0)	70 (70.7)	75 (69.4)
Refused or declined to be interviewed	0 (0.0)	0 (0.0)	0 (0.0)
Relocated to other schools and settlements	37 (17.9)	16 (16.2)	21 (19.4)
Hospitalized or taking care of a person in the hospital	3 (1.4)	2 (2.0)	1 (0.9)
Died	1 (0.5)	0 (0.0)	1 (0.9)
Others specify – Distant farm work	21 (10.1)	11 (11.1)	10 (9.3)

Comparison of loss to follow -up and reached participants

Participants who were reached at endline and those lost to follow-up were similar across all measured baseline characteristics. Among those lost to follow-up, 71.0% were mothers, 16.1% fathers, and 12.9% other guardians, compared with 69.7%, 9.0%, and 21.4%, respectively, among participants reached at endline ($p = 0.170$). Similarly, the distribution of caregiver sex did not differ significantly between the two groups, with females accounting for 82.3% of those lost to follow-up and 84.1% of those reached at endline ($p = 0.838$). Most respondents in both groups were primary caregivers (98.4% among those lost to follow-up versus 94.5% among those reached at endline; $p = 0.284$). The proportion of children using hearing aids was also comparable between the groups (8.1% versus 11.7%; $p = 0.623$). Likewise, caregiver education levels did not significantly

differ between participants lost to follow-up and those successfully reached, with primary education and no formal education being the most common categories in both groups ($p = 0.702$).

The absence of statistically significant differences in baseline characteristics between participants reached at endline and those lost to follow-up, suggests that attrition was largely non-differential with respect to the variables examined. This indicates that participants who remained in the study were broadly representative of the original sample, reducing concerns about attrition bias. Consequently, the endline findings are less likely to be systematically influenced by selective loss of participants and can therefore be interpreted with greater confidence as reflecting the experiences and outcomes of the original study population. Details Table 3.

Table 3: Comparison of baseline characteristics of participants reached at endline and lost to follow-up

Characteristic	Category	Lost to Follow-up n (%) (N=62)	Reached at Endline n (%) (N=145)	Test Statistic (p-value)
Relationship with child	Mother	44 (71.0)	101 (69.7)	0.170
	Father	10 (16.1)	13 (9.0)	
	Other guardian	8 (12.9)	31 (21.4)	
Sex of caregiver	Male	11 (17.7)	23 (15.9)	0.838
	Female	51 (82.3)	122 (84.1)	
Primary caregiver	No	1 (1.6)	8 (5.5)	0.284
	Yes	61 (98.4)	137 (94.5)	
Child uses hearing aid	No	57 (91.9)	128 (88.3)	0.623
	Yes	5 (8.1)	17 (11.7)	
Highest education level of caregiver	University	4 (6.5)	6 (4.1)	0.702
	O' Level	10 (16.1)	19 (13.1)	
	Primary	26 (41.9)	71 (49.0)	
	Never attended school	22 (35.5)	49 (33.8)	

2.3. Data Management and Processing

In this phase, data management and processing involved cleaning and checking for correctness, completeness and accuracy. To streamline and ease data management, all collection tools were administered in English based on the assumption that all the participants were able to speak, read and write in English. However, provisions were made for translations in real time where participants needed language support. The use of electronic data capture ensured accuracy, reduced the risk of data loss, and facilitated detailed analysis with insights into educational outcomes and alumni experiences by demographics and study effect.

2.4. Data Analysis and Reporting

In general, the survey data were analyzed using descriptive statistics with frequencies, percentages, means, and medians in *Stata 16* and various tests of intervention impact. The results were disaggregated by socio-demographic characteristics, including sex, age, school, sub-categories, and status, and level of education for a deeper understanding of the intervention impact across variables. During analysis, cross-tabulation was done to determine relationships between variables, associated factors, and the play and learning. For other discrete variables, cross-tabulations were done to test for any associations between or across factors using correlated responses. Where necessary, weighting was done to account for non-responses and missing data, which made it possible to determine the effects of enabling and disabling factors on the overall intervention effect by targets and outcomes.

Qualitative data was analyzed thematically following an iterative manual content-driven approach. This approach was adopted to provide contextual explanation on relationships between variables and draw meanings and implications from the interviews and FGDs that captured respondents' perspectives, opinions, knowledge, experiences, and stories of the programme. Findings have been reported with quotes, relevant texts, numbers, and tables to corroborate statistical information as presented in section three, below.

Outcome and explanatory variables

The outcome variables included numeracy and literacy scores while explanatory variables included the socio-demographics of children, such as age and sex. Other variables than socio demographics included baseline proficiency scores in numeracy and literacy, study class of participant, category of school (private or public), and history of illness that may have occurred within a week to the assessment period. Parent-related characteristics included marital status of parents, work/employment status, parents' age, attitudes to play, and disability status, among others.

2.5. Ethical Approval and Considerations

The study was cleared by Makerere University School of Social Sciences Research and Ethical Committee – Institutional Review Board (IRB), and the Uganda National Council for Science and Technology (UNCST). Throughout the fieldwork, the Research Team (Supervisors and RAs) adhered to ethical guidelines aimed at protecting the rights and dignity of participants, enhancing research validity, and upholding integrity. These guidelines included clearly elucidating the purpose of the study to all participants (i.e., parents/guardians, teachers, learners, community leaders, district officials, etc.); ensuring voluntary participation; and maintaining confidentiality throughout the study, data storage, analysis, and reporting processes.

3.0. PRESENTATION OF STUDY FINDINGS

Research objectives addressed at endline

1. How interactive play and parental guidance could improve school readiness, foundational literacy and numeracy, parent-child relationships, socio-emotional skills, and resilience in children.
2. The facilitators and barriers to school readiness, playful parenting, and foundational literacy and numeracy in crisis contexts, and how the barriers could be alleviated.

This section presents the study's key findings, detailing the identified outcomes; the results of the learners' assessments and parents' survey covering demographics, emergent numeracy and literacy scores post-intervention, by school. Results from the interviews and FGDs, post-intervention, are also captured. The endline results are organised under two main research questions supported by verbatim quotes from respondents. The section concludes with recommendations and conclusions.

3.1 Socio-demographics

Table 4 presents the educational attainment of caregivers/parents across the two study schools. Overall, most caregivers showed low levels of formal education, with nearly half (46%) having completed only primary education and over one-third (34%) having no formal education. Caregivers with secondary education were fewer, with 14% attaining O-level and only 4.8% reaching A-level or higher. Differences were observed between the schools: Ayuu-Anaka had a higher proportion of caregivers with primary education (56%) and lower levels of no formal education (22%), while Worldview had a considerably larger proportion of caregivers with no formal education (45%). These findings suggest that the study population was predominantly composed of caregivers with limited educational attainment, although educational levels varied between the two schools.

Table 4. Distribution of caregivers/parents' education by school at baseline/endline

Carer education	Ayuu-Anaka, n (%) (n=98)	Worldview, n (%) (n=109)	Total, n (%) (n=207)
≥ A-level	4 (4.1)	6 (5.5)	10 (4.8)
O-level	17 (17.3)	12 (11.0)	29 (14.0)
Primary	55 (56.1)	42 (38.5)	97 (46.9)
No formal education	22 (22.4)	49 (45.0)	71 (34.3)

3.2 Emergent numeracy scores (3-6 years)

Median scores improved between baseline and endline across most domains of early numeracy. The median emergent numeracy (composite) score increased from 14 (interquartile range [IQR] 8–18) at baseline to 18 (12–21) at endline. Improvements were also observed in shape recognition, with median scores increasing from 2 (1–4) to 3 (1–5), and in sorting, where the median increased from 1 (1–2) to 2 (2–2). One-to-one correspondence and puzzle-solving scores similarly increased, from 2 (1–3) to 3 (1–3).

and from 2 (0–4) to 3 (1–5), respectively. Number identification improved modestly, with the median increasing from 0 (0–1) to 1 (0–1). Although the median addition and subtraction score remained unchanged at 3, the interquartile range shifted from 0–3 at baseline to 2–3 at endline, suggesting improved performance among children with lower scores. Size recognition remained consistently high throughout the study, with a median score of 4 (IQR 4–4) at both time points. The illustration of the distribution of results is further shown in Figure 1.

Table 5. Median (P25, P75) of Emergent Numeracy Assessment Scores at Baseline, Endline, and Overall

Variable	Baseline Median (P ₂₅ , P ₇₅)	Endline Median (P ₂₅ , P ₇₅)	Overall Median (P ₂₅ , P ₇₅)
Emergent numeracy (composite)	14 (8, 18)	18 (12, 21)	15 (10, 19)
Size and length comparison	4 (4, 4)	4 (4, 4)	4 (4, 4)
Shape identification	2 (1, 4)	3 (1, 5)	2 (1, 4)
Number identification	0 (0, 1)	1 (0, 1)	1 (0, 1)
Sorting and classification	1 (1, 2)	2 (2, 2)	2 (1, 2)
One-to-one correspondence	2 (1, 3)	3 (1, 3)	2 (1, 3)
Addition & subtraction	3 (0, 3)	3 (2, 3)	3 (1, 3)
Puzzle completion	2 (0, 4)	3 (1, 5)	2 (0, 4)

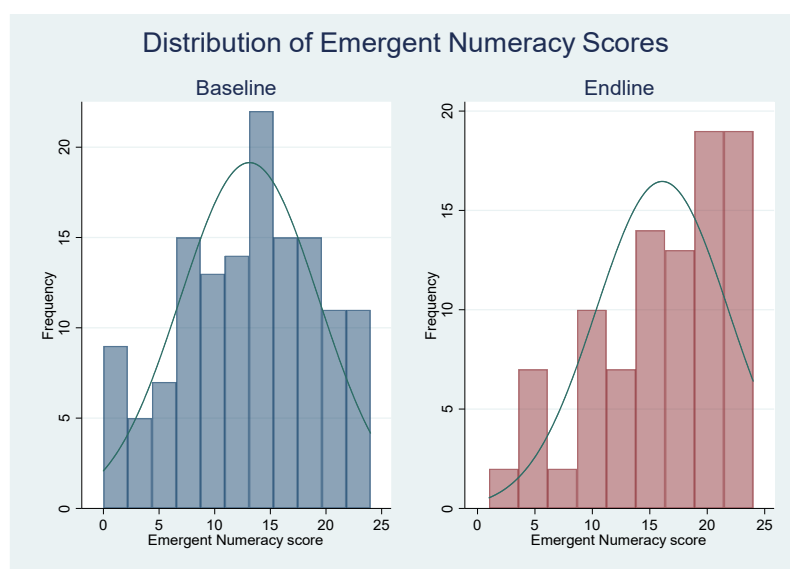


Figure 1. Distribution of composite emergent numeracy scores

A linear mixed-effects regression model with a random intercept for child was used to examine whether there was a change in emergent numeracy scores from baseline to endline. The analysis included 229 observations from 116 children, with a mean of 2.0 observations per child (range 1–4). Overall, the model demonstrated strong evidence of association between the covariates and the outcome (Wald $\chi^2(7) = 112.91$, $p < 0.001$). After adjustment for child age, sex, school, and carer education, emergent numeracy scores were significantly higher at endline than at baseline ($\beta = 10.76$, 95% CI 7.00 to 14.52; $p < 0.001$). Children aged 6 years had higher scores than younger children ($\beta = 16.01$, 95% CI 9.05 to 22.97; $p < 0.001$). There was no evidence of a difference in

scores by child sex or carer education. Children attending Ayuu-Anaka school had higher scores than those in Worldview ($\beta = 10.58$, 95% CI 4.17 to 17.00; $p = 0.001$).

Table 6. Mixed-effects regression model for percentage emergent numeracy score (random intercept for child)

Variable		β (95% CI)	p-value
Time	Baseline	1	
	Endline	10.76 (7.00, 14.52)	<0.001
Age	< 6 years	1	
	A6 years	16.01 (9.05, 22.97)	<0.001
Sex	Male	1	
	Female	-1.05 (-7.12, 5.02)	0.734
School	Worldview	1	
	Ayuu-Anaka school	10.58 (4.17, 17.00)	0.001
Carer's education	Primary education	1	
	O-level education	8.04 (-0.48, 16.56)	0.181
	$\geq$ A-level	11.29 (-5.24, 27.81)	0.064
	No education	0.90 (-4.91, 6.71)	0.762

Substantial difference between-child heterogeneity remained after adjustment for the fixed effects. The estimated variance of the child-level random intercept was 151.15 (95% CI 87.71 to 260.47), whereas the residual variance was 221.15 (95% CI 171.16 to 285.72). The corresponding intraclass correlation coefficient was 0.41, indicating that approximately 41% of the total variability in emergent numeracy scores was attributable to differences between children, with the remaining variation occurring within children over time. Adjusted predicted marginal mean percentage emergent numeracy scores increased from 48.0% (95% confidence interval [CI] 44.6% to 51.5%) at baseline to 58.8% (95% CI 55.2% to 62.4%) at endline (Figure 2). These estimates, obtained from the mixed-effects model adjusted for child age, sex, school, and carer education, indicate a marked improvement in emergent numeracy performance over the study period.

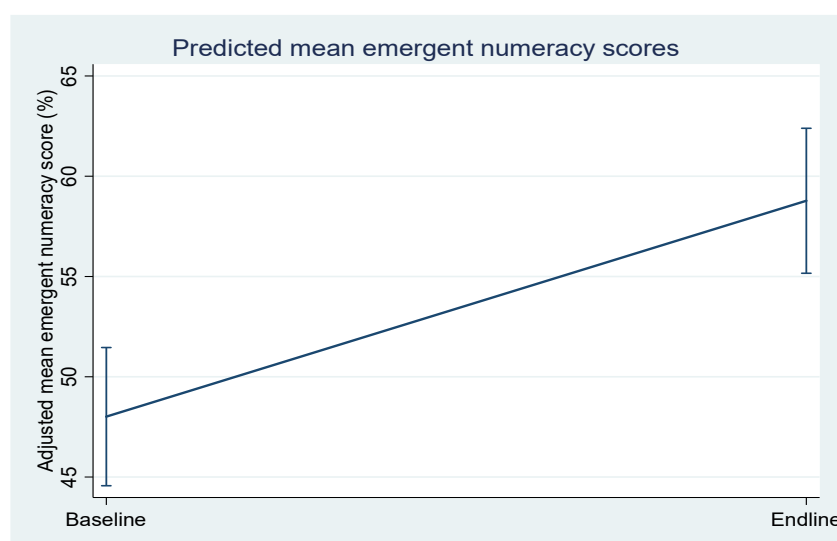


Figure 2. Shows the adjusted predicted mean percentage emergent numeracy scores at baseline and endline by school.

3.3 Emergent literacy scores (3-6 years)

The median literacy scores generally improved from baseline to endline. The median emergent literacy (composite) score increased from 17 (IQR 12–22) at baseline to 20 (IQR 14–28) at endline, while vocabulary scores increased from 6 (3–9) to 8 (4–10). Median letter identification scores increased modestly from 1 (0–6) to 2 (0–5), and emergent writing scores increased from 0 (0–2) to 2 (0–4). The greatest improvement was observed for comprehension, with median scores increasing from 0 (0–1) at baseline to 4.5 (2–5) at endline. In contrast, print awareness scores declined from a median of 6 (3–9) at baseline to 3 (3–6) at endline, whereas first letter sound scores remained low, with median values of 0 at both time points. Overall, the distributions suggest improvements across most literacy domains over the study period, as illustrated in Figure 3 below.

Table 7. Median (P25, P75) of Emergent Literacy Assessment Scores at Baseline, Endline, and Overall

Variable	Baseline Median (P ₂₅ , P ₇₅)	Endline Median (P ₂₅ , P ₇₅)	Overall Median (P ₂₅ , P ₇₅)
Emergent literacy (composite)	17 (12, 22)	20 (14, 28)	18 (13, 24)
Vocabulary	6 (3, 9)	8 (4, 10)	7 (4, 10)
Print awareness	6 (3, 9)	3 (3, 6)	5 (3, 9)
Letter identification	1 (0, 6)	2 (0, 5)	1.5 (0, 6)
First letter sound	0 (0, 1)	0 (0, 2)	0 (0, 1)
Emergent writing	0 (0, 2)	2 (0, 4)	1 (0, 3)
Comprehension	0 (0, 1)	4.5 (2, 5)	1 (0, 4)

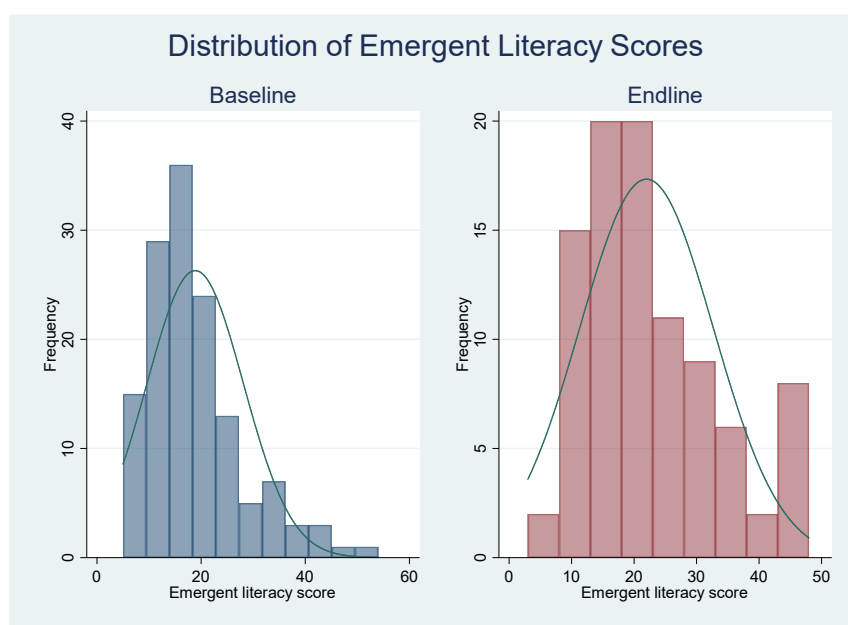


Figure 3. Distribution of composite scores of emergent literature scores

A linear mixed-effects regression model with a random intercept for child was used to assess changes in emergent literacy scores over time while accounting for repeated observations within children. The analysis included 229 observations from 116 children, with a mean of 2.0 observations per child (range 1–4). Overall, there was strong

evidence that the covariates included in the model were associated with emergent literacy scores (Wald $\chi^2(9)=87.47$, $p<0.001$). After adjustment for child age, sex, hearing and visual status, school, and carer education, emergent literacy scores were significantly higher at endline than at baseline ($\beta=5.10$, 95% CI 2.32 to 7.88; $p<0.001$), indicating an overall improvement in literacy performance over the study period. Older children (6 years) achieved higher scores than younger children ($\beta=8.96$, 95% CI 4.06 to 13.86; $p<0.001$), consistent with expected developmental gains. There was no evidence of an association between literacy scores and child sex or caregiver education. Children attending Ayuu-Anaka school had higher scores than those attending Worldview school ($\beta=11.83$, 95% CI 5.67 to 17.99; $p<0.001$), suggesting that contextual or school-level factors may have influenced literacy attainment. In contrast, children with hearing difficulties had lower scores than those without hearing difficulties ($\beta=-5.31$, 95% CI -10.32 to -0.29; $p=0.038$), while visual difficulties were associated with an even greater reduction in scores ($\beta=-7.59$, 95% CI -12.20 to -2.98; $p=0.001$), highlighting the potential impact of sensory impairments on early literacy development.

Table 8. Mixed-effects regression model for percentage emergent numeracy score (random intercept for child)

Variable	Category	β (95% CI)	p-value
Time	Baseline	1	
	Endline	5.10 (2.32, 7.88)	<0.001
Age	<6 years	1	
	6 years	8.96 (4.06, 13.86)	<0.001
Sex	Male	1	
	Female	1.51 (-3.94, 6.95)	0.588
Hearing status	No difficulty	1	
	Difficulty	-5.31 (-10.32, -0.29)	0.038
Vision status	No difficulty	1	
	Difficulty	-7.59 (-12.20, -2.98)	0.001
School	Worldview	1	
	Ayuu-Anaka school	11.83 (5.67, 17.99)	<0.001
Carer's education	Primary education	1	
	O-level education	-6.47 (-18.24, 5.30)	0.282
	No education	-6.35 (-19.38, 6.68)	0.340
	$\geq$ A-level	-9.01 (-21.61, 3.58)	0.161

Considerable difference between-child heterogeneity remained after adjustment for the measured covariates. The estimated variance of the child-level random intercept was 60.46 (95% CI 28.84 to 126.78), while the residual variance was 178.44 (95% CI 125.11 to 254.50). The corresponding intraclass correlation coefficient was 0.25, indicating that approximately one quarter of the total variability in emergent literacy scores was attributable to differences between children, with the remaining variability reflecting within-child variation over time and unexplained residual variability. Adjusted predicted marginal mean emergent literacy scores increased from 33.9% (95% confidence interval [CI] 31.4% to 36.4%) at baseline to 39.0% (95% CI 36.0% to 42.0%) at endline (Figure 4).

These model-derived estimates provide further evidence of an overall improvement in emergent literacy performance over the follow-up period.

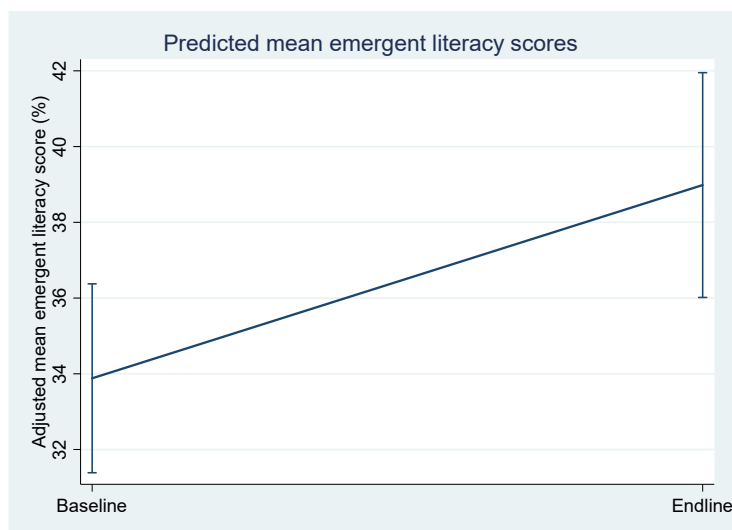


Figure 4. Shows the adjusted predicted mean percentage emergent numeracy scores at baseline and endline by school.

3.4 Early Grade Reading Assessment (7 years +)

The median EGRA composite scores increased from 9.5 (IQR 1–24) at baseline to 19 (IQR 5–26) at endline, indicating an overall improvement in early reading performance. Gains were most evident in letter-name knowledge, with median scores increasing from 17.5 (IQR 6–23) to 23.5 (IQR 5–26). In contrast, median scores for letter-sound knowledge remained low, and there was little evidence of improvement in segmenting, nonword decoding, oral passage reading, or reading comprehension, for which median scores remained at or close to zero at both time points. Overall, the findings suggest that improvements in EGRA performance were driven primarily by gains in foundational letter-name knowledge, with limited progress observed in higher-order reading skills among children 7 years old and above.

Table 9. Median (P25, P75) scores for EGRA domains at baseline, endline, and overall

Variable	Baseline P ₅₀ (P ₂₅ , P ₇₅)	Endline P ₅₀ (P ₂₅ , P ₇₅)	Total P ₅₀ (P ₂₅ , P ₇₅)
EGRA score (composite)	9.5 (1, 24)	19 (5, 26)	14.5 (3, 26)
Letter-name knowledge	17.5 (6, 23)	23.5 (5, 26)	20 (5, 26)
letter-sound knowledge	3 (0, 10)	0 (0, 15.5)	2 (0, 14)
Segmenting	2.5 (0, 5)	0 (0, 0)	0 (0, 5)
Nonword decoding	0 (0, 5)	0 (0, 0)	0 (0, 2.5)
Oral passage reading	0 (0, 0)	0 (0, 0)	0 (0, 0)
Reading Comprehension	0 (0, 4)	0 (0, 5)	0 (0, 4)

Figure 5 illustrates the distribution of literacy scores at baseline and endline. Scores were positively skewed at both time points, with most children concentrated at lower score values and a small number exhibiting markedly higher scores. Although the distribution at endline was shifted towards higher scores, indicating overall improvement, substantial heterogeneity in literacy performance remained.

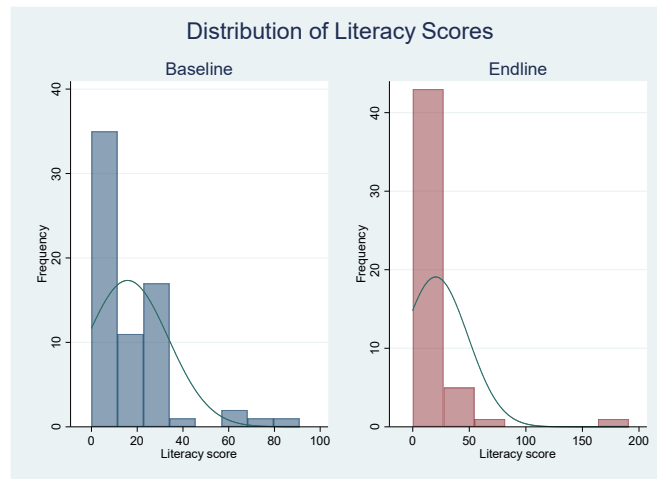


Figure 5. Distribution of literacy scores at baseline and endline

3.5 Early Grade Mathematics Assessment (7 years +)

Changes in performance between baseline and endline were assessed using paired-samples *t*-tests for each EGMA subtask and the overall EGMA score, with statistical significance determined at the 5% level. Table 10 summarizes children's performance across the six EGMA subtasks at baseline and endline. At baseline, children demonstrated relatively low performance in Number Identification (mean = 8.32) and Number Discrimination (mean = 5.45). Following the intervention, the average scores increased to 10.74 and 6.92, respectively, suggesting improvement in foundational number recognition and number comparison skills. Performance in addition and subtraction also increased between baseline and endline, with the mean addition score increasing from 68.36 to 94.62 and the mean subtraction score increasing from 25.09 to 48.22. In contrast, the *Missing Number and Word Problems* subtasks showed identical mean scores at both assessment points, indicating no observable change. Overall, the average EGMA score increased substantially from 60.96 at baseline to 160.37 at endline, suggesting an overall improvement in mathematics performance following the intervention.

Table 10: Descriptive statistics for EGMA scores at baseline and endline

Metric	Baseline Mean (SD)	Median	Range	Endline Mean (SD)	Median	Range
Number Identification	8.32 (7.12)	7.5	0–20	10.74 (6.88)	13	0–20
Number Discrimination	5.45 (4.70)	4.5	0–20	6.92 (4.85)	6.5	0–20
Missing Number	15.60 (15.76)	9	2–75	15.60 (15.76)	9	2–75
Addition	68.36 (59.43)	48	0–216	94.62 (97.90)	77.5	0–560
Subtraction	25.09 (29.79)	19.5	0–122	48.22 (40.35)	33.5	0–154
Word Problems	4.54 (2.73)	5	0–8	4.54 (2.73)	5	0–8
Overall EGMA Score	60.96 (80.19)	30	3–428	160.37 (141.21)	126	2–725

N=145

Paired-sample t-tests were conducted to evaluate changes in children's mathematics performance between baseline and endline. The findings indicate a statistically significant improvement in Number Identification scores, with an average increase of 2.33 points ($t = 2.46$, $p = 0.028$), suggesting that the intervention strengthened children's ability to recognize and identify numbers. Overall, children's mathematics performance improved significantly following the intervention, with the overall EGMA score increasing by an average of 99.40 points ($t = 5.12$, $p < 0.001$), providing evidence of a positive intervention effect on overall numeracy performance.

Table 11: Paired Comparison of baseline and endline EGMA scores

EGMA Domain	Mean Difference	t-statistic	p-value	Interpretation
Number Identification	2.33	2.46	0.028	Significant improvement
Number Discrimination	1.93	1.5	0.155	Improvement not statistically significant
Addition	22.73	0.66	0.518	Improvement not statistically significant
Subtraction	19.53	2.12	0.052	Borderline improvement
Overall EGMA Score	99.4	5.12	<0.001	Statistically significant improvement

N=145

Conclusion

Overall, the findings showed general improvement in interactive play, how parental guidance could improve school readiness or contribute to foundational literacy and numeracy. Improvements in parent-child relationships, socio-emotional skills, and resilience in children were also identified.

3.6 Playful Parenting

The learning through play attitude scale demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.789 at baseline and 0.818 at endline. Both values exceeded the recommended threshold of 0.70, indicating that the scale was reliable for

measuring caregivers' attitudes towards learning through play. Table 12 presents changes in learning through play outcomes between baseline and endline. Mean scores increased across all three domains following the intervention. Learning through play attitudes improved from 64.7 to 67.4 points, home learning activities increased from 5.6 to 6.7 activities, and play practices increased from 25.7 to 26.9 points. Median scores also increased for all outcomes, indicating an overall improvement in caregiver attitudes and practices related to learning through play.

Table 12. Changes in learning through play outcomes between baseline and endline

Outcome	Baseline (n=207) Mean ± SD	Endline (n=145) Mean ± SD	Median (Baseline)	Median (Endline)	Min-Max (Baseline)	Min-Mx (Endline)
Learning Through Play Attitudes	64.7 ± 6.6	67.4 ± 6.5	65	68	43–83	46–86
Home Learning Activities	5.6 ± 2.3	6.69 ± 1.9	6	8	0–8	0–8
Play Practices	25.7 ± 6.8	26.9 ± 5.3	25	27	8–40	9–39

Paired-sample *t*-tests showed statistically significant improvements across all three learning through play outcomes following the intervention. Caregiver attitudes toward learning through play improved significantly by an average of 2.62 points ($t = 3.47$, $p = 0.001$). Home learning activities demonstrated the greatest relative improvement, increasing by an average of 1.03 activities ($t = 4.59$, $p < 0.001$) and yielding the largest effect size ($d = 0.38$). Play practices also improved significantly, with an average increase of 1.23 points ($t = 2.04$, $p = 0.043$), although the effect size was small ($d = 0.17$). Overall, these findings indicate that the intervention had a positive effect on caregivers' attitudes, engagement in home learning activities, and learning through play practices.

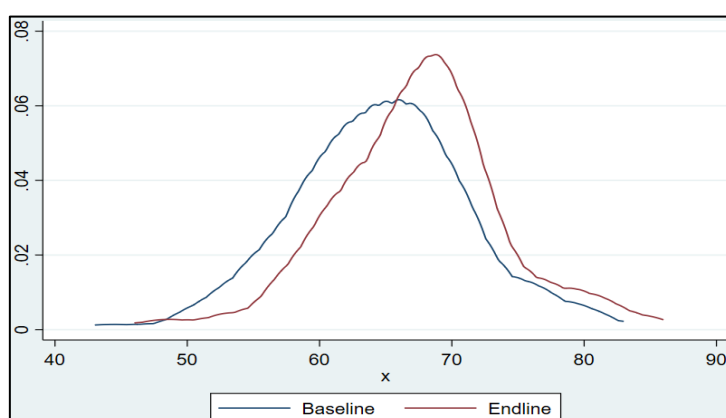
Table 13: Changes in learning through play outcomes following the intervention

Outcome	Mean Change (95% CI)	t-value	p-value	Effect Size (Cohen's <i>d</i>)
Learning Through Play Attitudes	2.62 (1.13, 4.12)	3.47	0.001	0.29
Home Learning Activities	1.03 (0.59, 1.48)	4.59	<0.001	0.38
Play Practices	1.23 (0.04, 2.43)	2.04	0.043	0.17

Paired Sample N=145

The findings suggest that the intervention successfully strengthened caregivers' support for learning through play. The most pronounced gains were observed in home learning activities, indicating that caregivers increasingly engaged children in stimulating learning experiences at home. Significant improvements in caregiver attitudes and play practices further demonstrate that the intervention positively influenced both perceptions and behaviours related to learning through play, supporting its effectiveness in promoting responsive caregiving and early childhood learning in the home environment.

Figure 6: Kernel density distribution of learning through play attitude scores at baseline and endline



Conclusion

The kernel density plot shows a rightward shift in the endline distribution compared with the baseline distribution, indicating that caregivers generally had higher attitude scores towards learning through play after the intervention. The endline scores are more concentrated around higher values, suggesting an overall improvement in caregivers' attitudes and perceptions regarding the importance of learning through play.

3.7 Findings from Playful Parenting Intervention, FGDS and Interviews

The findings in this section are presented according to research questions addressed, covering overlapping themes on how interactive play and parental guidance contribute to improved school readiness, foundational literacy and numeracy competencies, parent-child relationships, socio-emotional skills, and resilience in children as evident in the respondents' perspectives. Following thematic analysis based on descriptive and selective coding procedures, twelve interrelated themes emerged, reflecting strong convergence across parent involvement in play-based literacy and numeracy, materials, training, and school readiness. Facilitators and barriers were identified, although barriers occurred less often in the responses, but appeared consistently across sources, interviews, FGDS, and the intervention outcomes.

Table 14. Descriptive coding overview

Codes	
Parental guidance and home continuity	Household poverty and seasonal livelihoods
Local and instructional materials	Large classes and inadequate space
Foundational literacy and numeracy through play	Funding, infrastructure, and material insecurity
Training, leadership, and partner support	Environmental and seasonal safety risks
School readiness and routines	Time and workload constraints
Socio-emotional development and relationships	Resilience-related support and inclusion

3.8 The Playful Parenting Intervention - Findings

Summary of intervention experience and outcomes

The playful parenting intervention was implemented between December 2025 and March 2026 following the orientation of six community-based facilitators to support the weekly sessions. Of the six facilitators, two were males, each one drawn from the immediate school community, and the four were female caregivers from the two project schools. The facilitators were purposively selected based on their roles in the study community and experience or understanding of foundational learning. Each facilitator was given a test version of the playful parenting manual to guide the playful parenting sessions.

Parenting session attendance

Although attendance was inconsistent for some parents, most engaged weekly and completed the sessions. The parents recruited into the groups were those whose children were already enrolled in the study. The two schools enrolled parents as follows: 108 from Worldview and 99 from Ayuu-Ananka Nursery and Primary schools, respectively. Overall, most parents attended more than five of the 10 sessions, although parents of Ayuu-Ananka were more consistent compared to Worldview. Women tended to be more consistent than men for both refugees and host communities. Below are some of the reasons associated with non-attendance:

*I did not attend on some days because I was looking for food. I go to people's gardens to work, far away **(Parent - Community)**.*

*Some of the refugees go to the border areas to get food from their gardens. There is a place where they dig there ...so this affected attendance **(Male Facilitator)**.*

*But sometimes, events in the community also affected them...you know, we had elections, Christmas...they needed time to be part of those **(Female Facilitator)**.*

*In my group, some people also did not come because of sickness or burial ...like that **(Parent -Refugee)**.*

Change associated with the playful parenting activities

The parents were grouped in males and female groups and taken through weekly activities by the facilitators. They would practice the alphabet, sounds, short words, mathematical concepts, e.g., counting, number recognition, and storytelling with the facilitators. After each session, parents were given simple take-home activities to practice with their children. They were encouraged to be innovative, creative, and apply local knowledge as much as possible. Some of the activities guided them to practice writing the letters of the alphabet and their sounds together with their children, naming objects, singing and dancing, and drawing, for example. They were given notebooks to record their activities where possible. Some of the participants explained what they did in terms of supporting learning as follows:

Before this programme, I did not know a, b, c, d, I could not read or write, but the teachers taught us from here, showed us how to do the same with our children playfully and told us to do the same at home...Now, I can read and write a, b, c, d with my child (Parent FGD- Mother).

The teachers told us to practice writing in the air, in the sand or use the book. For me and my children we practiced all and it makes us laugh (Parent FGD – Mother).

We even learned how to count and tell the numbers together with my children. For me now, I can check my child's book when he comes back home...But in the past I did not check because I did not know what to look for (Parent FGD – Father).

Change in parenting practices

Complementary to the parent-guided play-based learning activities and games, the parents were also introduced to positive parenting messages adapted from the Parenting for Respectability (PfR) manual to help them reflect on their parenting practices. They worked in groups as guided by the facilitators, but also took home simple activities. Post-intervention, the parents alluded to several changes that they attributed to their participation in the programme:

For me, I never used to play with children. I drunk a lot and always stayed out late. Then when I got home, I found the children sleeping...But when I started the training and listened to what the teachers were saying, I surprised the children by inviting them to play with me...They used to run away from me before...I can say, I am a changed father now (FGD – Father).

It is my wife who joined the training first and I thought she was wasting time until one day I heard talking to the children and I liked how they responded to her. They were playing and laughing freely. I started following her and now we are all closer as a family (FGD- Father).

I was quick to beat children and send them away to play with other children. I thought I was too old to play...Now, the children call me to join them...They don't fear me anymore, we laugh and sing together. The programme should not stop (FGD- Mother).

The training informed us that play does not only keep children fit, we learnt about our jobs as parents and now I understand that my children will trust me more and get close to me because they now look at me without fear (FGD Mother).

During the training we learnt that play is important for the child's brain, physical and emotional growth...When I play with my child, they come closer to me. I now understand what makes my child happy (FGD- Father).

We also learnt that play makes communication with children easy...they can understand that we love them when we play together...this is something I did not know before the training (FGD- Mother).

3.9. Impact of interactive play on foundational numeracy and literacy

Findings for Research Question 1: How could interactive play and parental guidance be used to improve school readiness, foundational literacy and numeracy competencies, parent-child relationships, socio-emotional skills, and resilience in children?

Interactive play strengthens foundational numeracy through movement and manipulation

Participants described numeracy as more understandable when children connect number ideas to body movement and real objects. Counting while jumping links oral number sequences to rhythm and physical action. Sticks, stones, bottle tops, Lego bricks, shapes, and sorting tasks support one-to-one correspondence, number recognition, classification, and early operations. The child sees, touches, moves, and checks an answer rather than receiving a verbal explanation only. As it emerged from the FGDs and KII cited below:

Yeah, like when you are counting, you can count while jumping... I can count numbers 1 to 10... You playfully do things, but at the same time, you are learning (FGD – Female Parent, School 1).

The instructional materials should reach the hands of all the learners... on mathematics, we can do addition... the learning aid should be enough for all the learners so that they do everything equally. Then they learn better through play. (KII - Deputy Head Teacher, School 2).

*These children... learn well when they are seeing, they are touching, and doing those things. They learn by doing also (FGD – Male Parent, **School 1**).*

The findings indicate that interactive numeracy works through symbolic practice, concrete representation, and direct participation of both child and caregiver/teacher. Equal access to play materials is important for all children and promotes inclusion. A play activity loses value when only a few children handle the objects.

Interactive play strengthens oral language, emergent reading, and writing

Literacy activities included songs, oral questions, alphabet work, letter-sound identification, matching words to colors, flashcards, reading cards, picture charts, writing on sand, and writing in the air and on the chalkboard. These activities connect speech, visual recognition, sound, movement, and match-making. Participants also described progression from identifying a letter and its sound to reading short words as demonstrated in the interview below:

*We have Lego bricks... I can do Lego bricks with an English lesson, and I can also teach using Lego bricks with mathematics... Then go and match where it is written father, where it is written mother (KII, Deputy Head Teacher, **School 2**).*

You tell the child to pick and say the name of the letter and the sound of the letter... then you go to a three-word letter... they can be in position to read 'boy, bag, pen,' (KII - Head Teacher, School 1).

They should give room to these children when they are at home to play... [and] make this writing on the sand can be practiced at home (KII -Head Caregiver, School 1).

Playful literacy is strongest when children speak, listen, identify, touch, match, draw, and write within the same learning sequence. Sand writing and locally made cards lower the cost of materials and encourage regular practice. For parents, this means they can get children practicing anytime, anywhere, and at no cost, as sand is readily available. So, parents do not have to spend on expensive play-learning materials.

Structured routines build practical school readiness

School readiness was presented as broader than academic knowledge. It included familiarity with daily routines, the classroom, the toilet, the playground, and learning materials. Participants linked readiness to social behaviour, sharing, group movement, time management, orientation, and transition into formal school or progression to the next level, e.g., primary school. One caregiver described an eight-stage day that included: *morning circle, mathematics, outdoor play, snack, oral literacy, free choice, language, and goodbye circle*. This showed the routine and structure that the learners are socialized to adhere to while at school to keep them focused, happy, and learning as elaborated by the respondents below:

We as Early Childhood Educators... are using the daily routines... morning circle... mathematics... outdoor... snack... oral literacy... free choice... language... goodbye circles to enjoy learning and being in school (Teachers FGD – School 1).

The first week will be orientation... showing that this is a toilet, this is the playground, and this is the materials that you are supposed to play with... The second week, you will bring a child to classwork (Teachers FGD – School 1).

The competency that they show... they are very social with each other. Yes, they know, they share things, they also show good use of the toilet (Teachers FGD – School 2).

This finding indicates that readiness for schooling develops through repeated participation in predictable routines. Orienting learners to adapt to a formal school environment reduces uncertainty and enables a child to navigate school independently. Additionally, play provides a safe setting for learning classroom expectations, peer interaction, the school system, and the learners' routines.

Parental guidance creates continuity between school and home

Participants consistently argued that learning should not stop at school. Parents were expected to play, guide, observe, practice writing, point to letters and pictures, provide materials, and discuss what the child learned. The strongest perceived post-intervention change was repetition of school activities at home. This continuity increased practice

time and reduced the separation between school, learning, and home life. The views of the parents captured below confirm this finding:

The children should not only play at school, but also play with their parents; they have to involve themselves in playing when the children are at home... during holidays, the teacher will not be there (**Female Parents FGD – School 1**)

After involving their parents and giving them knowledge from here, they go home and involve the children again. And even writing, it is now easier for them - the parents, because we have been practicing together (**Female Facilitator – School 1**).

When the children go home, the parents will be giving them writing activities again, then they come to school, we are doing the same thing (**Female Facilitator – School 2**).

The above perspectives indicate that parental guidance is a form of dispersed practice. When a child encounters the same skill in multiple settings and with multiple supportive adults, this experience accelerates meaningful learning, which confirms that the skill is vital to them. The repetition likely supports knowledge acquisition, retention, and confidence, especially where school time and resources are limited.

Playful interaction strengthens parent-child relationships

The participants' accounts linked play with affection, shared attention, and communication. Playing together gives the parent a practical way to learn what the child knows and where support is needed. It also creates a less formal interaction in which a child is more willing to try, speak, and ask for help. The respondents quoted below explained:

To show parental love... to make the parent share what the child has learned from the school (**KII - Head Teacher, School 1**).

It builds even more confidence in the child to play with the mother, with the parent (**KII- Head Teacher, School 2**).

The relationship we have with the parents it is a good one because... we as a school, we cannot say that we can manage everything (**FGD – Teachers School 1**).

As seen in the above views, the relationship benefit comes from shared activity rather than instruction alone. Parent-child play creates an enabling environment for nurturing care, observation, feedback, and mutual fun and enjoyment within learning.

Play develops socio-emotional skills and resilience-related capacities

Participants identified problem-solving, sharing, communication, cooperation, socialisation, and confidence among the skills observed in the children during and after the intervention. Group games and shared materials require turn-taking and negotiation, and according to the participants, the children demonstrated improved abilities in all these areas. The findings also indicate that supportive adults help children

persist when a task is difficult. This has encouraged the inclusion of children with disabilities and those with slower learning abilities:

Problem solving... sharing with others... communication even is some of the things the children are doing well now as they play more with their parents (FGD – Male Parent, School 1).

Play gives children space to socialize among themselves... they cooperate, learn sharing, like sharing materials, sharing ideas, and build confidence in the child in what he or she is doing (KII- Head Teacher, School 2).

Teachers usually take them aside and discuss with them when the child still has the problem (KII - Deputy Head Teacher, School 1).

Although the participants do not provide strong direct evidence on resilience as a measured outcome, they do provide evidence for capacities associated with resilience, including confidence, problem solving, supportive relationships, inclusion, persistence after difficulty, and help-seeking.

Perceived post-intervention changes

Participants reported improvement after training and parent engagement. The clearest perceived changes were greater parental involvement, easier writing or improved abilities to write, more effective use of materials, improved time management, and stronger teacher practice. These are self-reported changes:

After this programme... There is a lot of improvement... after involving their parents... even writing, it is easier for them (FGD – Male Parent, School 2).

I have noticed that time management has greatly improved. We have enough learning materials, the charts on the wall, which can help them to learn whenever the teacher is there or not (KII with Head Teacher, School 2).

Once the teacher is entering the class, they should lesson plans with some materials that involve play... it will bring permanent retention to the learners (KII - Deputy Head Teacher, School 2).

Conclusion

Interactive play and parental guidance improve readiness and foundational learning when they are organised as one continuous learning process across school and home. At school, adults use movements, songs, manipulatives, pictures, matching, sorting, building, role play, and routine-based activities. At home, parents repeat simple activities, provide emotional encouragement, observe progress, and connect learning to everyday objects. The combined process supports academic practice, confidence, communication, cooperation, shared attention, and the practical behaviour needed for school participation.

3.10. Facilitators and barriers to school readiness, playful parenting, foundational learning, and alleviators

Findings for Research Question 2: What are the facilitators and barriers to school readiness, playful parenting, and foundational literacy and numeracy in crisis contexts, and how could they be alleviated?

Pattern across the data

Analysis identified patterns associated with the facilitators and barriers to school readiness, playful parenting, and foundational literacy and numeracy in crisis contexts, and how they could be alleviated. The results below are presented according to facilitators and barriers. Five facilitating factors and six barriers are presented below.

3.11 Summary of facilitating factors

Training, coaching, and professional collaboration

Continuous professional development training helped teachers understand play as a learning method rather than a break from learning. Participants described caregiver training, partner-led training, CPD committees, joint planning, lesson supervision, and feedback on strengths and weaknesses. These structures support consistent implementation and help teachers adapt play to different subjects and age groups, as seen in the views presented below:

All the caregivers were trained... the training, some are organized by this agency... We have the IRC... providing them both indoor and outdoor materials (KII- Head Teacher, School 1).

We did the training on learning through play with IRC Play Matters... We have the CPD committees... we lay down what should be done to improve learning at school through play (KII Deputy Head Teacher, School 2).

We see the strong points and the weak points after the supervision... what is difficult and what could we do best to improve (KII Head Teacher, School 1).

The implication here is that, to maintain school-based coaching after initial preservice training, is for the school leaders and managers to encourage the use of demonstration lessons, peer observation, shared material-making sessions, and follow-up supervision focused on learner participation to help teachers improve their practice.

Parent sensitization and community structures

Parent involvement was supported through meetings, school visits, letters, telephone calls, notices, local councils, school management committees, and parent-teacher structures. The sensitized parents visited classrooms, observed teaching, checked results, supplied materials, and supported school kitchen gardens and feeding. Community structures helped mobilize children of school-going age and reinforce the value of ECD as evidenced in the perspectives below:

*We work hand in hand with the local council... We tell them the advantage, the benefit of ECD... so that they mobilize the school-going age **(KII Head Teacher, School 1)**.*

*They come on their own because they were being sensitized before. So, they have that knowledge **(FGD – Teachers School 2)**.*

*We started with the SMC... after, we did a campaign with parents... even the parents and PTA members also **(KII Deputy Head Teacher, School 2)**.*

Use of repeated, practical demonstrations rather than one-off awareness meetings has been instrumental in facilitating community engagement. However, there is a need to schedule sessions around parents' livelihoods and to communicate through several channels to reach all parents.

Low-cost and locally available materials

Participants viewed local materials as essential in low-resource settings. These include stones, sticks, bottle tops, banana fibers, ropes, clay, plants, pictures, charts, and household objects, which were adapted for counting, matching, shape work, movement, and science. Locally available materials reduce dependence on purchased resources and connect learning to the child's environment. Respondents made the following observations about play materials:

*The sticks, like for counting. Even the stones... bottle tops... the bottle itself even **(FGD - School 1)**.*

*With or without commercial materials we can still reinforce learning... make good use of available materials in the environment **(Head Teacher, School 1)**.*

*A teacher should not only buy things, but teachers should also look at the environment **(Deputy Head Teacher, School 2)**.*

Develop safe local-material kits, material inventories, and school storage systems. Involve parents and children in the collection only when items are safe, clean, and age-appropriate.

Structured routines, inclusive practice, and local language

Predictable routines, orientation, local-language teaching, and close teacher support helped diverse learners participate. Participants described seating and involving a learner using a wheelchair, giving additional support to slower learners, and using local language in the lower primary. These practices reduce exclusion and help children understand instructions as seen below:

*We have used the local language for P1 to P3. **(KII Teacher, School 1)**.*

*She sits in front, and we also make her participate among the learners. They do things equally **(KII Teacher, School 2)**.*

We are not satisfied that maybe this is a class for those without impairment... it is inclusive... we do not leave anyone. (FGD – Teachers, School 1).

Teachers need to design play activities with several entry points, visual instructions, local-language support, adapted materials, and small-group assistance.

Nutrition, feeding, and safe learning conditions

Participants connected nutrition and attendance. Parent-supported gardens, maize, beans, soybeans, and vegetables were described as food resources for improving school feeding and child nutrition in the refugee settlement schools. School leaders discussed a safe learning environment and monitoring absence. In crisis contexts, readiness depends on the child being healthy, fed, and present, as these respondents put it:

We have 3 acres where we have planted beans, maize, and the soybean... [parents] come for weeding and planting (KII- Head Teacher, School 1).

Working with schools, we encourage parents to grow maize so that the children's nutrition is catered for, so that they will be in a position to be in the school (Refugee leader School Community 1).

Linking playful learning interventions to attendance, nutrition, safeguarding, and referral for unmet basic needs still remains a critical area of intervention among refugees and the immediate host communities.

3.12 Summary of the Hindering Factors

Large classes and inadequate space

Large class numbers reduce the teacher's ability to guide each child, monitor safety, and ensure equal participation. However, small classroom spaces restrict movement, group work, and material use. These barriers affect both learning quality and classroom management, as seen below:

The number of children that we have is a high number of children compared to a teacher... controlling the class will be difficult (FGD – Teachers, School 1).

The classroom is too small, so learning through play cannot be done easily... for learning through play to work, there should be enough space in the class where children can play (KII- Deputy Head Teacher, School 1).

To facilitate learning through play in the classroom, teachers use learning stations, small rotating groups, peer or child leaders, outdoor spaces, and simple group-management routines. However, it would be useful to expand classrooms where feasible and set safe maximum group sizes for high-movement activities to support learning through play.

Funding, materials, storage, and infrastructure

Schools reported difficulty raising construction funds, delayed public funding, inadequate materials, insecure classroom doors, and loss of displayed resources. Some

ECE provisions remained outside full government financing. These conditions create dependence on parents and development partners, as shown below:

We have problems with classrooms... we have started constructing 3 classrooms... but still we have some challenges with funds being raised from their parents since they also do not have enough (KII - Deputy Head Teacher, School 2).

We have some doors which are not lockable... over the weekend, the community around enter the classes and [materials] are taken away... our payment of the UPE may not come [on] time (KII - Head Teacher, School 1).

The government has not yet taken full control... the school is still under the community (Community leader, School 1).

Schools should create a minimum ECE material and infrastructure package, secure storage, lockable classrooms, predictable school grants, and public financing for caregiver pay, feeding, construction, and learning materials.

Teacher time and workload

Making learning materials requires time for collection, preparation, and storage. Workload and crowded timetables reduce teachers' capacity to prepare a full range of materials. This threatens consistency even when teachers value play-based learning, as discussed below:

Because of time and workload in our timetable, it does not allow teachers to make all those possible learning materials. (KII Deputy Head Teacher).

If time permits... I am doing PE (KII with Head Teacher, School 1).

Schools are encouraged to save weekly preparation time, organize joint material-making sessions, reuse durable kits, share materials across classes, and simplify lesson planning in order to make it easy for teachers to integrate whole school activities into their daily routines.

Seasonal livelihoods and uneven parent participation

Parents were less available during rainy seasons because of garden work. The focus group also described parents who viewed education as the school's paid responsibility and resisted supporting homework. Parent engagement in the playful parenting sessions, therefore, varied despite positive examples of school visits and contributions. Some parents resisted the playful sessions for different reasons, including:

During the rainy season, most of the parents are engaged in garden work, and they rarely come (Parenting Sessions Facilitator).

I paid the school fees... you said you are a teacher, but now you want me [to] do something for you (Parenting Sessions Facilitator).

Schedule sessions outside peak farming periods, provide short home activities, use telephone messaging and community demonstrations, and explain that parental guidance and engagement in play complements rather than replaces teaching.

Poverty, basic needs, and attendance

School readiness was affected by uniforms, food, school fees, and other basic needs. Teachers linked learner absence to unmet needs and described contacting parents. Nutrition was treated as a precondition for attendance and learning, not a separate issue as explained below:

Some of them were saying, I have not been given the uniform... then we call the parent so that they exercise their role... to provide the basic need for the child to attend the school (KII Head Teacher, School 1).

Getting money is hard (FGD – Female Parents).

To alleviate the situation, schools need to combine the teaching-learning programming with school feeding, flexible parent contribution arrangements, referral for protection and basic-needs support, and early follow-up on absence to ensure learners enroll and stay in school.

Environmental hazards and seasonal availability of local materials

Local materials are affordable, but collection may expose children and adults to hazardous objects or require travel outside the confines of the home or the school. Some plant-based materials are unavailable in particular seasons, e.g., sorghum stems and banana fiber. Adopting the local-resource approaches, therefore, requires safety standards and planned collection, as argued by these respondents:

We have some harmful objects... this stone sharp thing... when you step on it, it will cut you (KII Teacher, School 2).

For you to make a low-cost material... You should have to get a banana fibre from here... carry [it]... that is also sometimes a problem (FGD – Parents, School 1).

Adults should pre-screen collection sites, clean materials, avoid sharp or contaminated items, maintain a seasonal collection calendar, and store durable materials for later use.

Conclusion

The findings show that the main facilitators of learning through play are trained and supported teachers, engaged parents, strong school-community structures, partner assistance, accessible local materials, inclusive routines, local-language support, nutrition, and safe learning conditions. The main barriers identified include: large class sizes, limited space, insecure or inadequate materials, workload, seasonal parent availability, poverty, weak public financing, and environmental risks. Alleviating these barriers requires a combined response involving schools, the community, parents, and relevant stakeholders in education. Training alone will not sustain playful learning

without time, space, materials, parent engagement, nutrition, inclusion, and predictable financing.

3.13. Integrated Interpretation

The main pathway of change

The findings support the following pathway: trained adults organize activities, inclusive play using simple materials; children practice language, numbers, movement, and social interaction; parents repeat and guide similar activities at home; repeated school-home practice strengthens knowledge, confidence, relationships, and school participation. This pathway depends on enabling conditions, including adequate space, materials, time, nutrition, safeguarding, and community support. The Table below describes what would support this pathway to achieve the desired child outcomes.

Table 15. Pathway to desired child outcomes

Elements	Respondents Informed Description
Inputs	Teacher and parent training; local materials; routines; space; nutrition; school-community structures
Activities	Counting games; songs; matching; sorting; building; picture and letter games; writing on sand; role play; guided home play
Immediate outputs	More child participation; more adult-child interaction; repeated practice at school and home; wider access to learning materials
Short-term outcomes	Letter and sound recognition; counting and classification; communication; sharing; cooperation; confidence; school routines
Longer-term outcomes to test	School readiness; foundational literacy and numeracy; parent-child relationship quality; socio-emotional skills; resilience
Conditions	Inclusive practice; manageable groups; secure materials; teacher preparation time; parent availability; public and partner support

Table 16. Strength of evidence by outcome

Outcome	Assessment	Basis
Foundational literacy and numeracy	Strong qualitative evidence	Examples of counting, addition, matching, letter-sound work, reading cards, writing, and reported easier writing among children and parents.
School readiness	Strong qualitative evidence	Daily routines, orientation, toilet use, social behaviour, time management, and transition to primary.
Parent-child relationships	Moderate qualitative evidence	Parental love, shared learning, confidence, and parent-child play were explicitly described.
Socio-emotional skills	Strong qualitative evidence	Problem solving, sharing, communication, cooperation, confidence, and socialisation were named.
Resilience	Limited direct evidence	Related capacities were described, but resilience was not directly measured or discussed in depth.
Intervention impact	Suggestive, not conclusive	Participants reported improvement, but no quantitative baseline-endline outcome data were supplied.

4.0 Recommendations

4.1 Programme design and delivery

- a. Embed interactive play in daily literacy and numeracy lessons. Use movement, song, matching, sorting, building, role play, real objects and short games linked to clear learning objectives.
- b. Provide simple home-play activity cards or demonstrations. Activities should use common household objects, take 10 to 15 minutes and require little or no reading by the parent.
- c. Demonstrate each home activity to parents. Show how to encourage effort, ask questions, allow the child to try and avoid completing the task for the child.
- d. Use school-home continuity. Repeat core skills across the classroom, take-home activities and parent-child play so that practice occurs in several settings.
- e. Link play to routines and readiness. Include arrival, morning circle, toilet routines, snack, outdoor play, free choice, clean-up and goodbye routines.
- f. Design for inclusion from the start. Use visual instructions, local language, adapted materials, mixed-ability groups and additional adult or peer support.
- g. Integrate nutrition, attendance and safeguarding. Follow up absence early and connect families to available support.

4.2 Teacher and school support

- a. Maintain school-based CPD, coaching, peer observation and joint planning after initial training.
- b. Protect preparation time for making and organizing materials. Create shared, reusable class kits.
- c. Use stations and rotating groups in large classes. Assign clear roles and use trained child leaders for low-risk revision activities.
- d. Expand safe play space through classroom reorganization and scheduled outdoor learning.
- e. Provide lockable storage and a material inventory to reduce loss and repeated collection.
- f. Monitor the quality of play, including whether every child handles materials, speaks, makes choices and receives feedback.

4.3 Parent and community engagement

- a. Schedule parent sessions outside peak farming periods and repeat them through short meetings, telephone calls, notices and community demonstrations.
- b. Clarify the parent's role. Parent guidance reinforces school learning, but does not replace the teacher.
- c. Invite parents to observe classroom play and practice the same activity with the child before taking it home.
- d. Use local councils, SMCs, PTAs and parent champions to mobilize families and reach parents who attend less often.

- e. Set safety rules for collecting local materials. Adults should screen, clean and store materials before children use them.

4.4 System and financing

- a. Define a minimum ECD package covering trained caregivers, safe classrooms, adequate space, indoor and outdoor materials, secure storage, feeding and supervision.
- b. Provide predictable public financing for ECD staff, learning materials, classroom construction and maintenance.
- c. Plan for partner transition. Training resources, material specifications and monitoring tools should remain with schools and local authorities when projects end.
- d. Track equity by disability, refugee status, sex, language and household vulnerability.

4.5. Limitations

- a. The timeframe for the intervention was too short for implementing a phonics-based literacy activity.
- b. The parents' literacy levels had implications for the learners' acquisition of literacy skills.
- c. There were gaps in the teachers' capacity to support a home-based learning intervention due to variations in pre-service foundation and resource gaps.
- d. d. The transient lifestyle among refugees affected attendance and completion of the intervention, and also complicated the follow-up of participants.

5.0. Conclusion

The endline combined qualitative findings with child assessments, parent measures, implementation data, and disaggregated analysis. The study demonstrated that interactive play is a practical method for teaching literacy, numeracy, school routines, and social behaviour. In the study, parental guidance emerged as the mechanism for conveying learning into the home and strengthening the relationships around the child. The approach is most likely to succeed when every child participates, adults receive ongoing support, materials are accessible and safe, parents understand their role, and schools have adequate space, time, nutrition and financing.

The study results have shown that parenting interventions and early childhood programmes should focus on strengthening parents' understanding of child development and demonstrating how simple, low-cost play and learning activities can be integrated into daily family routines. Such approaches are particularly important in rural and low-resource settings, where caregivers' educational backgrounds may constrain their engagement with more formal learning materials without affecting their capacity to nurture children's development through meaningful interactions.

From a socio-cultural perspective, the study indicated that caregivers with limited education could draw on indigenous knowledge systems, community practices, and intergenerational learning to support children. Additionally, programmes that recognize and build upon these existing strengths, rather than assuming deficits, are more likely to enhance caregiver engagement and improve children's foundational literacy, numeracy, language, and socio-emotional skills.

In this regard, the relatively low educational attainment of caregivers has important implications for their ability to support children's play-based learning and foundational skills development. Parents with limited formal education often lack access to information about child development, early learning, and the educational value of play. As a result, they are less likely to engage in intentional learning activities like storytelling, guided play, book sharing, number games, or literacy-rich interactions known to promote cognitive, social, and emotional development in children. Hence, in situations where caregivers have only primary or no formal education, play is often considered as recreational only rather than as a critical pathway for learning and school readiness. This also emerged in the participants' views on how the intervention has changed their opinions about play.

Overall, this study has further demonstrated that low educational attainment does not necessarily imply the inability to support children's learning. The findings confirm that caregivers can still promote foundational learning based on culturally relevant play, everyday household activities, storytelling, songs, and responsive interactions, regardless of their literacy levels. While they may lack knowledge, resources, and confidence to deliberately use such practices as learning opportunities, their educational profile underscores the need for accessible, contextually appropriate parenting support initiatives that can empower caregivers to become active facilitators of children's learning through play in the home environment. Moreover, the improved scores in numeracy and literacy as well as the positive changes in parenting practices and attitudes all demonstrate the extent to which structured play-based parenting interventions can contribute to early learning and better parent-child interactions/relationships.

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