



Advancing the School Readiness 4-6 Program in Rwanda Endline Report



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October, 2019

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Executive Summary

Rwanda has achieved remarkable progress in expanding access to schooling: The net enrolment rate, at the primary school level, stands at 98.3% (98.5% for girls and 98% for boys)¹ and significant efforts have been made to improve school curricula and educational institutions. Despite this progress, significant challenges remain at the pre-primary school level. In response to the challenge of quality of learning, Advancing the Right to Read Program was designed. Implemented in the Gasabo and Ngororero districts of Rwanda, the project aimed at increasing school readiness skills, knowledge and attitudes for children aged 4-6 years for a later performance.

To understand the impact of the ELM project on children's learning and development and caregivers' attitude towards childcare related to children's learning, an impact evaluation study was conducted. Specifically, the study intended to determine the change in parental practices, attitudes, beliefs, skills and knowledge on children's school readiness over time, to determine the gain in children's emergent numeracy, literacy, socio-emotional, fine and gross motor skills over time for children in pre-primary school, and to determine which factors are correlated with children's gains on the school readiness.

The evaluation implemented a quasi-experiment by comparing children who received the program, and children who never received it. From the target Gasabo and Ngororero districts, a random sample of schools was chosen for the treatment group. To recruit a control group, schools from neighboring Nyabihu and Kicukiro districts, with similar characteristics were randomly selected. The study compared the learning and development of children and caregiver attitude measured before and after the program, for both treatment and comparison groups. The data was collected using the International Development and Early Learning Assessment (IDELA) tool and a caregiver tool was used to capture the home learning environment. The salient findings from the study revealed the following.

Key findings

Children

The project impact evaluation analysis finds a statistically significant impact on children's learning and developmental skills measured through IDELA. The mean score gained was larger for the treatment group children compared to comparison children. The improvement in numeracy and literacy skills is especially prominent, with the emergent literacy domain seeing the largest gain in scores due to receiving the program. The equity analysis found that the program seems to have a stronger impact on children with literate fathers. If children with literate father received treatment, the endline IDELA score tends to be higher compared to children with illiterate father who received the intervention. Characteristics such as children with high baseline IDELA scores, older children, or high parents' education predicted higher endline IDELA scores.

¹ NISR (2019). 2019 Statistical Year Book. Kigali.NISR.

Caregivers

The analysis found a statistically significant impact of the program on caregivers' attitude measured through HLA (Home Learning Activities) and HLE (Home Learning Environment). The program had an impact on all domains except for negative discipline, and the largest impact on HLA. Particularly for HLA, the impact was significant, showing the effectiveness of the program. When looking at the disaggregated items for HLE separately, for types of reading material, the treatment effect on households having a storybook was large. There was also a significant increase in the household with toys that teach numbers and homemade toys. In terms of HLA, treatment is associated with an increase in all types of positive childcare activities. The equity analysis found that for HLE, for the household whose language was English, the endline HLE score as a result of the program tends to be higher, compared to the households whose home language was not English. Characters such as high baseline HLE and younger children predicted higher endline HLE and HLA. Whereas high father's education and home language as English predicted higher endline HLE scores, and high mother's education predicted higher HLA scores.

Limitations

At the end line data collection found around 15.9% of children missing from baseline to end line. Children attrited tend to be more from urban areas and had higher motor skills on average. This limits our ability to generalize the results to the overall population the sample we have represented. The results are only applicable to the population of similar characteristics, which is the children from a more rural background and with lower motor skills on average.

Conclusion

The results from the impact evaluation of Rwanda ELM project emphasizes the importance of the caregiver focus coupled with intervention targeting children. The results showed that children who benefited the intervention of the program increased learning and developmental skills compared to children who did not, especially for emergent literacy and numeracy domains. Caregiving practices in the intervention group captured through HLA and HLE found increased home learning activities with children relating to reading, playing and improved access to reading resources and types of toys, compared to the comparison group. The analysis shows that the intervention had a statistically significant impact on the caregiver's activities and home learning environment. Thus we can say that it is beneficial to provide the intervention to the household and children whose characteristics were similar to the household/children in this study. The analysis found that the project had a different effect by the literacy status of the parents. Finding ways to ensure that the project tailors to the needs of both illiterate and literate populations could enhance the impact of the project.

I. Introduction

I.1 Background/ Country context

Rwanda has achieved remarkable progress in expanding access to schooling: The net enrolment rate, at the primary school level, stands at 98.3% (98.5% for girls and 98% for boys)² and significant efforts have been made to improve school curricula and educational institutions. At the pre-primary school level, the Government of Rwanda, through the Rwanda Education Board (REB), developed competence Based Curriculum for pre-primary and related documents by 2015. It started rolling out a one-year pre-primary school program using this curriculum in February 2016. This curriculum aims to prepare children aged 3-6 years for primary school.

Despite this important progress, significant challenges remain at the pre-primary school level - challenges that continue to undermine effective rollout of the competence based curriculum. For example, there are limited numbers of trained pre-primary school teachers, there is a lack of teacher's motivation as pre-school teachers are not on government payroll. Play and learning materials are also in short supply in pre-school classrooms, while even more importantly, infrastructural constraints at existing primary schools make it difficult to accommodate all pre-primary age children into the one year pre-primary classrooms. According to the 2016 Education Statistical Year Book, by the end of 2016, only 17.52% of pre-primary age children were in school. By 2019, school enrolment increases to 20.6% meaning that the remaining 82.88% were left out.

The relationship between parental engagement, children's learning and developmental outcomes is now well established in educational research. Children whose parents actively engage in activities that promote learning at home consistently outperform those children who do not receive parental support. Despite this, SC experience, globally, and in Rwanda, shows that parents are not always aware of the important role they can play to support their children to learn. This knowledge and practice gap can, however, be bridged by implementing a well-designed parenting education program that does not only create awareness among parents about the role they can play to unlock their children's potential, but that also empowers them to develop the skills and confidence needed to support their children's learning within the home.

These multiple challenges, that range from inadequate learning spaces in pre-primary schools to lack of appropriately qualified and motivated teachers, inadequate play and learning materials, and inadequate parental awareness and engagement, negatively impact Rwandan children's school readiness, and consequently, their performance at the primary school level. For example, a Save the Children Political Economy Analysis conducted in 2017 revealed that "a full 50% of P1 students, 26% of P2 students, and even 14% of P3 students, reach the end of the school year

² NISR (2019). 2019 Statistical Year Book. Kigali.NISR.

without being able to read even one word of Kinyarwanda”³. Furthermore, only 32% of P6 students could read more than 50 words per minute, which is “considered the minimum required level of fluency for solid comprehension”. Research shows that these literacy challenges at the primary school level can be mitigated by delivering effective school readiness programs that target pre-primary school age children themselves, pre-primary school teachers, and parents or guardians.

Learning from, and building upon the achievements of the Advancing the Right to Read (ARR) signature program in Ngororero and Gasabo districts, SC proposes, through this funding, to strengthen the education system by fostering the capacity of the school-based school leaders to coach pre-primary teachers to ensure quality learning at the pre-primary school level. Furthermore, Save the Children staff /ECD staff worked to increase the support to pre-primary schools by engaging education authorities right from the sector to district and national levels; advocate with URCE (University of Rwanda-College of Education) to prioritize training of pre-primary school teachers and REB (Rwanda Education Board) to provide regular incentives to pre-primary teachers, as well as the equipment needed for pre-primary classrooms. Besides consolidating the results achieved in the six sectors where ARR has been implemented thus far, SC has extended the program to the remaining 18 sectors of the two districts since 2018.

1.2 Program overview

One of Save the Children’s programmatic priorities is supporting 3-6 years old children around the world with quality early childhood care and development programs. The key focus is on strengthening school readiness skills so that children are ready to enter Grade I and succeed in school. Emergent Literacy and Math skills (ELM) developed in these pre-primary years are crucial for later reading and math outcomes. Save the Children has been implementing an innovative ELM toolkit with an aim to provide targeted training to preschool teachers on how best to support these acquisition of these skills through play and joyful leaning at home as well we at school.

This project is part of Save the Advancing the Right to Read Program which was designed as a direct response to the critical challenge of quality of learning in Rwanda.

Implemented in the Gasabo and Ngororero districts of Rwanda, the Advancing School Readiness Project aimed at increasing school readiness skills, knowledge and attitudes for children aged 4-6 years for later performance. From 2018 to 2019, the project focused on 3 three major components: (1) Improving pre-primary teachers’ practices and early learning environment, (2)

³ EDC, "National Fluency and Mathematics Assessment of Rwandan Schools: Literacy, Language, and Learning Initiative (L3) End line Report" (Washington, DC: Education Development Center (EDC), 2017).

Improving parenting practices at home to support children's school readiness skills, and (3) Increasing support to school readiness program by the Government of Rwanda.

Improving pre-primary teachers' practices and early learning environment: 242 preprimary teachers were trained on how to teach school readiness lessons as per the national competence-based pre-primary curriculum. Preprimary teachers were also provided with child-friendly learning materials and incentives, enabling them to deliver quality school readiness lessons.

Improving parenting practices at home to support children's school readiness skills: Community Parenting facilitators were trained to support parents and children in the communities in early learning initiatives. Parents and caregivers were also trained and gifted story books to deliver quality parenting practices in line with the GoR curriculum. 242 community playgroups and reading clubs attached to the parenting groups were established and functional.

Increasing support to school readiness program by the Government of Rwanda: Save the Children trained 24 SEOs and 2 DEOs on school readiness package, monitoring and supervision approaches. Save the Children's staff provided mentorship and coaching to 24 SEOs and 2 DEOs on how to monitor teachers and parenting facilitators. Save the Children also conducted advocacy to 2 districts and REB to prioritize School Readiness mentorship.

Summary of Activities :

The following set of activities represents the main focus of Save the Children's 4-6 work under this Advancing School Readiness project.

- Build the capacity of the pre-primary teachers, Community health workers (Who co-facilitate teachers for parents education), School Leaders, MINEDUC and REB /Early childhood Education and Inspector from Ministry of Education on teaching practices, school monitoring and coaching teachers as well.
- Provide monthly incentives for Teacher motivation
- Run parental education: Building capacity of parents and engage families in child development and learning through play from home and family visitation
- Provide resources for conducive learning environment
- Deliver Educational technical support to Government such as Supporting Rwanda Education Board to development pre-primary curriculum, linked training materials, and Early childhood Education minimum standard (the work from 2015-2019), and deliver Training of Trainers on teaching approaches aligned to National curriculum
- Raise community Awareness for improving understanding regarding pre-primary and school readiness and community contribution.

1.3 Research Objective

The main objective of this study is to understand the impact of the ELM program on children's learning and development, and caregivers' attitude towards childcare related to children's learning.

More specifically, this assessment intended to:

- To determine change in parental practices, attitudes, beliefs, skills and knowledge on children's school readiness over time;
- To determine the gain in children's emergent numeracy, literacy, socio-emotional, fine and gross motor skills over time for children in pre-primary school;
- To determine which factors are correlated with children's gains on the school readiness.

1.4 Research Questions

- Are comparison and treatment groups similar in characteristics?
- How does the attrition affect the analysis and the generalizability of the results?
- Did the intervention impact child development measured in the IDELA score?
- Did the intervention impact caregiver attitude and household learning environment measured by Home Learning Activities (HLA)⁴ and Home Learning Environment (HLE)⁵?

2. Study methodologies

2.1 Study design

This study is an impact evaluation of Emergent Literacy Math (ELM) project to document the benefits of the program for children's learning and developmental outcomes, and the caregivers' attitude and knowledge towards childcare related to child's learning. The learning and development of children and caregiver attitude were measured before and after the program, for both treatment and comparison groups. By comparing the improvement before and after in treatment and comparison groups, we will be able to gauge the impact attributed to the program intervention. Because the selection of treatment and comparison groups were not randomly chosen, we used the quasi-experimental design of difference in difference to look at the impact.

The intervention was implemented in all primary schools in Gasabo and Ngororero so it was not possible to randomly allocate schools into treatment and control groups. Instead, a random sample of schools in Gasabo and Ngororero were chosen for the treatment group, and a random sample of schools in two neighbouring districts (Nyabihu and Kicukiro) which had a quite similar characteristics as the intervention districts were chosen for the comparison group.

⁴ HLA consists (total 10) of: Read to child, Tell story to child, Sing to child, Take child outside, Play with child, Name objects/draw things, Teach something new, Teach alphabet, Teach numbers, and Hug child

⁵ HLE consists (total 15) of: Number of types of toys at home (total 9), and Number of types of reading material (total 6)

2.2 Sampling: Sample size, selection criteria, Unit of Analysis.

The target sample for this study has been calculated using information from previous studies of children’s early learning in Rwanda that used the IDELA tool. Cluster sampling calculations were used to account for children learning within the same classrooms with a minimum detectable effect of 35 standard deviations, intra-cluster correlation of 20, baseline-endline correlation of 61, power of 80, and a significance level of 05. The sample was then increased by 20 percent to account for possible attrition. The resulting sample size was 30 classrooms per treatment arm, with 10 children per classroom. A random sample of pre-primary classrooms were chosen, and then a random sample of children within those classrooms.

Even though many classrooms in Rwanda are likely to have many more than 10 children, the classroom size was kept to 10 because the sampling targeted the oldest children in each classroom . Pre-primary classes in Rwanda can enrol children from age 3 – 6 years, making them quite diverse in terms of children’s learning and development . To maintain consistency across classrooms and to provide information most relevant to primary school system integration, in 2018 we targeted 5-year-olds who were likely to transition into grade I at the end of project (after the 2019 school year) . In addition, a parent or legal guardian of children participating in the study also were included in the assessment .

The same children and parents/caregivers assessed at the beginning of the school year in baseline, before the program begins, were followed up again, at the end of the school year.

District	Sector	Teachers	Schools	Parents	Children
Gasabo	6	7	7	70	70
Ngororero	10	23	23	230	230
Nyabihu	8	15	15	150	150
Kicukiro	8	15	15	150	150

2.3 Survey Instruments

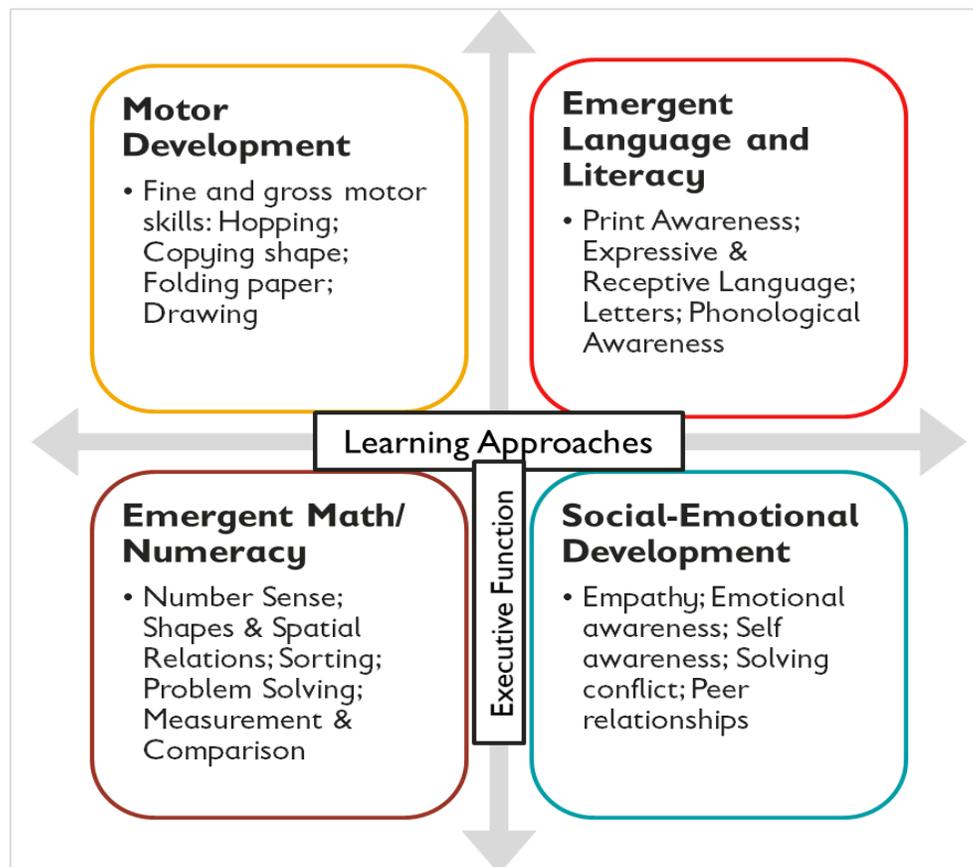
The study used two data collection instruments :

International Development and Early Learning Assessment (IDELA)

The International Development and Early Learning Assessment (IDELA) was used to measure children’s learning and development across domains such as motor, literacy, numeracy, social-emotional development, and approaches to learning. IDELA was developed by Save the Children over the course of four years for the assessment of children aged 3.5 – 6.5 years. Testing and modifying the tool over multiple years across eleven countries (Bangladesh, Bhutan, Egypt, Ethiopia, Indonesia, Mali, Malawi, Mozambique, Pakistan, Rwanda, and Zambia) has resulted in a 22-item assessment that balances three key dimensions: psychometric rigor, feasibility, and

international applicability⁶. As a result, IDELA is easily translated and administered in varied cultural contexts and has strong reliability and validity.

The following shows the domains of the IDELA sub-test.



Caregiver Questionnaire

A caregiver questionnaire was used to gather information about parenting practices and the home environment. Items include information about parent education, access to learning materials in the home, caregiver-child interactions in the home (play, learning, and discipline), care and feeding practices and socioeconomic indicators.

2.4 Data collection procedures

Data collection was done by 24 data collectors from the Save the Children database and trained in using the data collection tools. Four teams were composed and each team had 1 team leader and 5 data collectors.

⁶ Pisani, L., Borisova, I., & Dowd, A. J. (2015). International Development and Early Learning Assessment Technical Working Paper. Washington, DC: Save the Children. Retrieved from <https://idela-network.org/resource/international-development-and-early-learning-assessment-technical-working-paper/>.

Save the Children project officers acted as supervisors during data collection and MEAL team was in charge of the overall survey. Each participant was explained the purpose of this survey and requested to fill a consent/assent form prior to his/her participation in the study (no one was interviewed without his/her informed consent/assent). The Consent/assent form was read and the participant was given time to ask questions and was given a copy of the consent form to keep.

2.5 Ethical approval and dissemination of the findings

The research team sought ethical approval from the Rwanda National Ethics Committee (RNEC) and to the SC US Ethics Review Committee. The research findings were disseminated at the national level to different stakeholders and education actors. The results were also shared at the local level to the beneficiaries and local leaders.

2.6 Limitation of the study

Differences in sampling strategy in Treatment and Comparison at baseline limits comparability of the full sample. In order to address this issue, we utilize the quasi-experimental method Difference in Difference.

At the end line data collection found around 15.9% of children missing from baseline to end line. Loss of study program participants to some extent has affected the sample size by reducing the study's statistical power to detect effects. There were 30 treatment and 30 comparison schools. In total, 60 schools were visited, and data from 3- 10 children per school were collected. There is a low interclass correlation within schools, therefore the total remaining observation of 502 children in treatment and comparison should still give more power of explaining the difference than less observation was collected. However, attrition might have been associated with certain characteristics. For instance, children attrited tend to be more from urban areas and had higher motor skills on average. This limits our ability to generalize the results to the overall population the sample we have represented. The results are only applicable to the population of similar characteristics, which is the children from a more rural background and with lower motor skills on average.

3. Study Results

Overview of the study population

Attrition

From the 592 observations from baseline, we were able to identify 502 observations in the endline. We could not locate 15.9% of the baseline observations. (Table 1) The endline analyses will be conducted on the remaining 502 children and caregivers who were interviewed at baseline and endline.

Table 1: Sample table, by treatment status

Baseline variable	All (N=596)		Attritted (N=94)		Remaining (N=502)	
	Treatment (N=295)	comparison (N=301)	Treatment (N=35)	comparison (N=59)	Treatment (N=260)	comparison (N=242)
Child age (months)	54.9	51.6	54.2	52.1	55.0	51.5
Female (%)	52%	47%	51%	54%	52%	45%
IDELA score (%)	31%	31%	33%	36%	30%	29%

The attrition analysis found that there were statistically significant differences between treatment and comparison in the rate of attrition. In addition, in the overall sample, attrition analysis found variables that predict attrition that is statistically significant. For instance, children from urban areas are less likely to be found at the endline than children in rural areas. Further, children with higher motor skills and children who scored higher on attitude to learning also found less likely to be found at the endline than children with less motor and attitude to learning scores. This means that when we talk about the results, we can only generalize the results to the population, which the remaining sample represents, who has similar characteristics. In another word, results are valid for children who are more likely to be in rural areas, with lower baseline attitude to learn and motor skills, and whose parents answered “strong agree” less to the care attitude question 6 (Do you agree with “I think I can support my child’s educational development at home”) and 7 (Do you agree with “I think my child can learn a lot of skills by playing games”).

There were also characteristics that affected only one of the treatment or comparison group. The children and household with the following characteristics attrited differently.

- The number of types of toys: Treatment group who has more toys is less likely to attrit than other groups.
- HLA: comparison group who has higher HLA scores is less likely to attrit than other groups.
- Care attitude 6 “I think I can support my child’s educational development at home”: comparison group who agrees more with the question care attitude 6 is less likely to attrit than the comparison group who agrees less to the question. Treatment group who agrees with question care attitude 6 is more likely to attrit than other groups.
- Care attitude 7 “ I think my child can learn a lot of skills by playing games.”: comparison group who agrees more with the question care attitude 7 is more likely to attrit than the comparison group who agrees less to the question. Treatment group who agrees with question care attitude 7 is less likely to attrit than other groups.
- Attitude to learn: Comparison group who scored high on attitude to learn is more likely to attrit than other groups.

This different rate of attrition means that the sample may not be balanced for comparison. We will need to control for these characteristics in the analysis.

Balance test of background characteristics :

With the different rates in attrition, the characteristics of the sample are different from baseline to endline. (Table 2) N/A means that there was no variance, meaning all sample answered the same. For instance, for the baseline sample, all children in the dataset answered that they attended ECD. We will need to control for these characteristics in the analysis. Some of the key differences are as follows. The comparison group children tend to be statistically significantly younger on average, compared to the treatment group. There are more female children in treatment group compared to comparison group. Mother's education tend to be on average higher with the comparison group than treatment group. The same trend goes for father's education, with comparison group being higher. These are all statistically significantly different between the two groups .

Table 2: Comparison of the change in the mean value of background variables, by treatment status

Variables	BASELINE			ENDLINE		
	Comparison mean	Treatment mean	Is it significant	Comparison mean	Treatment mean	Is it significant
Child age (months)	51.52	54.95	***	68.50	72.78	***
% of female	0.45	0.52	*	0.44	0.53	**
Mother's age (years)	31.59	32.86	*	33.59	33.82	
Mother is literate (%)	0.91	0.81	**	0.88	0.83	
Mother's education level (from 0-6)	1.64	1.12	***	2.16	1.64	***
Father's age (years)	35.76	36.54		37.05	37.51	
Father is literate (%)	0.90	0.79	***	0.93	0.84	***
Father's education level (from 0-6)	1.60	1.02	***	2.42	1.73	***
Number of children	1.08	1.17		3.47	3.54	
Home Possessions (Total Types)	3.05	2.69	***	3.12	2.89	*
Child enrolled in ECCD	1.00	1.00	N/A	0.69	0.86	***
Home language is Kinyarwanda	1.00	1.00		1.00	1.00	N/A
Home language is English	0.03	0.00	**	0.07	0.05	
Home language is French	0.05	0.00	***	0.06	0.02	**
Home language is Swahili	0.02	0.00		0.04	0.00	***

*Rounding to the second decimal. The value below 2 decimals does not show.

* Education category: 0 "never attended school", 1 "Lower primary", 2 "Primary", 3 "Vocational training", 4 "Secondary", 5 "Diploma", 6 "Bachelor's and above"

* Home possessions 9 item max (radio tv fridge bike motorbike mobile elec land livestock)

The overall change of outcome variables (Average score): Descriptive analysis

Looking at the change from baseline to endline, you can see that there is a positive trend. For example, for the household outcome, such as the Home Learning Environment (HLE) at baseline, the treatment group had fewer reading materials. At endline, this difference was no longer statistically significant, signifying that the treatment group caught up with the comparison group.

For the child’s learning outcome, the total IDELA score was similar in the baseline, and by the endline, there is a statistically significant difference between the comparison and treatment. When we look at the change between the baseline and endline by treatment status, we are not controlling the effect of the difference in characteristics of each group. For instance, having more female children in treatment group may be affecting the score. Therefore, this section alone cannot guarantee impact attributed to the program. Even though this is a simple comparison of means and we cannot attribute any impact, this shows important trend, and it is promising. (See Table 3)

Table 3: Comparison of the change in the mean value of outcome variables, by treatment status

Variable	BASELINE			ENDLINE		
	Comparison mean	Treatment mean	Is it significant	Comparison mean	Treatment mean	Is it significant
Home Learning Environment (0-15)	4.08	3.31	***	4.90	5.22	
Home Learning Activities (0-10)	5.24	4.40	***	4.95	6.29	***
Negative Discipline (Total Types)(0-3)	1.79	1.52	**	1.53	1.46	
Reading Materials (Total Types) (0-6)	1.30	0.95	***	1.53	1.64	
Toys (Total Types)(0-9)	2.79	2.35	***	3.37	3.57	
Emergent Numeracy	0.30	0.30		0.53	0.59	***
Social-Emotional	0.27	0.28		0.56	0.59	
Emergent Literacy	0.23	0.22		0.54	0.61	***
Motor	0.37	0.41	*	0.76	0.79	*
Total IDELA	0.29	0.30		0.60	0.64	***

The break-down descriptive figure of score gain tells a similar story. For HLE, there is a prominent gain in the storybook and textbook in the treatment group compared to the comparison group. Similarly, the overall number of types of toys household has higher gains for the treatment group compared to the comparison group. The prominent gain seems to be from drawing toys and homemade toys, as well as outside objects. (Figure 1 and Figure 2). As stated above, because this is a mere comparison of before after without controlling for other characteristics, the gain difference is not tested for statistical significance. This is an overview of the result, before looking at the impact. Which already shows the difference in gain. Figure 4 shows the practice of negative discipline by caregivers, disaggregated by type. In each type, we observe decrease of practices in treatment group.

Figure 1: types of reading material gain, by treatment

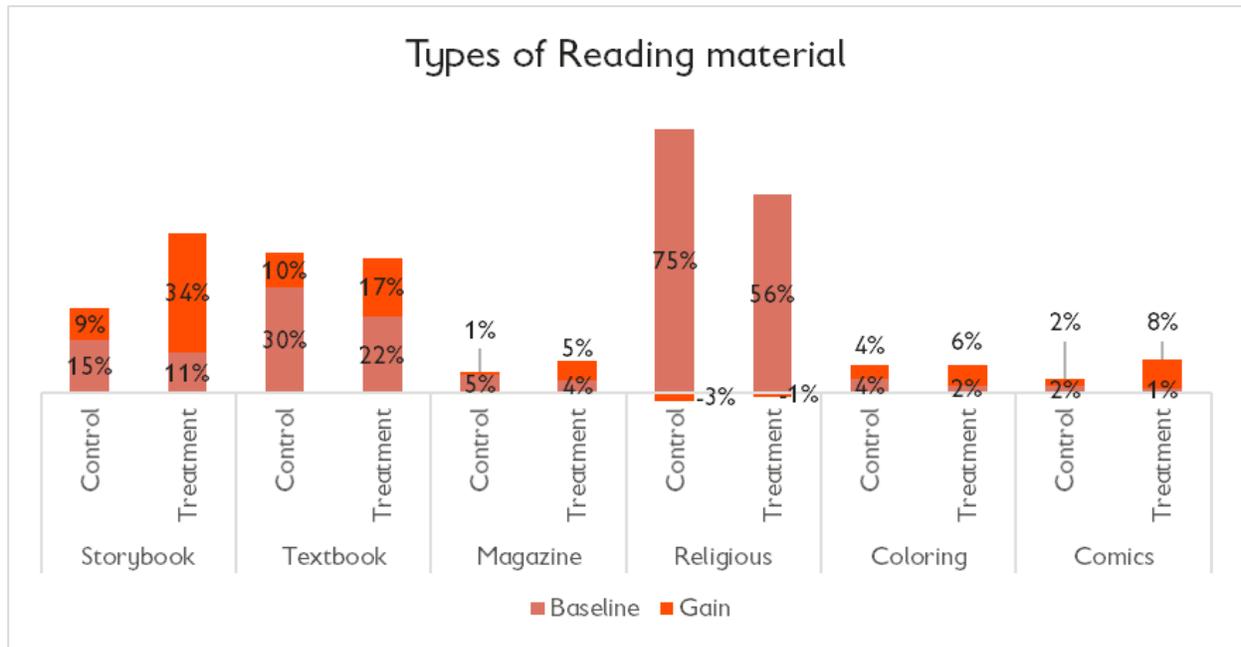
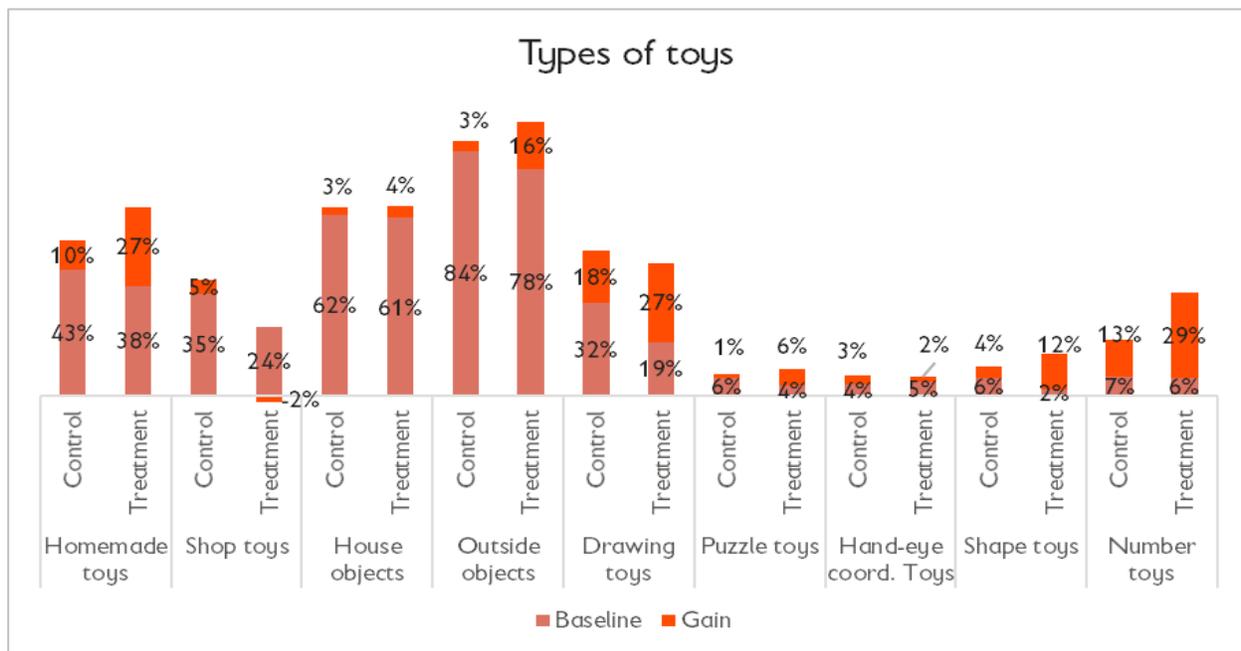


Figure 2: types of toys gain, by treatment



For HLA, there is a prominent gain for the treatment group, compared to the comparison group, in teaching their child something new, letters, as well as numbers. There seems to be a large gain in reading to children as well.

Figure 3: Home Learning Activities gain, by each activity, by treatment

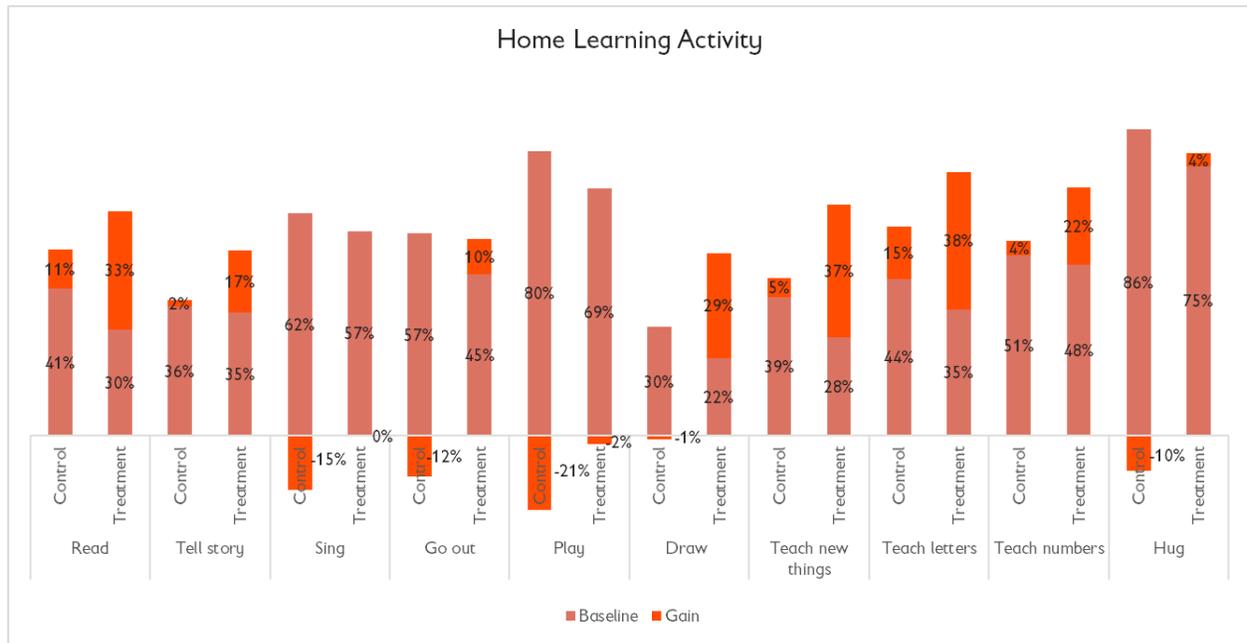
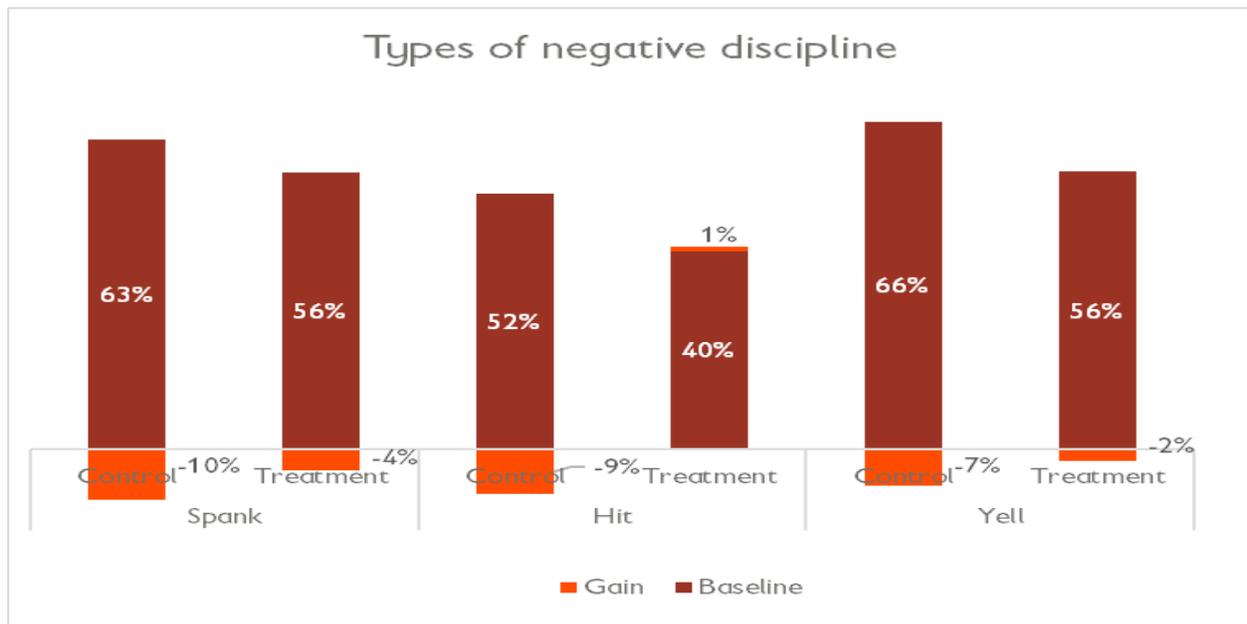


Figure 4: Change in negative discipline, by types of discipline, by treatment



The gain seems to be larger overall for the treatment group for both child learning measured by IDELA, and caregiver attitude variables. The gain for literacy and numeracy is especially prominent for the treatment group. (Figure 5. IDELA score gain, Figure 6) This is a simple balance test

without controlling for other characteristics, so we still have to look at a controlled gain in the later section, but this trend gives us an indication.

Figure 5. IDELA score gain, by treatment

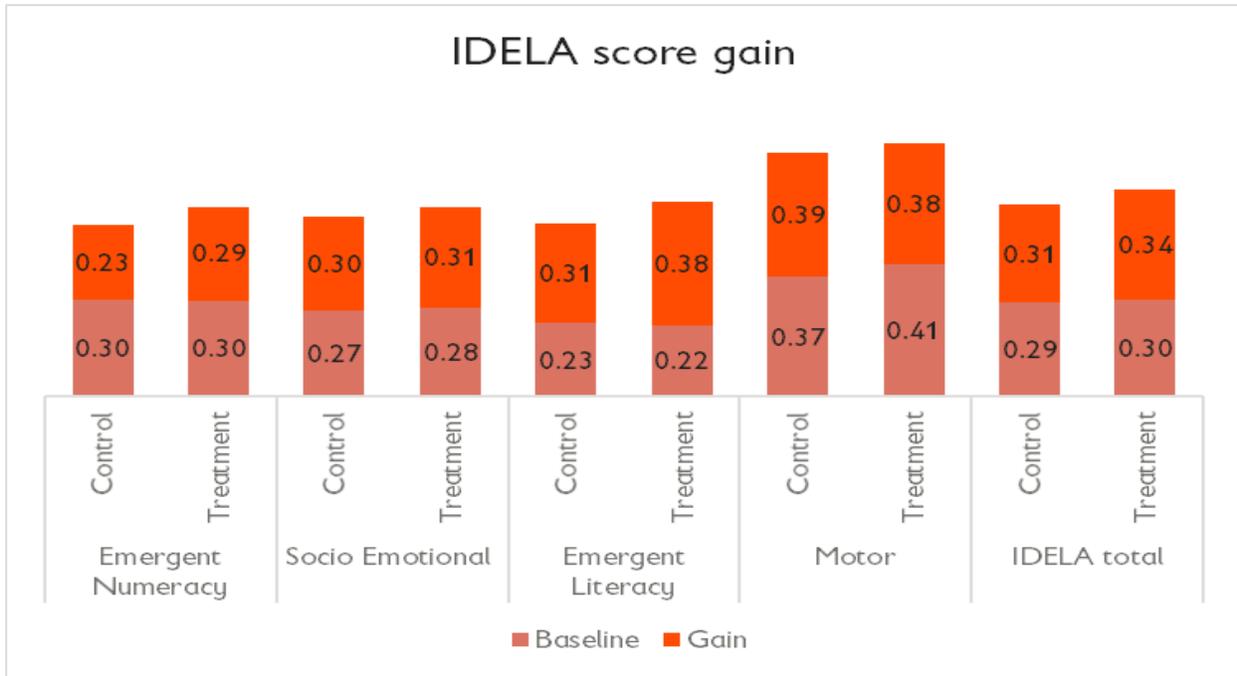
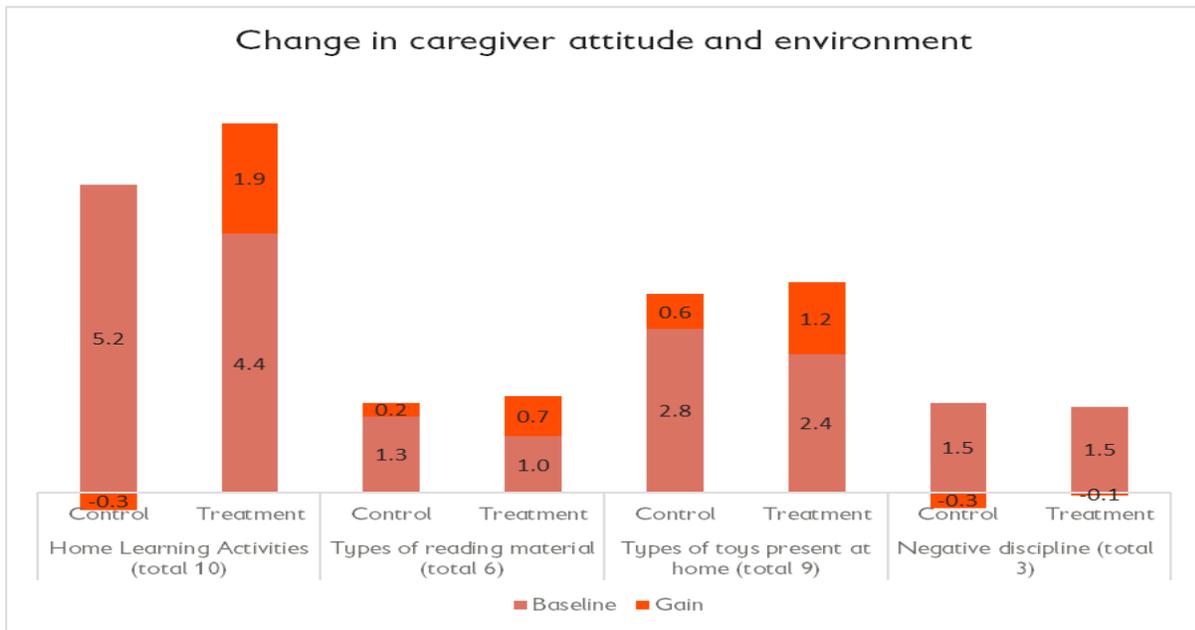


Figure 6. Change in caregiver attitude



Impact evaluation analysis: Children’s learning and developmental skills

This section provides children’s learning and developmental skills at the endline measured through the direct assessment of children’s skills using the IDELA tool. It presents the average percentage score in the total IDELA, as well as in each of the four domains of literacy, numeracy, gross and fine motor, and social-emotional. The average percentage correct for each item was calculated by dividing the total points correct by the total number of possible points for that item. Calculations of changes in learning over time were conducted using multivariate regression that controlled for baseline scores, baseline home learning environment, and other characteristics such as gender, age, mother’s age, and education, home language, pre-primary attendance, and the number of children at home. We clustered standard errors at the school level.

Impact evaluation analysis finds a statistically significant impact on children’s learning and developmental skills measured through IDELA. Figure 7 depicts the change in IDELA total score by treatment group. The score distribution narrowed and shifted towards a higher score for the treatment group. The difference is prominent compared to the comparison group.

Figure 7. Change in distribution of IDELA score by treatment status

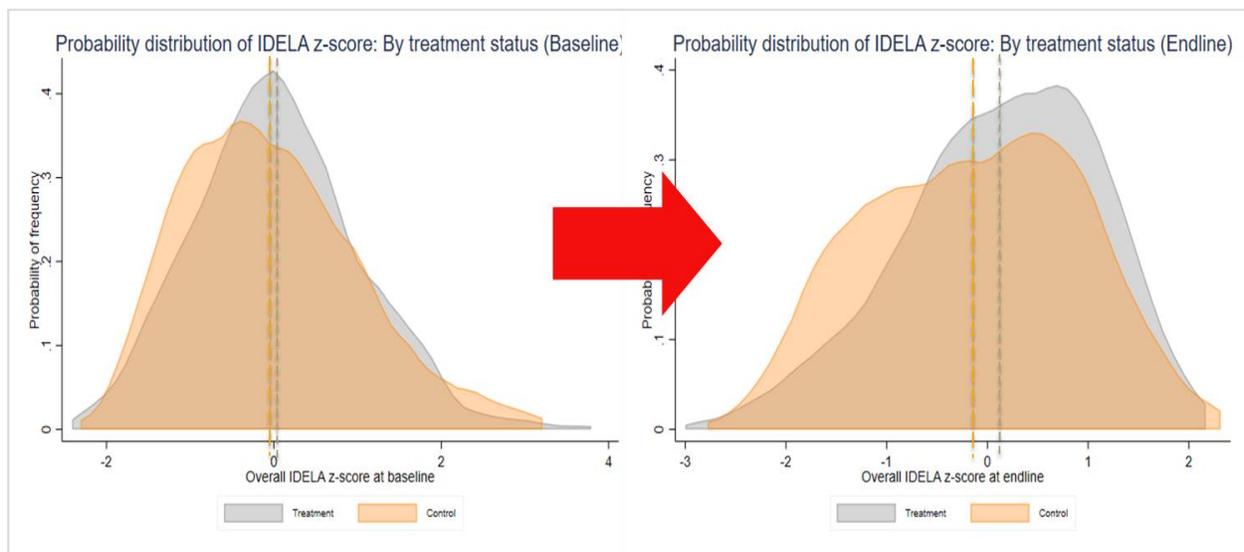
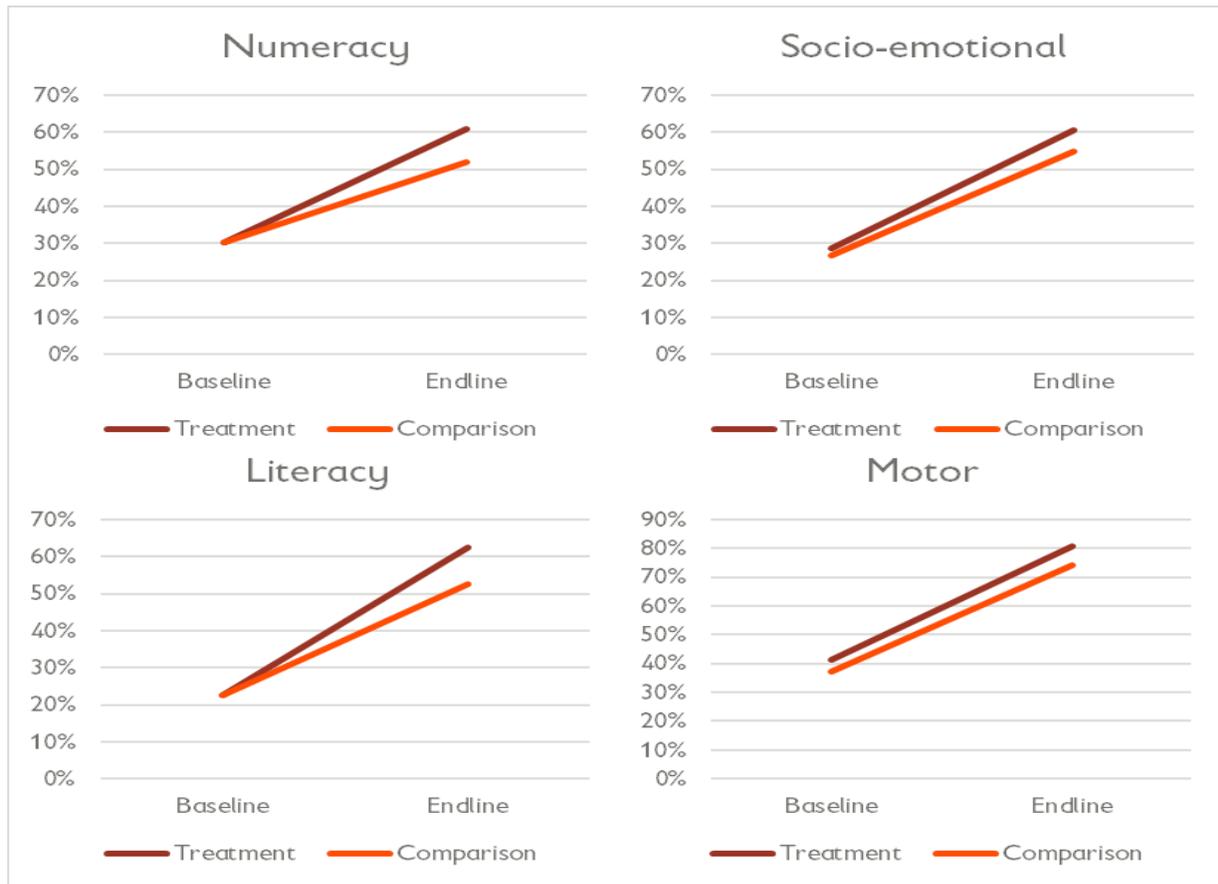


Figure 8 shows covariate-adjusted IDELA sub-test scores at baseline and endline for each treatment group. The score takes into account the variability caused by different characteristics, such as gender, age, and parent education and looks at the mean score of the children, holding other characteristics constant. The graph visualizes the difference in gains for the children with similar characteristics. The improvement in numeracy and literacy is especially prominent.

Figure 8: Change in covariate-adjusted IDELA sub-test scores, by treatment status (N=450)

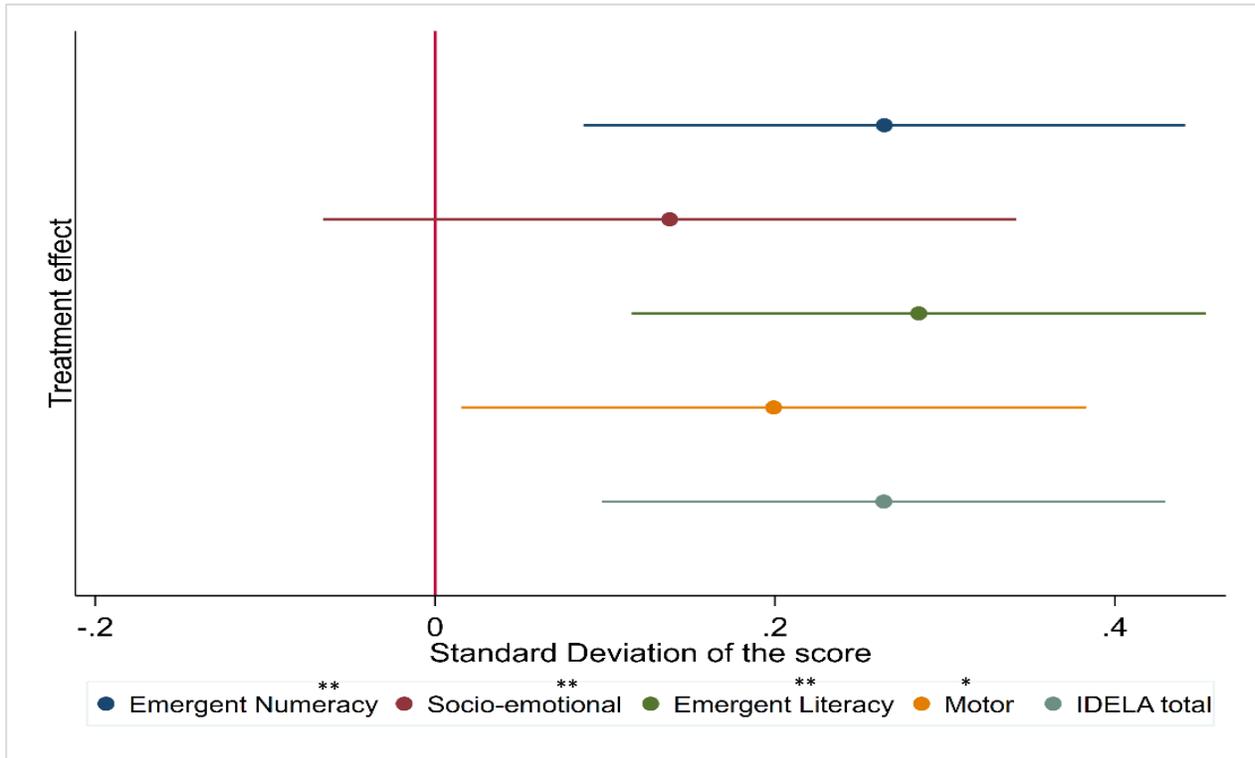


Because the IDELA scale is not comparable from one domain to another, in order to look at the effect size of the intervention, we adopted Cohen's *d* effect sizes to make the comparison easier. Figure 89 presents the effect size of the treatment by domain. The dot is the effect size and the line is the 95% confidence interval. In all domains but socio-emotional skills, the effect was statistically significant at the 5% level. The program had the largest impact on the emergent literacy domain, followed by the emergent numeracy domain.

Apart from the treatment status, the following characteristics also predicted higher IDELA total score on average at the 5% significance level or less. These are effect of variables holding other variables constant, meaning if all the other characteristics are the same between the two groups. (See appendix for the regression Table 4.)

- Children who scored high on baseline numeracy, literacy, socio emotional or motor score on average scores higher on the endline IDELA as well compared to those who did not.
- Older children scored higher than younger children
- Higher mother's and father's education levels also predicted higher IDELA scores compared to children with parents whose educational attainment is lower.

Figure 9: Treatment effect (impact from the intervention), in standard deviation term



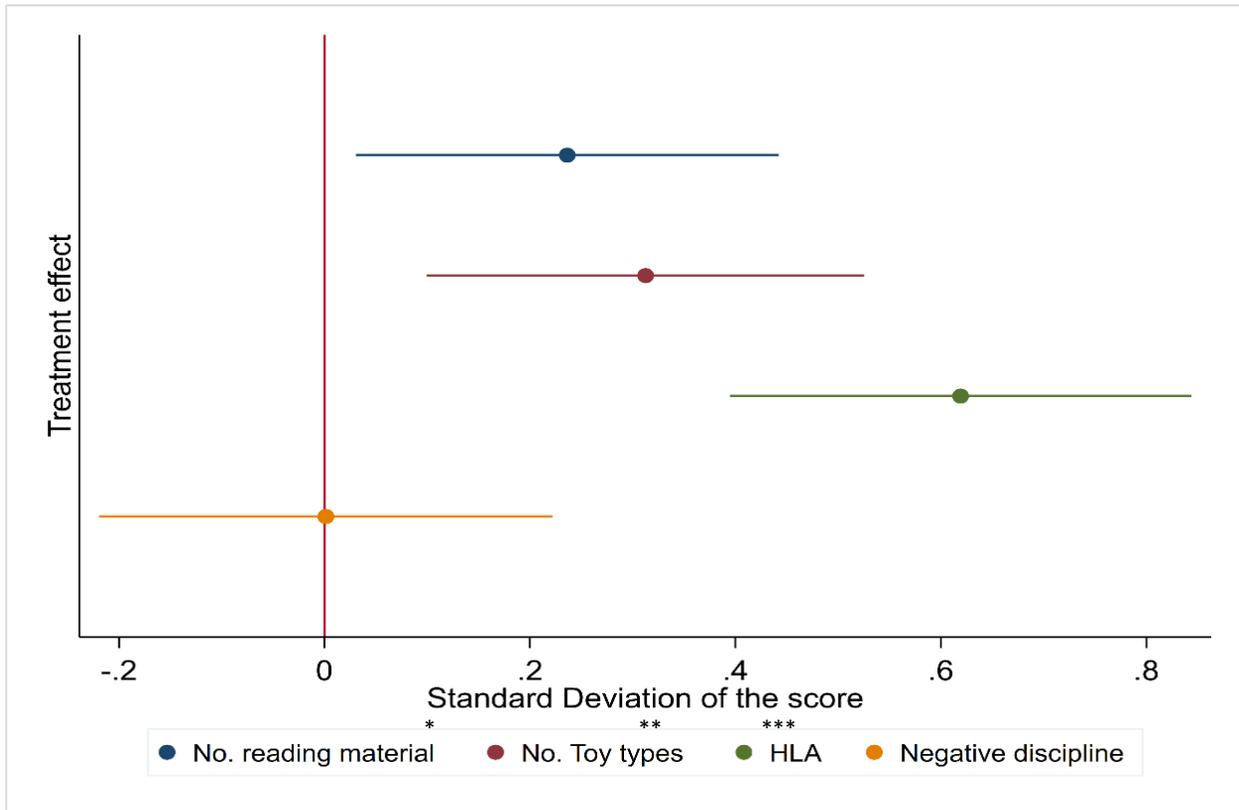
Impact evaluation analysis: Caregiver results

Caregivers were also surveyed before and after the intervention to document any potential changes in their behavior and care of children. Parents were asked about the Home Learning Environment (HLE), which is a composite of how many types of reading materials their children had access to, and how many times that children had access to type of toys. They were also asked about Home Learning Activities (HLA), which are the positive activities they engaged in with their children, as well as about practices in negative disciplines.

As for IDELA, the calculations of changes in caregiver attitude over time were conducted using multivariate regression that controlled for baseline scores, baseline home learning environment, and other characteristics such as gender, age, mother's age, and education, home language, pre-primary attendance, and the number of children at home. We clustered standard errors at the school level.

Impact evaluation analysis found a statistically significant impact of the program on caregivers' attitude measured through HLA and HLE. Figure 10 presents the impact of HLA, HLE (disaggregated by the number of types of toys and reading material), and negative discipline (3 categories of spank child for misbehaving, hit child for misbehaving, and criticize or yell at child) using Cohen's d effect sizes, to make the comparison easier. **The program had an impact on all domains except for negative discipline, and the largest impact on HLA. Particularly for HLA, the impact was significant, showing the effectiveness of the program.**

Figure 10: Treatment effect (impact from the intervention) for caregiver outcomes, in standard deviation term



Regression analysis on the breakdown of the HLA and HLE shows **which item is driving the impact**. For reading material, the treatment effect on households **having a storybook was large and statistically significant at 0.1% level**. In addition, there was a statistically significant effect on households having comics at the 1% level, and magazine at the 5% level. Religious materials saw decrease at 5% level. The types of toys available to children also saw a statistically significant increase attributed to the program. There was a significant increase in the household with toys that teach numbers and homemade toys at the 1% level. Further, outside object toys and toys that teach shapes also increased for treatment households compared to comparison groups, at the 5% level. In terms of HLA, treatment is associated with an increase in all at 5% or less. The variance is large, which means that there is a wider spread of different answers compared to responses for types of reading material. (See Figure 11, Figure 12 and Figure 13 below.)

Figure 11: Treatment effect (impact from the intervention) for reading material, in standard deviation term

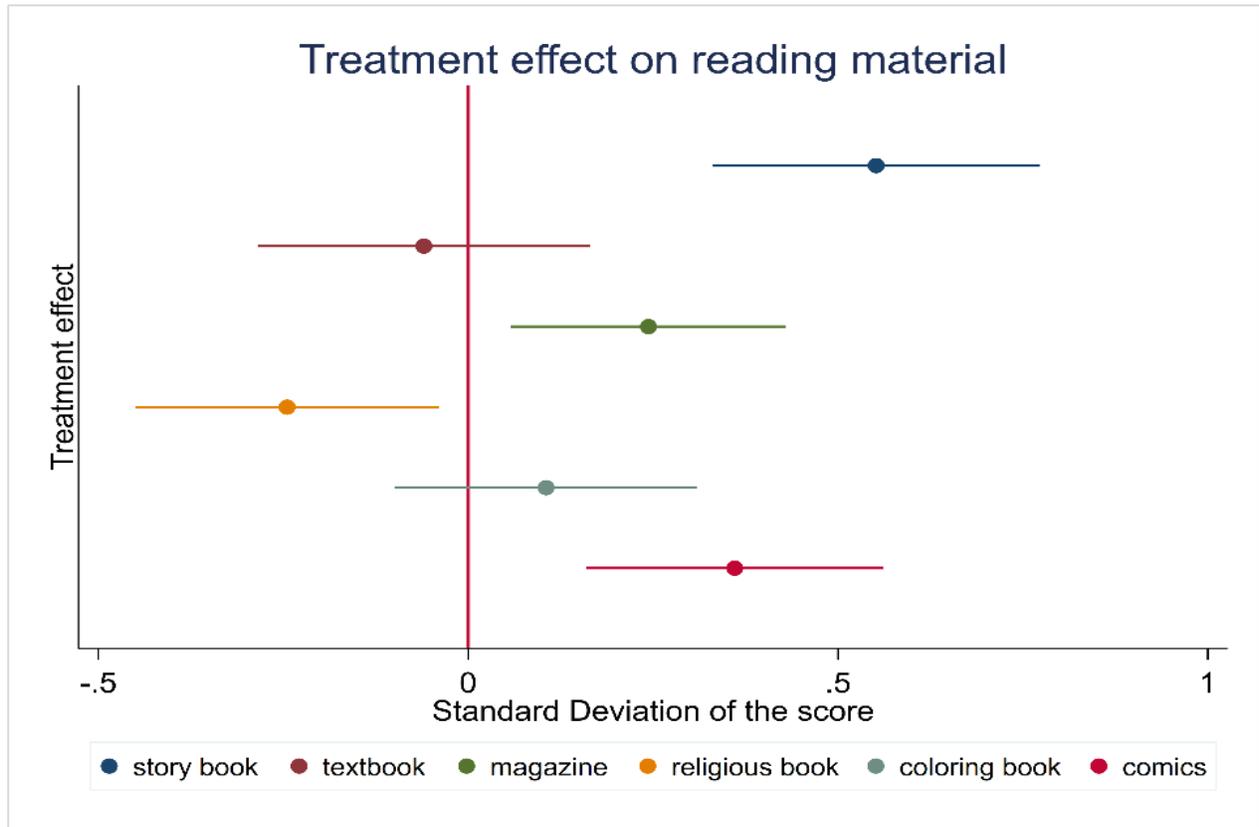


Figure 12: Treatment effect (impact from the intervention) for types of toys, in standard deviation term

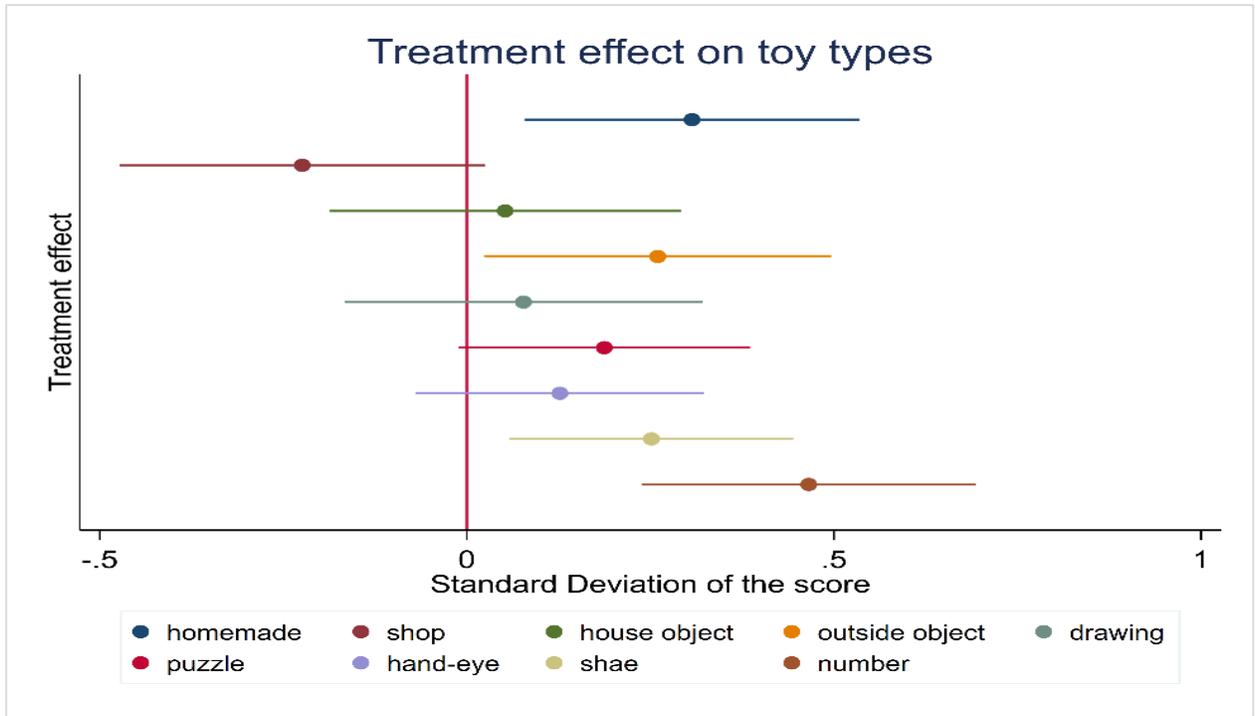
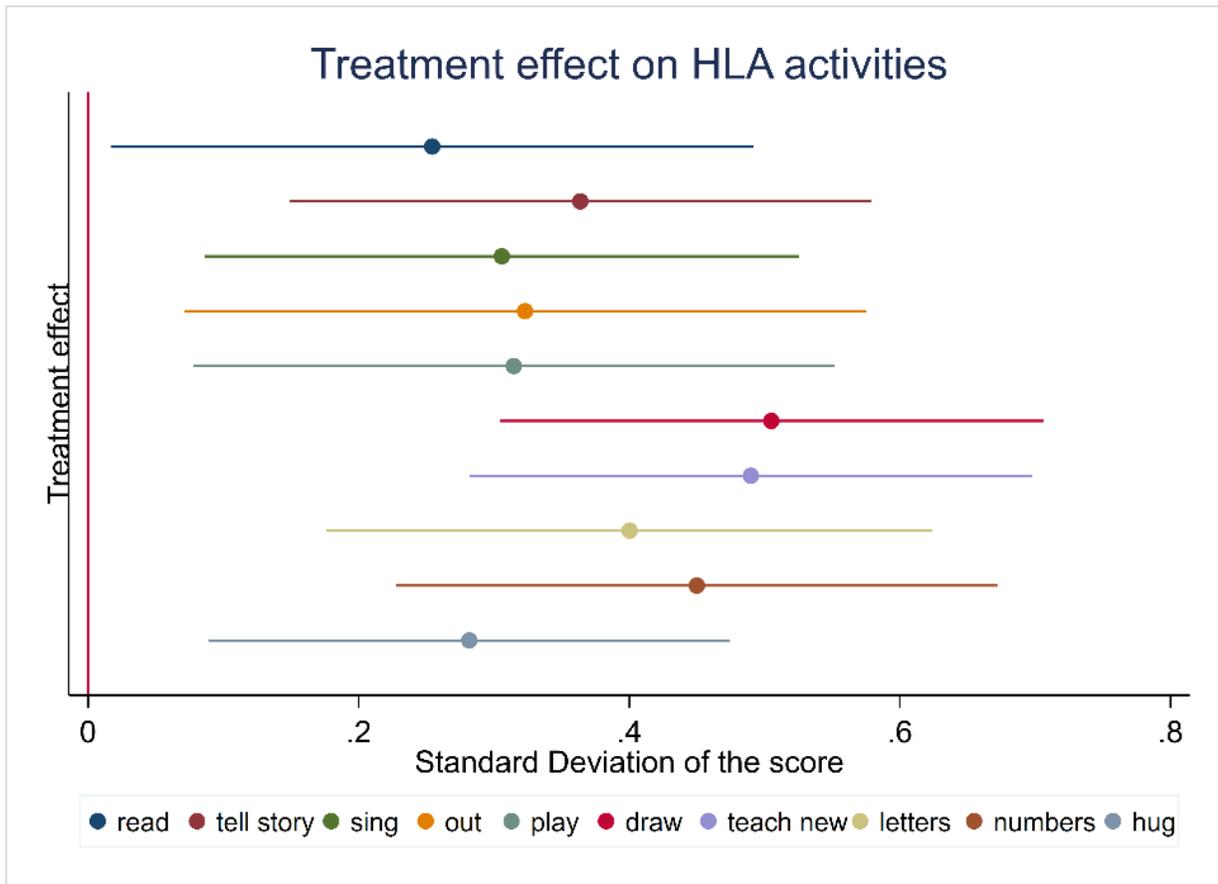


Figure 13: Treatment effect (impact from the intervention) for each HLAs, in standard deviation term



Apart from the treatment status, the following characteristics also predicted higher HLA and HLE⁷ total scores on average at the 5% significance level or less. (See appendix for the regression Table 4.)

For HLE:

- Households with higher baseline HLE scores tend to have higher score at the endline compared to household with lower HLE scores.
- Older children reported fewer toys and reading material at home compared to younger children.
- Higher father's education predicted higher HLE scores compared to fathers with lower education.
- Households with home language as English on average scored higher on HLE⁸ than households whose home language is not English. (Home language as English" is not correlated with IDELA score outcomes or HLA outcomes, only on HLE).

For HLA:

- Households with higher baseline HLE scores tend to have higher score at the endline compared to household with lower HLE scores.
- Household with older children tend to have lower HLA score compared to household with younger children.
- Mother's education predicted higher HLA score compared to mothers with lower education attainment

Equity analysis of IDELA total score

Analyses in this section were taken from multivariate regression models that control for children's age, gender other individual characteristics, and clustered at the school level. The only variable that was statistically significant was the father's literacy. For children's learning development, the intervention seems to have a stronger impact on children with fathers who were literate. If children with literate father received treatment, the endline IDELA score tends to be higher compared to children with illiterate father who received the intervention. This was significant at the 5% confidence level.

In caregiver attitude outcomes, following was found. For HLE, for the household whose language was English, the endline HLE score tend to be higher, compared to the households whose home language was not English. This was significant at the 5% confidence level. (See appendix for the regression Table 5, Table 6, and Table 7.)

4. Conclusion

The results from the impact evaluation of Rwanda ELM project emphasizes the importance of the caregiver focus coupled with intervention targeting children. The results from the quantitative

⁷ For the equity analysis here, both father's and mother's educational attainment was not significant in this analysis.

⁸ HLE consists of types of reading material and types of toys. When disaggregating the HLE and run regression, "home language as English" is significantly correlated with more types of reading material. Meanwhile number of toy types were not correlated with the home language being English.

analyses showed that children who benefited the intervention of the program increased learning and developmental skills compared to children who did not, especially for emergent literacy and numeracy domains. The improvement compared to the comparison group was statistically significant. The evaluation revealed no gender differences in children's skills acquisition but older children performed better as compared to younger children.

Caregiving/Parents practices in the intervention group captured through HLA and HLE found increased home learning activities with children relating to reading, playing and improved access to reading resources and types of toys, compared to the comparison group. The results were statistically significant.

Additional findings to look at the equity analysis revealed different impacts of the program on children's learning, depending on the family characteristics. Although there was no statistically significant difference between wealth or gender, there was a difference in children's scores by their father's literacy status. Further, for caregiver outcomes of reading materials at home, the equity analysis found that if the household had more types of toys at the baseline, they were more likely to have more types of reading material at endline, and if the home language is English, they were more likely to have more types of reading material. These were statistically significant at 5% level. There was no difference in treatment effect by household/child characteristics on HLA and the number of toy types at home.

5. RECOMMENDATIONS

1. From the impact evaluation comparing the base line and the end line results, we found that children who received the program intervention scored higher on IDELA, an assessment tool to measure child development. The program's main component was parent training on supporting child learning development, and the program evaluation shows that parents who received the intervention are more likely to engage with their children. It is therefore plausible to think that, together with other components of the program, parents' engagement in activities that promote learning at home contributed the higher development state of their children. Since all parents wish the best for their children, they do the best they can. However, the parents may not always have sufficient knowledge on how to effectively support their children at home. The result shows effectiveness of intervention on both parental attitude change, and improvement in child development score. The recommendation thus is that the Government use the existing education services and institutions that engage in ECD and other learning such as MINEDUC and MIGEPROP to promote awareness on the importance of parental support to the children's learning outcomes and to teach parents how to effectively provide such support. This would enable children to receive support from both school and at home, encouraging their development further.
2. Referring to the study results, the overall number of types of toys and the number of types of reading material household has tend to be higher for the households who received the program compared to the comparison households. The program had an effect on the increase in the number of types of books and toys. The program also had an effect on the child development. Together with other components, it is reasonable to think that at least in part, the increased number of types of toys and reading material is correlated with the

child development. It is possible that the presence of material, together with the training on how to effectively use them contributed to child development. Given this, parents and teachers should regularly be trained and refreshed on how to appropriately use them. Teachers should also be observed while teaching so they can receive constructive feedbacks on how they use these materials, as it is a way of keeping teachers motivated.

3. The results from the quantitative analyses shows that children who benefited the intervention increased learning and developmental skills compared to children who did not, especially for emergent literacy and numeracy domains. The difference in scores is attributed to the program, which included components such as teacher and parent support, and better equipment for the classrooms. We recommend Rwanda Education Board and other partners in ECD to engage in these interventions. The analysis shows that these activities are the keys to better child development and learning outcomes. We also recommend the Government and the Ministry of Education to augment budget for school materials and provision of learning resources . Given the cost of the teaching aids in ECDs, such as toys, books, and plays, the report recommends that the MoE considers increasing the budget allocated to pre-primary education, as it sets the foundation for all the education levels in everyone's life.
4. To all partners in Education sector in Rwanda: The analysis found that the project had a different effect by the literacy status of the parents. The impact of the program on child learning and development was little higher if the parent was literate. The report recommends that different organizations intervening in education sector, and especially in ECD, to implement activities conducted by the project, but with special focus to consider this point. Finding ways to ensure that the project tailors to the needs of both illiterate and literate populations could enhance the impact of the project. While improving adult literacy would be an admirable goal, it may be difficult to achieve. Thus, future implementations to make sure that the materials of the project are accessible to all caregivers.
5. To all parents and teachers: Knowing the importance of the reading, learning and play materials such as books and toys, parents and teachers are encouraged to improvise in the creation of these materials for their young children, and not wait for the government to provide the fancy tools imported from abroad. From the waste, and other used materials, parents and teachers can make amazing play materials for their children, and achieve the same goals as parents with modern materials.
6. The analysis shows that the intervention had a statistically significant impact on children's learning development measured by IDELA. The baseline IDELA score was about 0.4 standard deviations higher for children with intervention. Thus we could expect a beneficial impact of the intervention to children with similar characteristics who have not received the intervention. There seems to be an additional impact on children parents fathers who were literate. The program may benefit by incorporating this element; illiterate parents can definitely support children's learning and there will be positive impact on children working with them. This finding only suggests that there may be a bigger effect if the father is literate.

7. The analysis shows that the intervention had a statistically significant impact on the caregiver's activities and home learning environment. Thus we can say that it is beneficial to provide the intervention to the household and children whose characteristics were similar to the household/children in this study.

The intervention had a stronger impact if the household had a large number of types of toys and if the language spoken at home was English. This could be incorporated into the intervention to strengthen the impact.

Appendix

Table 4 Predictors of IDELA, HLA and HLE scores

VARIABLES	(1) IDELA score	(2) sum_hle	(3) sum_hla
bl_sum_hle	0.000776 (0.00356)	0.337*** (0.0704)	0.121** (0.0550)
bl_sum_hla	-0.00135 (0.00278)	0.0407 (0.0375)	0.0712 (0.0442)
bl_sum_neg	-0.00575 (0.00528)	0.108 (0.0795)	0.162 (0.110)
bl_enumpct	0.157** (0.0658)	-1.054 (1.149)	-1.095 (1.428)
bl_soemopct	0.0798** (0.0354)	1.296 (0.892)	0.433 (0.802)
bl_elitpct	0.225*** (0.0563)	-1.760 (1.350)	0.121 (1.488)
bl_motorpct	0.286*** (0.0407)	1.278 (0.908)	0.148 (1.091)
bl_efpct	-0.00173 (0.0340)	-0.877 (0.666)	0.119 (0.767)
bl_atlpct	-0.0540 (0.0357)	1.057 (0.714)	0.356 (0.909)
bl_careatti6_agree	0.0132 (0.0155)	-0.413 (0.338)	-0.344 (0.299)
bl_careatti7_agree	-0.0195 (0.0152)	0.000179 (0.334)	-0.0702 (0.373)
childage	0.0332*** (0.00856)	-0.440** (0.198)	-0.453* (0.233)
female	0.00705 (0.0120)	-0.0601 (0.208)	0.159 (0.312)
momage	-0.000716 (0.00153)	0.0202 (0.0251)	-0.00834 (0.0261)
momliterate	0.00966 (0.0231)	0.485 (0.359)	-0.300 (0.445)
momed	0.0147** (0.00682)	0.129 (0.152)	0.447*** (0.153)
dadage	0.00226* (0.00121)	-0.00964 (0.0132)	0.0150 (0.0166)
dadliterate	0.00670 (0.0225)	-0.613* (0.363)	-0.311 (0.473)
daded	0.0166*** (0.00540)	0.307** (0.134)	0.0647 (0.133)
nchild	-0.00525	-0.0409	-0.117

	(0.00419)	(0.0846)	(0.0886)
homelang_English	-0.0577*	1.890**	0.778
	(0.0325)	(0.790)	(0.636)
homelang_French	0.00633	-0.625	0.335
	(0.0268)	(0.812)	(0.391)
homelang_Swahili	0.0178	0.176	-0.539
	(0.0269)	(1.160)	(0.807)
treatment	0.0455***	0.857***	1.818***
	(0.0143)	(0.273)	(0.330)
Constant	0.109	4.246***	5.883***
	(0.0663)	(1.567)	(1.822)
Observations	450	450	450
R-squared	0.487	0.260	0.178

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 Equity analysis interaction regression: IDELA total and father's literacy status

VARIABLES	(1) IDELA differential effect by father literacy
dadliterate	-0.0662* (0.0361)
l.treatment	-0.0486 (0.0385)
0b.treatment#co.dadliterate	0 (0)
l.treatment#c.dadliterate	0.106*** (0.0408)
bl_careatti6_agree	0.0147 (0.0164)
bl_careatti7_agree	-0.0229 (0.0166)
childage	0.0320*** (0.0113)
female	0.00908 (0.0123)
momage	-0.000725 (0.00136)
momliterate	0.00830 (0.0204)
momed	0.0162** (0.00709)
dadage	0.00221**

	(0.000983)
daded	0.0169**
	(0.00672)
nchild	-0.00517
	(0.00406)
homelang_English	-0.0609*
	(0.0323)
homelang_French	0.00748
	(0.0371)
homelang_Swahili	0.0229
	(0.0460)
bl_sum_hle	0.000855
	(0.00338)
bl_sum_hla	-0.00143
	(0.00238)
bl_sum_neg	-0.00509
	(0.00508)
bl_enumpct	0.158***
	(0.0605)
bl_soempct	0.0823*
	(0.0437)
bl_elitpct	0.215***
	(0.0683)
bl_motorpct	0.285***
	(0.0422)
bl_efpct	0.00283
	(0.0325)
bl_atlpct	-0.0550
	(0.0381)
Constant	0.182**
	(0.0830)
Observations	450
R-squared	0.495

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 Equity analysis interaction regression: HLA and child's sex

VARIABLES	(1) HLA differential effect by child's sex
female	-0.425 (0.376)
l.treatment	1.279*** (0.370)
l.treatment#c.female	1.128** (0.523)
bl_careatti6_agree	-0.310 (0.346)
bl_careatti7_agree	-0.142 (0.353)
childage	-0.433* (0.239)
momage	-0.00693 (0.0289)
momliterate	-0.237 (0.433)
momed	0.441*** (0.150)
dadage	0.0127 (0.0208)
dadliterate	-0.244 (0.480)
daded	0.0524 (0.142)
nchild	-0.118 (0.0860)
homelang_English	0.731 (0.684)
homelang_French	0.465 (0.789)
homelang_Swahili	-0.610 (0.973)
bl_sum_hle	0.126* (0.0716)
bl_sum_hla	0.0778 (0.0505)
bl_sum_neg	0.176 (0.108)
bl_enumpct	-1.203 (1.283)

bl_soempct	0.589
	(0.928)
bl_elitpct	-0.0344
	(1.445)
bl_motorpct	0.0850
	(0.894)
bl_efpct	0.0828
	(0.688)
bl_atlpct	0.406
	(0.808)
Constant	5.954***
	(1.654)
Observations	450
R-squared	0.187

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7 Equity analysis interaction regression:HLE and home language as English

VARIABLES	(1) HLE differential effect by English spoken at home
homelang_English	1.055
	(0.761)
l.treatment	0.754***
	(0.248)
l.treatment#c.homelang_English	1.748*
	(0.989)
bl_careatti6_agree	-0.437
	(0.304)
bl_careatti7_agree	0.0396
	(0.310)
childage	-0.463**
	(0.210)
female	-0.0457
	(0.231)
momage	0.0177
	(0.0255)
momliterate	0.399
	(0.384)
momed	0.146
	(0.132)
dadage	-0.00920

	(0.0184)
dadliterate	-0.682
	(0.423)
daded	0.305**
	(0.125)
nchild	-0.0301
	(0.0762)
homelang_French	-0.377
	(0.704)
homelang_Swahili	0.260
	(0.864)
bl_ntoytypes	-0.123
	(0.271)
bl_sum_hle	0.444*
	(0.234)
bl_sum_hla	0.0340
	(0.0448)
bl_sum_neg	0.0998
	(0.0945)
bl_enumpct	-1.016
	(1.140)
bl_soemopct	1.160
	(0.822)
bl_elitpct	-1.655
	(1.276)
bl_motorpct	1.387*
	(0.790)
bl_efpct	-0.868
	(0.608)
bl_atlpct	0.852
	(0.720)
bl_religious	-0.0546
	(0.354)
bl_textbook	-0.229
	(0.378)
Constant	4.716***
	(1.474)
Observations	448
R-squared	0.267

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1