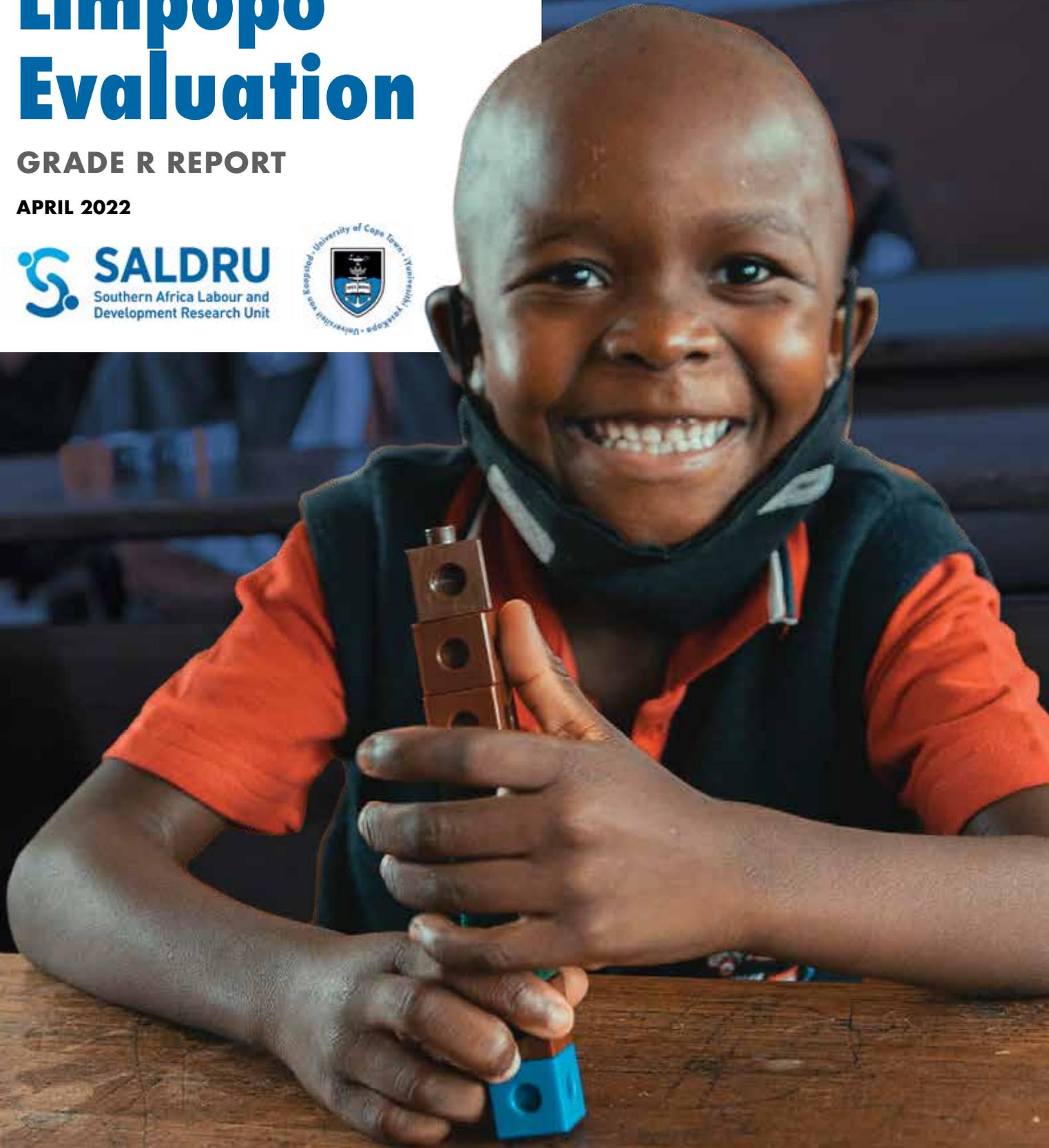


# Funda Wande Limpopo Evaluation

GRADE R REPORT

APRIL 2022



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## INTRODUCTION

The hierarchical nature of mathematics means that success in later grades relies crucially on well developed foundational skills. Longitudinal national and provincial studies have traced poor matric and grade 9 mathematics outcomes in South Africa all the way back to weak mathematical skills in grade 3 (Von Fintel & Van der Berg 2017; Taylor et al., 2015). While there is very little empirical evidence on mathematical skills earlier in the Foundation Phase, recent evidence from Gauteng suggests that deficits in foundational skills manifest well before grade 3. Fritz et al. (2020) find that the majority of learners enter grade 1 lacking the conceptual knowledge necessary to engage with the grade 1 curriculum. Moreover, an evaluation of the expansion of grade R concluded that the additional year of formal schooling was only impactful for fee charging schools (quintiles 4 and 5) (van der Berg et al. 2013). These foundational deficits only serve to exacerbate learning inequality.

The importance of early interventions for laying down strong foundational skills for later grades has long been acknowledged by the Department of Basic Education (DBE). However, there is a lack of rigorous evidence on how best to intervene in pre-school in the South African context. Evidence from two randomized controlled trials (RCT) in Mozambique (Martinez et al. 2017) and Kenya (Piper et al. 2018) suggest that a combination of learning and teaching materials (LTSM), together

with ongoing support has the potential to shift numeracy outcomes in pre-school. In Mozambique providing classroom materials, training, and follow-up support to community-based pre-schools improved numeracy skills such as being interested in mathematics, being able to count, ordering objects and recognising geometric shapes (Martinez et al., 2017). In Kenya, learning and teaching support materials (LTSM) provision enabling pre-school teachers to facilitate small-group work during every lesson and continuous in-classroom support from local officials led to improved numeracy outcomes (Piper et al. 2018). In South Africa there have been no RCT evaluations of pre-school numeracy interventions. The *R-Maths* intervention was evaluated in one urban and one rural district in the Western Cape using a quasi-experimental design (difference-in-difference). The intervention offered teacher training, LTSM, and follow-up support. The evaluation found a small but significant impact in rural schools and no impact in urban schools.

Recognizing both the potential of the grade R year and the dearth of evidence on how to ensure this potential is realised, Funda Wandé partnered with RED INK to introduce a numeracy programme with an accompanying impact evaluation into grade R in the Capricorn North and South education districts in Limpopo. This report presents results for the evaluation of the first year of the Bala Wandé Grade R programme.



## INTERVENTION

Funda Wandé is a not-for-profit organization with the goal of ensuring that all learners in South Africa can read for meaning and calculate with confidence, in their home language by the age of 10. They aim to achieve this goal through a combination of advocacy, teacher professional development, expanding access to materials and rigorously testing interventions with a focus on scalability. Funda Wandé is currently implementing a series of interventions with accompanying evaluations across the Limpopo, Eastern and Western Cape provinces. These interventions target teachers and learners in grades 1 to 3 and are built around the core set of Funda Wandé (literacy) and Bala Wandé (numeracy) Learner and Teacher Support Materials (LTSM) with variations in the package of support.

In Limpopo, all intervention schools receive the LTSM together with teacher, HOD and Subject Advisor training. In addition, half of the intervention schools receive one teacher assistant per teacher in the relevant grades. The programme seeks to utilise the latent potential of unemployed youth in Limpopo to in response to both large and heterogenous classes and high unemployment rates. Funda Wandé selects, trains, and support matriculants to assist teachers in implementing the structured programme.

Funda Wandé has partnered with RED INK to expand the numeracy programme into the grade R year in the Limpopo intervention schools. RED INK is a non-profit public benefit organisation that develops and provides quality early childhood resources and support for development in early literacy and mathematics. RED INK developed the LTSM and led the training of mentors, teachers and teacher assistants for the grade R programme in Limpopo.

The Bala Wandé Grade R programme began in 2021 and will be rolled-out to the next two cohorts of Grade R learners (2022 and 2023).

## Learner and Teacher Support Materials (LTSM)

The Grade R materials focus on mathematics and were developed by RED INK in partnership with Funda Wandé and a reference team of Early Childhood Education (ECD) and early mathematics specialists. These materials are an adaptation of existing open-access resources, developed by RED INK for the DBE, and are aligned with the existing suite of grade 1-3 Bala Wandé materials. The materials are also CAPS aligned and have been signed off by the DBE as an approved resource. The materials are based on the premise that language forms the basis for concept development and therefore maths terminology is presented as a feature of ‘new words’, along with explicit questioning techniques. The materials are play-based and encourage problem-solving and positive interaction between the teacher and children.

The LTSM comprises (1) Teacher’s Guides, (2) a Dictionary box, and (3) learner manipulatives (Figure 1). All three components are strongly aligned so that teachers can seamlessly move between the different materials.

In addition to the use of Bala Wandé Grade R materials, teachers in the intervention schools continued to use the usual DBE rainbow workbooks and teacher materials to plan and execute their lessons.

**Figure 1: Bala Wandé Grade R resources**



## Training on the use of LTSM

All intervention schools, grade R teachers, teacher mentors, and teacher assistants receive two days of centralised training on the use of the LTSM at the beginning of each quarter. The training was conducted by RED INK with input from Funda Wandé content specialists. The purpose of the training for teachers is to take the teachers through the content covered in the Teacher Guide and to demonstrate how to use the other supporting resources. Whilst training for teacher assistants focuses on classroom practice, teacher assistant mentors are equipped with the mathematics content knowledge to train and support the teacher assistants in their classroom practice. Unfortunately, the first three termly trainings for both TA mentors and TAs were conducted online due to COVID-19 restrictions. Of the expected participants at term 1 training in 2021, 70 percent of grade R teachers attended. This improved to 88 percent for term 2 training. In term 3, a specialized two-day training was introduced for the foundation phase Heads of Department (HODs). The provincial Director of ECD and Foundation Phase and the subject advisors in Capricorn North and South have enrolled in the *Advanced Certificate in Foundation Phase Teaching: Literacy* at Rhodes University, with bursaries from Funda Wandé.

## Teacher assistants

A teacher assistant (TA) is provided to half of the intervention schools in Limpopo. TAs are school based and support teachers during the course of one year. In addition to supporting teachers to use the LTSM, their role is to help with classroom management and to increase the frequency of small group teaching and one-on-one teaching. Teacher assistants were recruited through a rigorous selection process managed by Funda Wandé. More than 1200 applicants took the competency assessments of which 256 were invited to an in person day long selection bootcamp. From this process, 145 teacher assistants were hired. They received two months of initial training focussing on ensuring that they were equipped to assist the teacher with i) administrative tasks (such as roll call), ii) handling of LTSM, iii) identifying and supporting struggling learners, and iv) doing remedial exercises with small groups of learners. Thereafter, they received two days of training each quarter, usually in the school holidays. The training was conducted by RED INK with input from Funda Wandé. Teacher assistants are periodically visited by a mentor during classes and have mentor group sessions with other teacher assistants to ensure that the programme is being implemented effectively. Teacher assistants receive a minimum wage stipend of R3760 per month paid for by government out of the Youth Employment Service (YES).

## Teacher monitoring and support

While RED INK develops and leads the materials development and training, they are not involved in implementation support at the school level, this is provided by Funda Wandé. The programme aims to provide support and monitor teachers through schools visits by content specialists and TA mentors. However, interruptions and delays due to the COVID-19 pandemic meant that by the third term content specialists had not yet managed a first visit at all 80 treatment schools. Many teachers had therefore only interacted with a content specialist during training. The mentors each have between 21 to 26 teacher assistants that they support. Each school with teacher assistants should be visited by a mentor at least once a month. This was largely observed but due to COVID interruptions, some schools were only visited once in term 3.



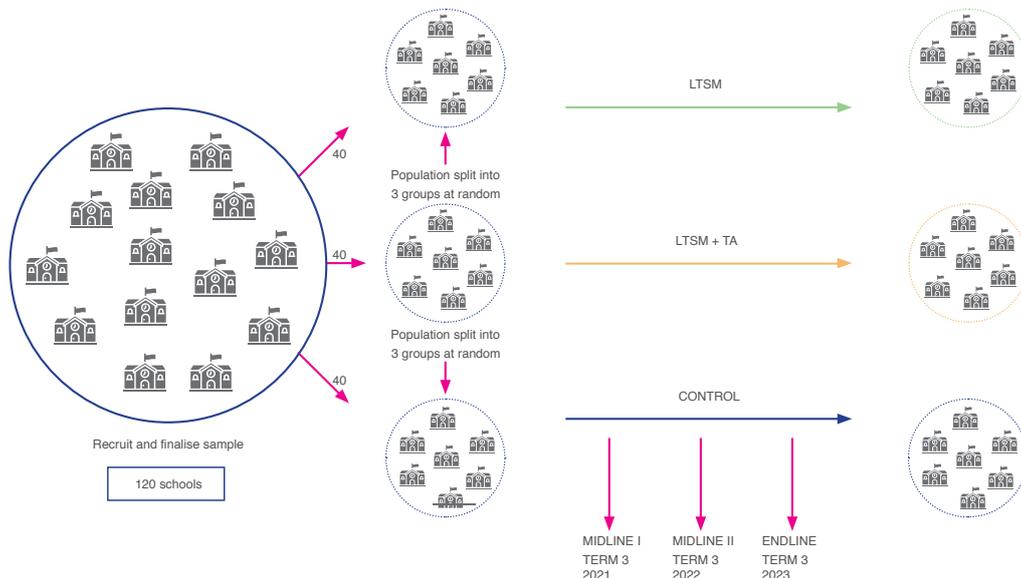
# EVALUATION

## DESIGN

The primary aim of this evaluation is to assess the causal impact of the intervention on foundational numeracy competencies. The evaluation uses a RCT with schools randomized into one of three arms – 1) Bala Wande LTSM, 2) Bala Wande LTSM + teacher assistants, and 3) control. Randomization ensures that the three groups are balanced prior to the intervention and allows us to attribute any differences observed between groups after roll-out to the programme.

Figure 2 provides a visual summary of the evaluation design together with the time points at which data will be collected. At each assessment point, we will compare the mathematics outcomes of learners in the two treatment groups against learners in the control schools.

**Figure 2: Evaluation design**



Even though random assignment was perfectly adhered to, it is possible that sampling variation could result in some imbalance between the treatment arms. Typically, researchers use baseline data, collected before the intervention begins, to check and control for any imbalance. However in light of South African COVID-19 infections and governmental regulations relating to delayed school openings, and strict social distancing requirements at the beginning of 2021, the evaluation team, in consultation with Funda Wandé, decided that conditions were not conducive to conducting a baseline before the programme began. Therefore, to check for any imbalance between the groups, we use data on a range of school, teacher, and grade R learner characteristics that could not be affected by the intervention. Additionally, we use data from reading assessments with grade 3 and 6 learners in the same school. These learners were assessed for the Sepedi early grade reading benchmarks study in collaboration with DBE. Since these learners are not targeted by the intervention, an analysis of their learning outcomes provides an additional credible check for balance across the three groups of schools.

The study and all associated data collection activities gained approval from the University of Cape Town Commerce Ethics in Research Committee. Permission to conduct research in the schools was also obtained from the Limpopo department of education (LPDoE).

## RECRUITMENT AND RANDOMISATION

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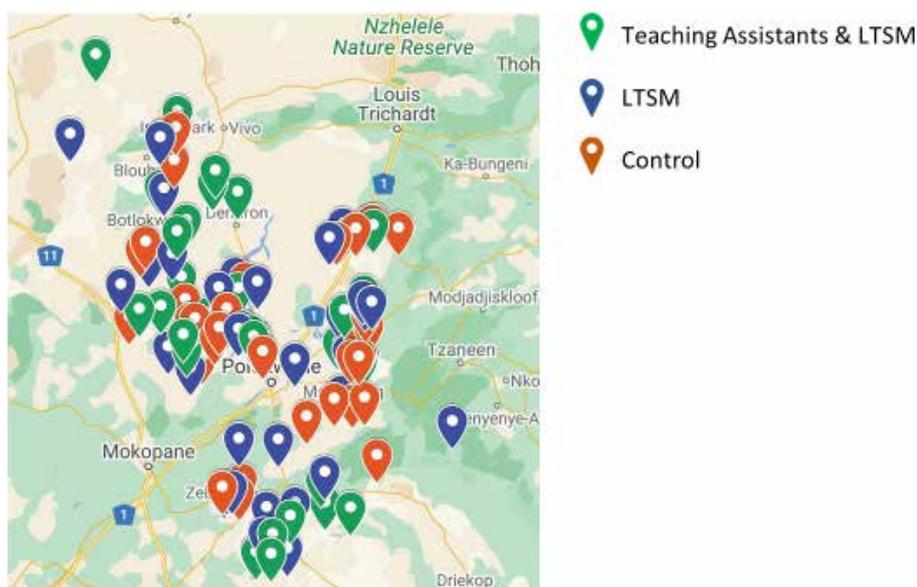
Recruitment of schools for the evaluation was done in collaboration with the LPDoE. Officials from the Capricorn North and South Districts helped to identify no-fee (quintile 1 to 3) schools with Sepedi as the language of learning and teaching (LOLT) in the Foundation Phase that met the following initial eligibility criteria:

- No chronic management issues
- Learner-educator ratio between 20 and 50
- No more than 4 classes per grade
- No multigrade classes
- Not part of an existing project for early learning outcomes in the Foundation Phase

Of the 519 Sepedi LOLT no-fee schools in Capricorn North and South, 379 schools met the criteria and were invited to apply for the intervention. In total, 170 schools applied and were vetted by Funda Wandé. However, it was found that the criteria was too restrictive for the number of schools needed. In order to meet the target of 120 schools, we relaxed the upper bound of the learner-educator ratio to 60 learners per educator and we allowed schools that participated in the Molteno Grade R Literacy project (since the Bala Wandé Grade R intervention is for mathematics).

The final list of schools was sent to the evaluation team for random assignment to one of the three treatment arms. In order to ensure that there was an equal split of the 21 Molteno schools, the sample was stratified on both district and exposure to Molteno. Within each stratum, schools were randomly assigned to one of the two treatment arms or the control group such that there were 40 schools in each arm<sup>1</sup>. Figure 3 depicts the geographical representation of schools by their allocated arm. The 120 schools are located in urban and peri-urban areas in the Northern and Southern Capricorn districts in Limpopo.

**Figure 3: Geographical representation of schools by treatment arm**



<sup>1</sup> Subsequent to randomization, Breadline offered to provide 40 classroom libraries. In order not to comprise the evaluation, these were allocated to seven randomly selected schools within each of the three evaluation groups.

Within each school, we randomly selected 20 grade R and 20 grade 1 learners for assessment. These same learners will be assessed during the second and third waves of fieldwork. We also randomly selected ten grade 3 and ten grade 6 learners for the Sepedi Benchmarking study. As described above, assessment data from these older learners are used to establish sample balance between the three treatment arms.

## INSTRUMENTS

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Three instruments were used in total. Data was collected at the school, teacher and learner level.

### **Learner assessments**

The grade R numeracy and literacy assessments used a subset of the grade 1 subtasks that were considered appropriate for this level. In order to avoid floor effects and improve our ability to discriminate amongst learners, several additional subtasks focussing on pre-literacy and pre-numeracy skills were included. The numeracy component focused on pre-emergent numeracy skills (see table 1) such as counting to 20 and counting on from a specific number; number identification, and order; number recognition and concrete counting; counting objects, showing a collection of objects; simple addition and subtraction; word sums; sorting; and shapes identification. The home language component of learner assessments comprised of a range of pre-literacy tasks assessing: expressive vocabulary, object naming, letter sounds recognition, and listening comprehension (see table 2). These tasks followed an extended version of the Early Grade Reading Assessment (EGRA). The EGRA for each grade was developed as part of the Sepedi Benchmarking project by Dr. Maledu and Dr. Makgabo, Sepedi language specialists from the University of Limpopo and the University of Johannesburg, respectively. The instrument development process involved two rounds of piloting across six different schools around Polokwane in Limpopo. All learner assessments were completed in a one-on-one setting with an enumerator and data were recorded on a tablet device.

**Table 1. Grade R numeracy subtasks**

Content Area	Topic	Specific Task
Numbers, operations and relationships		
	Number concept	Counting
	Number concept	Counting on from a given number
	Number concept	Number identification, recognition and order
	Number concept	Concrete counting, counting objects
	Solve problems	Word sums
	Number sense	Simple addition and subtraction
Space and shape		
	2-D shapes	Shape identification
	Spatial recognition	Position terminology, distance, and length
Data Handling		
	Sorts collection of objects	Sorting and classification

**Table 2. Grade R literacy subtasks**

Skill	Sub-task & Measurement
Listening comprehension	Number of questions answered correctly about a passage read aloud by the enumerator
Rapid Object naming	Number of objects identified in 20 seconds
Expressive vocabulary	Number of distinct items in shop and animals that learner names
Letter sound correspondence/ knowledge	Number of letters sounds identified in 60 seconds

## Teacher interview

Secondly, at each school, one grade R teacher was randomly selected. Teachers were interviewed about learner attendance, COVID-19 rotational timetabling, general teaching practices, and their experience with teacher assistants. The instrument included a battery of questions about the use of RED INK and DBE workbooks. In treatment schools, teachers were also asked about the use of the other LTSM included in the intervention.

## School observation

Lastly, at each school, field teams completed a series of observations about the school infrastructure. The instrument used a sub-set of items from the 2017 DBE School Monitoring Survey.

## DATA COLLECTION AND TRAINING

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The fieldwork company, iKapadata managed logistics of training and data collection in addition to technical issues related to SurveyCTO and the tablets. Fieldwork training took place in Polokwane from Friday 13<sup>th</sup> of August to Wednesday 18<sup>th</sup> of August, 2020, and data was collected during term 3 from August 19<sup>th</sup>-October 20<sup>th</sup> 2021.

The training covered all the instruments and participants were observed throughout the training. In order to emphasise the correct protocols and potential learner scenarios, participants engaged with mock assessments in the form of videos of actual learner assessments. On each day of training fieldworker candidates scored video assessments which allowed the training team to gauge their level of understanding of the correct assessment procedures and to rate their performance. The training included a day in a simulation school where fieldworkers carried out a series of real-time learner assessments across all grades to mimic an actual data collection setting in a school. Of the 65 participants who attended, 56 candidates were selected for the fieldwork.

Despite COVID-19 rotational timetabling challenges, numeracy and literacy data were successfully collected for 2392 grade R learners and their teachers (N=120) from 120 schools. Three schools had less than 20 learners in grade R, resulting in a slight deviation from an intended sample size of 2400 learners.

## BALANCE TESTS

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The grade R balance tests are presented in the Appendix, Table A1. A total of 19 variables for grade R were tested. Joint independence tests of all treatment arms, except for whether there is a mobile phone in the household, were insignificant. Further, ten grade 3 and twelve grade 6 literacy and numeracy outcomes, seven school characteristics, and seven teacher characteristics were used. Balance tests for grades 3 and 6 as well as teachers and schools are shown in Table A2-A5. These checks demonstrate the similarity between the treatment and control groups on learner and teacher characteristics, school environment, and reading skills. The similarity across the three groups reassures us that in the absence of the intervention, the three groups of schools have similar learning outcomes and programme impacts can be reliably estimated.



## CONTEXT

### School characteristics

Of the 120 schools, half are in quintile two, 37 percent are quintile three, and the remainder were classified as quintile one schools, as shown in Table 3 below. The number of learners in grades R to 7 ranges from 165 to 1496 with an average size of approximately 500 learners. All but one school had working electricity. The vast majority (93 percent) had water, and only 18 percent of schools had flush toilets for learners when the field teams visited. When we examined the learner to toilet ratio, only one in five schools met the World Health Organisation recommendation of 30 or fewer learners per toilet. Lastly, less than a third (28 percent) of schools have a library (mobile or on-site).

**Table 3: School characteristics**

	Mean
School quintile:	
1	12%
2	50%
3	37%
Number of learners in grade R to 7	497
Working electricity	93%
Working water	99%
Flush toilets for learners	18%
Ratio of learners to toilets:	
<31	21%
31-60	50%
>60	29%
Library	28%

### Teacher characteristics

The average grade R teacher is 48 years old and has 11 years of experience teaching foundation phase (Table 4). All teachers were women. The majority (65 percent) were formally trained in Foundation Phase teaching and a quarter have had ECD training. A quarter of teachers hold at least a bachelor's degree. Class size ranges from 15 to 102 learners per class, with an average of 41 learners. On the day of observation, there was an average of 33 learners in each classroom.

**Table 4: Average Grade R teacher characteristics**

Teacher characteristics	Mean
Age of teacher (years)	48
Female	100%
Experience (years)	11
Early Childhood Development training	25%
Foundation phase training	65%
At least a bachelors degree	25%
Class size	41
Learners present on day of observation	33
Observations	120

## Learner characteristics

There is an approximately equal gender split (Table 5) and the average learner is 5 years 8 months old. The majority of learners came from creche or an ECD centre in the previous year (88 percent), although this reported by the learner. While almost all learners have electricity at home, only 30 percent have hot running water inside their homes. The vast majority of learners have access to mobile phones (98 percent) and television (94 percent) at home. Less than half of grade R learners have a computer in their home (45 percent). Only 27 percent of learners have more than five non-school books at home. Interestingly, the bulk of learners report that they did school work on the days that they did not attend school (87 percent).

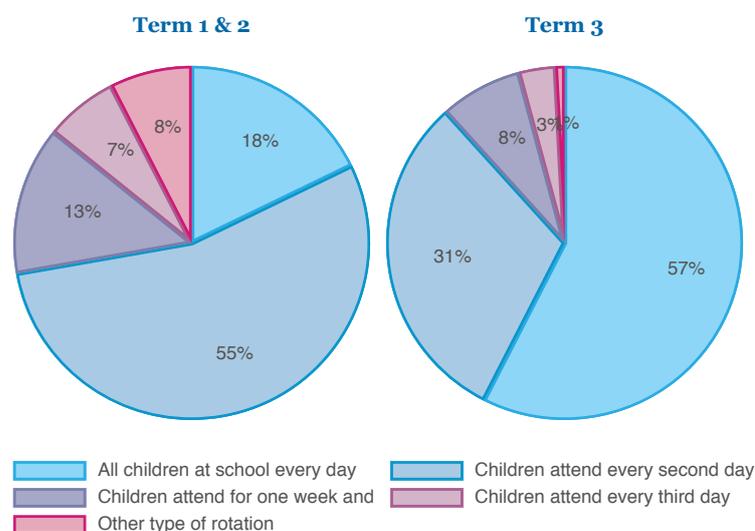
**Table 5: Learner characteristics by grade**

Learner characteristics	Mean
Female	52%
Average age in years	5 years 8 months
Came from creche/ECD centre in the previous year (2019)	88%
Electricity	96%
Hot running water inside home	30%
Mobile phone in household	98%
Television	94%
Computer	45%
Learner has more than five non-schoolbooks to read at home	27%
Learner did school work on they days that they did not go to school	87%
Observations	2392

## COVID rotational timetabling

The COVID-19 pandemic had significant effects on schooling attendance during 2021, with only 18 percent of schools allowing grade R learners to attend school every day in terms 1 and 2 of 2021 (Figure 4). Teachers report that the most common rotational timetable used during term 1 and term 2 of 2021 was a 10-day cycle where learners effectively attend every second day. In term 3, daily attendance tripled, and more than half (57 percent) of learners were in school every day.

**Figure 4: COVID rotational timetabling used**



Only 19 percent of teachers report that they are not trying to catch up on lost teaching time due to COVID-19 disruptions (Table 6). The most common strategies for trying to catch up are extra classes outside of school hours (46 percent of teachers) or giving extra work or homework to learners (48 percent of teachers).

**Table 6: Strategies for catching up on lost teaching time**

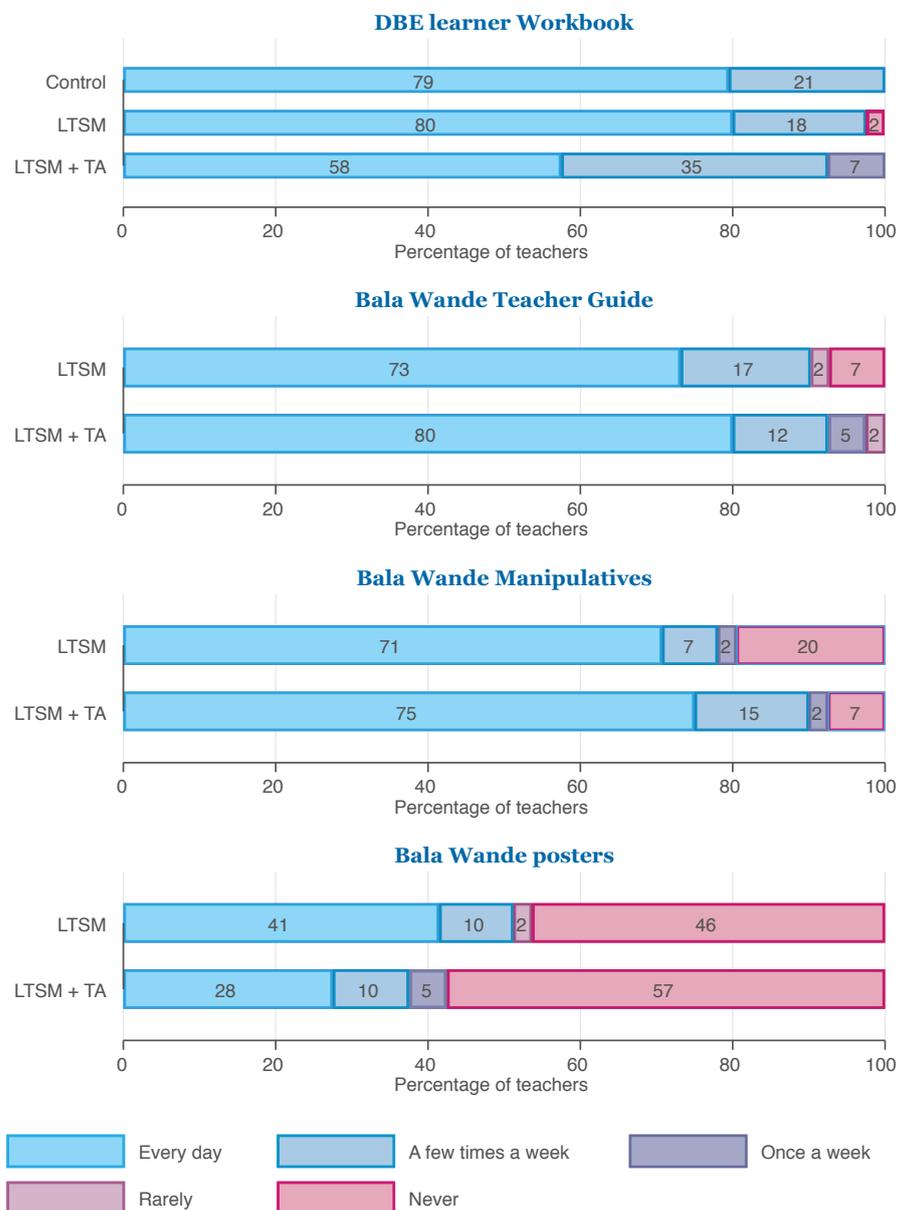
	Mean
Nothing	19%
Extra classes before/ after school or on weekends	46%
Extra work/ homework for the children	48%
Skipping topics to focus on core foundational skills	3%

Note: teachers can provide more than one option.

### Learning and Teaching Support Materials (LTSM)

Figure 5 summarises the reported use of DBE and Bala Wandé mathematics materials. Grade R teachers in the LTSM+TA arm report using the DBE rainbow numeracy books less frequently than other teachers, although usage is still high with 93 percent of teachers using the workbooks multiple times per week. Amongst teachers in intervention schools, reported use of the Bala Wandé teacher guide and manipulatives are high. For example, three-quarters of teachers in the LTSM+TA report using the manipulatives daily. The posters do not prove so popular, with around half of the teachers in intervention schools never using them.

Figure 5: Reported frequency of materials use



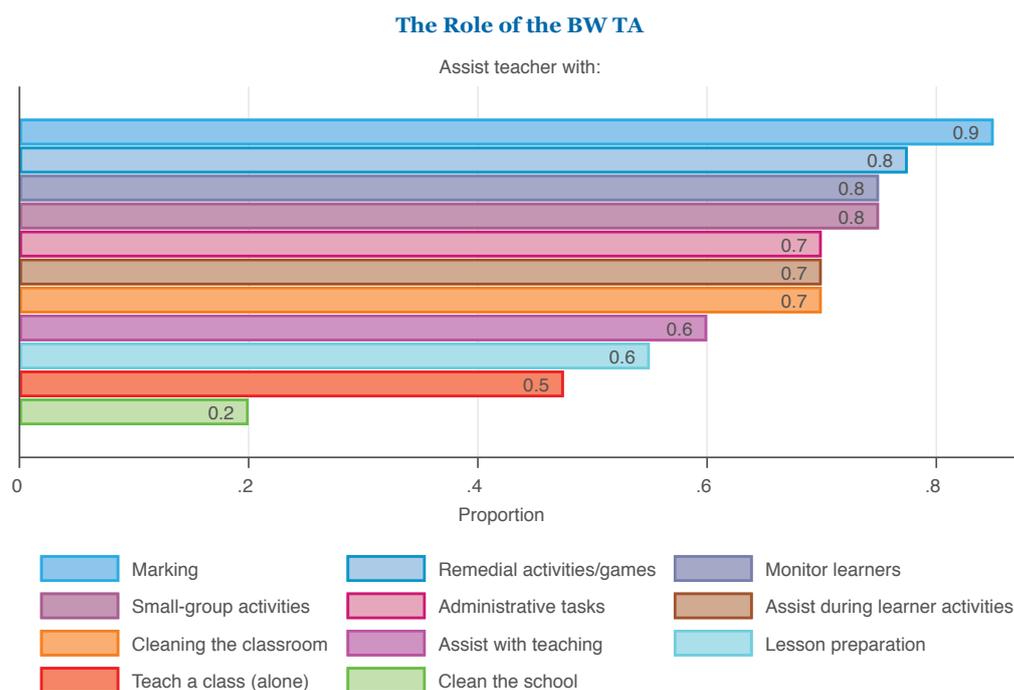
Note: Rarely includes a few times per month, once per month and never.

Grade R teachers report very positively on the Bala Wande Teacher Assistants (TAs) with 83 percent rating them as very helpful (Table 7). The majority of teachers think that the TAs have the right qualifications or skills and almost all teachers believe that TAs received adequate training and support. Unprompted, the majority of teachers in the LTSM+TA arm report that the top three roles of the TAs are to assist the teacher with marking, remedial activities, and monitoring the learners (Figure 6).

**Table 7: Teacher perceptions of Bala Wande Teacher Assistants**

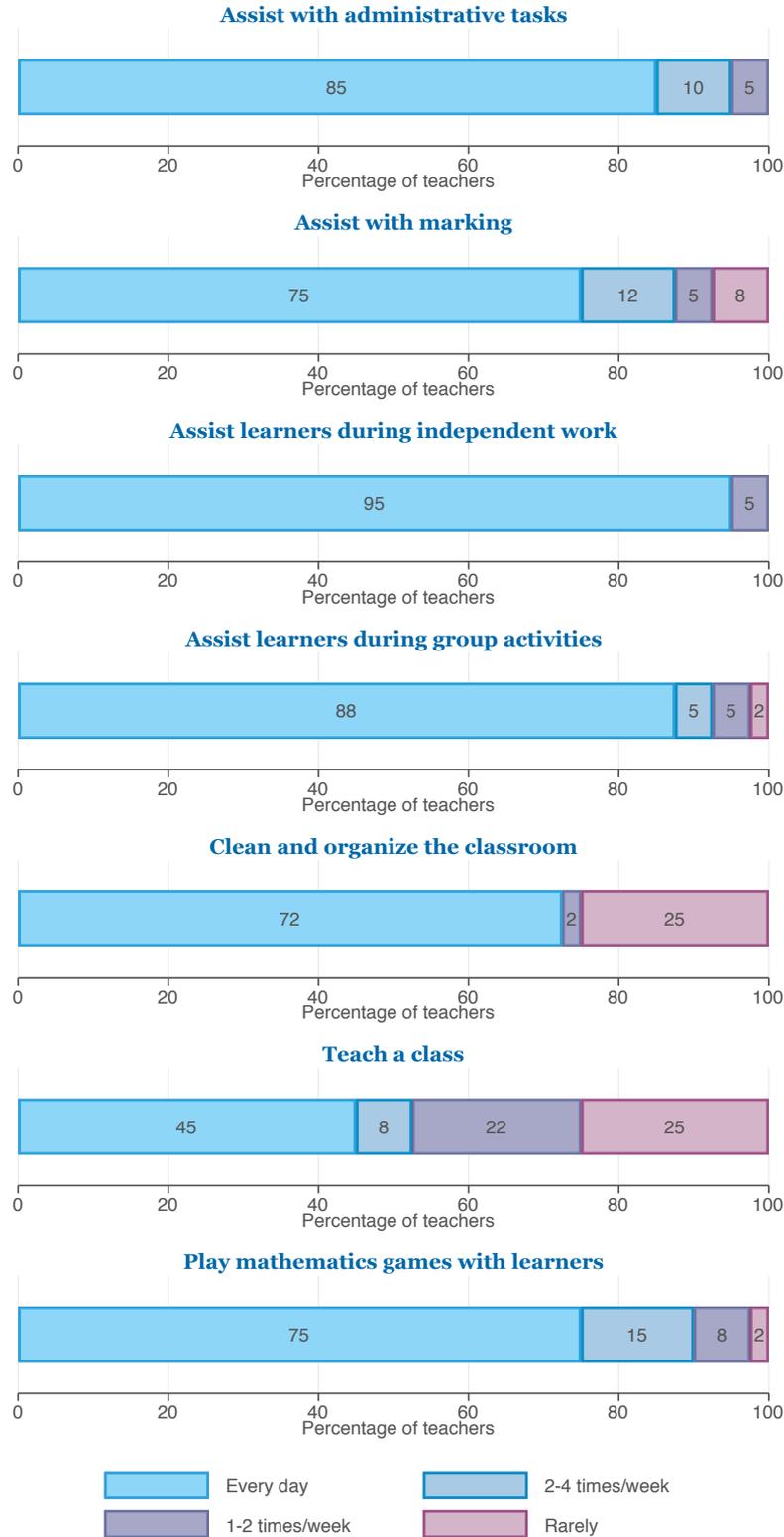
	Mean
TA has the right qualification/skill	65%
TA received adequate training	98%
TA received adequate support from Funda Wande	100%
TA rated very helpful	83%

**Figure 6: Teacher Assistant Roles**



When prompted about the frequency of specific activities (Figure 7), the majority of teachers report that Bala Wande TAs provide daily assistance across a range of tasks. TAs not only assist with classroom organisation and marking but also appear to frequently engage across a range of pedagogical activities such as assisting with independent work, group work, and playing mathematics games.

**Figure 7: Reported frequency of TA engagement in specific activities**

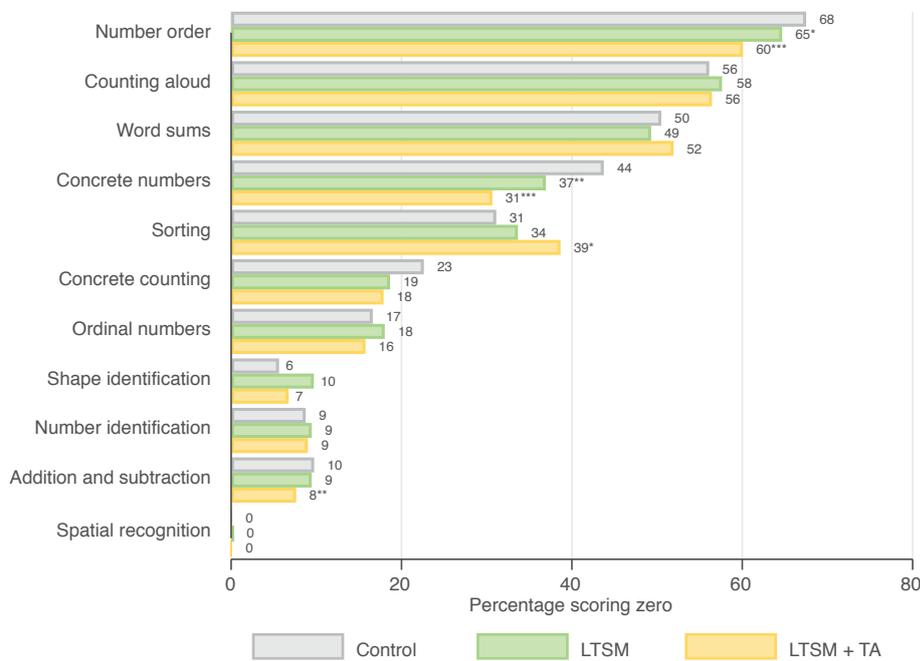


## NUMERACY AND LITERACY OUTCOMES

To put the results of the intervention into context, we begin by examining the percentage of grade R learners who scored zero on each of the numeracy tasks (Figure 8). Tests for significance are conducted as regressions which include strata fixed effects and cluster standard errors at the level of randomization, i.e. the school. It is clear that most learners are behind the curriculum. For example, more than half of grade R learners across

both treatment arms and the control score zero in the counting aloud task. Almost two-thirds of learners cannot order number cards from 1 to 10. Learners in the LTSM+TA are significantly less likely than control learners to score zero concrete numbers, concrete counting, number order, and simple addition and subtraction. In materials-only schools, learners are less likely to score zero on the concrete numbers task.

**Figure 8. Percentage of grade R learners scoring zero on numeracy subtasks**



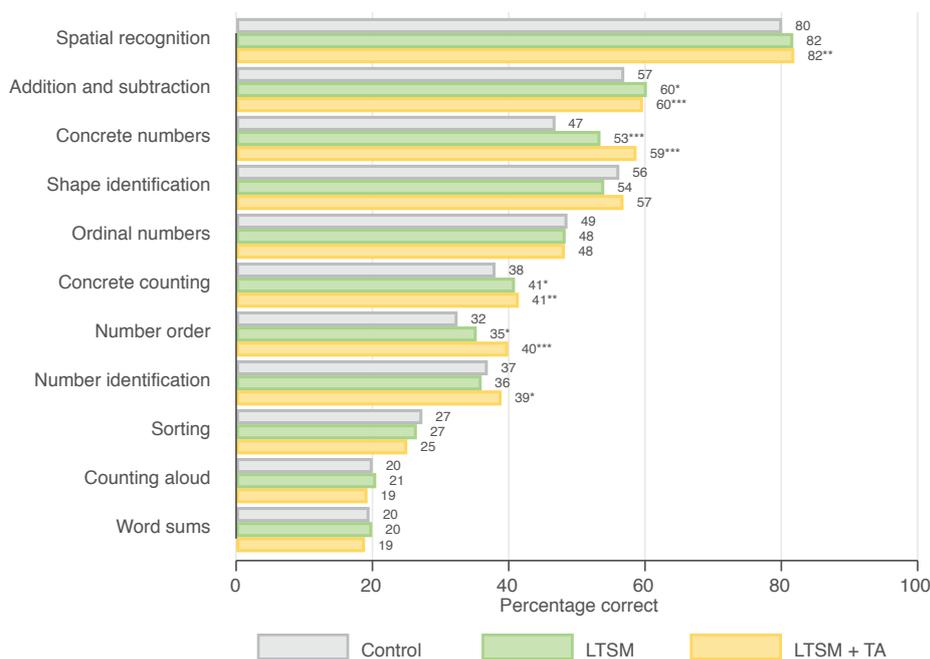
Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Asterisks indicate whether the differences between each treatment arm and the control group are statistically significant. Tests for significance are conducted as regressions which include strata fixed effects and cluster standard errors at the level of the school.

Moving to average scores in Figure 9, we see fairly poor performance across a range of tasks that learners are expected to have mastered by the third term of grade R. Learners in the LTSM+TA arm are out-performing their peers in control schools across

six of the eleven tasks. For example, 40 percent of learners in LTSM+TA schools can order number cards from 1 to 10 in comparison to only 32 percent of learners in control schools.

**Figure 9. Early numeracy results by treatment group**



Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

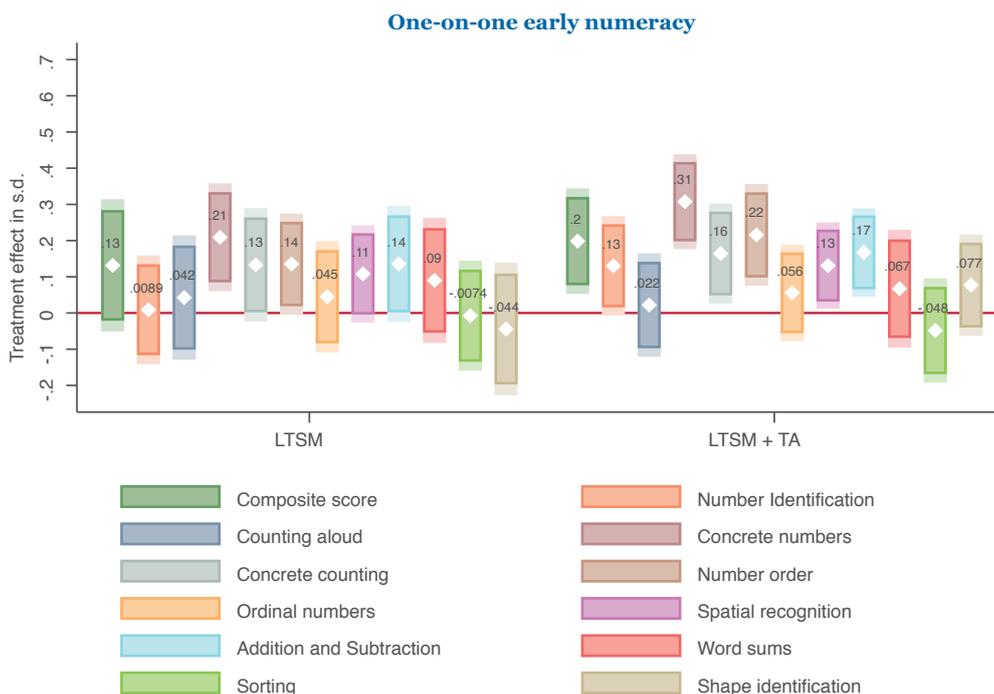
Asterisks indicate whether the differences between each treatment arm and the control group are statistically significant. Tests for significance are conducted as regressions which include strata fixed effects and cluster standard errors at the level of the school.

We create a composite numeracy score and show the estimated effect size on this composite score together with estimated effect sizes on standardized versions of the various subtasks in Figure 10. We used Principal Components Analysis (PCA)<sup>2</sup> to reduce the data on all the sub-tasks to a single variable that captures most of the common variation among them. This allows us to have a sense of the relative size of the impacts. The PCA was restricted to control groups learners so that the weightings of each subtask reflect those in the ‘business as usual’ environment. These weightings were then applied to all learners. The composite score is measured in standard deviations of control learner performance. The darker shaded areas of the bars display the 90 percent confidence interval, and the lighter shaded

fringes end at the 95 percent confidence intervals for the estimated impacts. For the LTSM only arm, we see that point estimates are mostly positive but very small and not significantly different from zero which is represented by the horizontal red line. For the LTSM+TA arm, the estimated impacts are relatively larger across the range of numeracy subtasks and are significantly different from zero for six of the subtasks (namely: number identification, concrete counting, concrete numbers, number order, spatial recognition (prepositions, distance, and length) and basic addition and subtraction). The estimated effect of the LTSM+TA intervention on the composite numeracy measure is 0.2 standard deviations and is statistically significant.

<sup>2</sup> Composite measures are essentially a weighted average of their component scores. There are a range of methods that can be used to establish these weights. We use PCA as it is one of the common approaches and specifically allows for comparability with DBE’s EGRS. As a robustness check, we created composite scores using a range of methods and estimated treatment effects.

**Figure 10. Estimated effect sizes of numeracy**



Although the grade R intervention targeted numeracy skills, it is possible that the presence of teacher assistants may have had an impact on home language learning. Table 8 shows the percent of learners scoring zero for each task, in the first three columns. The second three columns (% correct) show the average percentage correct or a fluency measure (items correct per minute) for each task. Asterisks indicate whether the differences between each treatment arm and control group are significant. Similar to above, tests for significance are conducted as regressions which include strata

fixed effects and cluster standard errors at the level of randomization, i.e. the school. We find that in line with numeracy, learners are behind the curriculum for home language. More than half of all learners were unable to correctly sound even one letter. For listening comprehension skills, learners in the LTSM+TA arm are five percentage points less likely to score zero than those in the control group. Learners in the LTSM arm score five percentage points higher than those in the control group on average. Other differences are small and insignificant.

**Table 8. Early Grade Reading Assessment (EGRA) results by treatment group**

	% scoring zero			% correct			fluency		
	Control	LTSM	LTSM+TA	(items per minute)			Control	LTSM	LTSM+TA
Naming objects	0	0	1	-	-	-	38.8	37.5	37.3
Letter sounds	55	59	54	-	-	-	3.6	2.9	2.9
Listening comprehension	18	15	13**	35	40**	38	-	-	-
Expressive vocabulary	1	1	2	41	40	41	-	-	-

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



## CONCLUSION

The Bala Wande LTSM together with teacher assistants resulted in significantly better performance across a range of numeracy skills in the third term of grade R. Learners in the LTSM+TA arm scored significantly higher on a range of subtasks. number identification, concrete counting, concrete numbers, number order, spatial recognition (position terminology, distance and length) and basic addition and subtraction. The effect on the overall composite score was 0.2 standard deviations and is in line with other studies conducted on teacher assistants (Muralidharan & Sundararaman, 2013; Duflo et al., 2015; Bold et al., 2018; Duflo et al., 2020). In the LTSM arm, learners only score significantly higher on the concrete numbers task, where learners match counters to a number card.

In general, reported usage of intervention materials was high for both LTSM and LTSM+TA teachers, with the exception of the use of the posters. The similarity between reported usage suggests that positive impacts are a result of the addition of TAs in the LTSM+TA arms. However, these are based on teacher self-reports and a further examination of fidelity is needed to truly isolate the impact of the materials.

In line with findings for the grade 1 LTSM+TA intervention in the same schools, teachers' report that the majority of TAs not only assist with classroom organisation and marking but also frequently engage with a range of pedagogical activities such as assisting with independent work, group work, and playing mathematics games. Teachers consistently report positive perceptions of TAs, although around a third (35 percent) of teachers did not feel that the TAs had the right qualifications and skills for the job.

The first year of the programme was implemented in the context of severe COVID-related disruptions to schooling. In the first two terms of the year on 18 percent of schools reported daily attendance of grade R learners. While this had improved to 57 percent in term 3, the average grade R learner was not at school for a substantial portion of the school year. It is impossible to know how programme impacts would have differed with full attendance. On the one hand, TAs may have been more effective in smaller classes. On the other hand, the addition of extra personnel might have been even more advantageous in very large classes. What is certain is that learners would only have been exposed to a portion of the intervention LTSM. With a return to normal attendance in 2022, the next round of the evaluation will shed light on the efficacy of the programme in more usual times.



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## APPENDIX

**Table A1: Grade R balance tests**

	Mean			p-value
	Control	LTSM	LTSM+TA	
Gender	52	54	50	0,07
Age	5,74	5,69	5,71	0,10
Less than 5 non-schoolbooks at home	73	71	74	0,72
Lives with mother	91	92	89	0,21
Lives with father	64	62	64	0,83
Radio	67	67	66	0,92
Mobile phone	99	97	98	0,01
Television	95	93	93	0,34
Computer	45	45	46	0,83
Fridge	95	95	95	0,82
Bicycle	51	51	56	0,07
Vehicle	59	61	64	0,31
Washing machine	67	66	71	0,22
Microwave	68	71	72	0,43
Flush toilet	61	59	68	0,17
Electricity	95	96	97	0,51
Running water inside house	43	43	48	0,32
Hot running water inside house	28	30	33	0,32
Has a sibling	98	98	98	0,98
Observations	800	793	799	

Notes: p-values are from joint orthogonality test of treatment arms

**Table A2: Grade 3 balance test**

	Mean			p-value
	Control	LTSM	LTSM+TA	
Maths score (%)	16%	13%	15%	0.152
Syllables : Correct items per minute	21	18	21	0.424
Letter sounds : Correct items per minute	39	37	39	0.763
Complex consonants : Correct items per minute	16	15	16	0.625
Words : Correct items per minute	15	14	15	0.704
Reading comprehension I : Percent correct	35%	34%	38%	0.623
Reading comprehension II : Percent correct	38%	37%	40%	0.743
Oral reading fluency I : Correct items per minute	24	22	25	0.688
Oral reading fluency II: Correct items per minute	25	23	26	0.616
Comprehension score (%)	21%	20%	23%	0.586
Observations	400	400	400	

Notes: p-values are from joint orthogonality test of treatment arms

**Table A3: Grade 6 balance test**

	Mean			p-value
	Control	LTSM	LTSM+TA	
Maths score I (%)	45%	44%	44%	0.853
Maths score II (%)	25%	25%	25%	0.877
Reading comprehension I : Percent correct	26%	28%	26%	0.554
Reading comprehension II : Percent correct	34%	34%	35%	0.952
Oral reading fluency I : Correct items per minute	48	46	47	0.558
Oral reading fluency II : Correct items per minute	67	65	68	0.725
EFAL Oral reading fluency: Correct items per minute	74	74	77	0.679
EFAL Reading comprehension : Percent correct	46%	49%	49%	0.318
Comprehension score (%)	41%	42%	42%	0.782
Vocab score (%)	68%	66%	67%	0.763
EFAL Vocab score (%)	13%	14%	13%	0.880
EFAL comprehension score (%)	31%	33%	32%	0.777
Observations	390	380	390	

Notes: p-values are from joint orthogonality test of treatment arms. EFAL stands for English First Additional Language.

**Table A4: Teacher balance tests**

	Mean			p-value
	Control	LTSM	LTSM+TA	
Age	48.7	50.2	49.1	0.738
Foundation Phase experience (years)	14.4	13.9	13.8	0.964
Degree	38%	38%	50%	0.430
Formal training for Foundation Phase	63%	75%	70%	0.482
Class size	41	38	41	0.457
Learners present	34	34	34	0.963
Observations	40	40	40	

Notes: p-values are from joint orthogonality test of treatment arms

**Table A5: School balance test**

	Mean			p-value
	Control	LTSM	LTSM+TA	
Total learners	476	499	516	0.803
Number of grade 1 learners	63	66	66	0.865
Quintile 1	20%	5%	13%	0.162
Quintile 2	47%	63%	43%	0.184
Quintile 3	32%	32%	45%	0.414
Educators have flush toilet	25%	32%	43%	0.258
Learner toilet ratio <=30	20%	18%	25%	0.734
Learner toilet ratio >30	80%	82%	75%	0.734
Running Water	98%	88%	95%	0.225
Central library	15%	32%	35%	0.106
Observations	40	40	40	

Notes: p-values are from joint orthogonality test of treatment arms

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