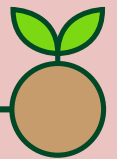


Roots and Shoots



WAVE 3 REPORT

April 2025

Research from
early learning to
school outcomes

By Heleen Hofmeyr and Jess Qvist

Executive summary

This report presents the results of the third wave of the Roots and Shoots study. The study, the first of its kind in South Africa, tracks learners from when they start school through the Foundation Phase. The main aim of the study is to investigate how inequalities in learning outcomes in the early grades can be traced back to inequalities in school readiness that were already present at the start of formal schooling.

The first wave of data collection occurred in the first term of 2022. 563 grade R learners distributed across 75 primary schools in the broader Cape Town region were assessed in six developmental domains using the Early Learning Outcomes Measure (ELOM) 4&5. A year later, 440 of these learners were assessed again. Learners' early literacy and mathematics skills were assessed using the ELOM 6&7 tool. The third wave of data collection occurred in the third term of 2024. The Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) were used to assess 367 of the original cohort of learners. The research team also administered surveys to the teachers and caregivers of participating learners in wave 3. The same learners will be assessed again using the EGRA and EGMA in the third term of 2025.

This report is the third in series of four that present the findings from each wave of the Roots and Shoots study. Results from the [first wave](#) point to clear socio-economic gaps in school readiness, with children from more disadvantaged backgrounds being much more likely to be developmentally behind at the start of grade R compared to their wealthier counterparts. This echoes findings from the nationally representative Thrive by Five study (Giese *et al.*, 2022). Results from [wave 2](#) show that while there was some evidence of catch-up among learners who were developmentally behind at the start of grade R, these learners were mostly concentrated in historically advantaged schools. Learners who were behind at the start of grade R and attending historically disadvantaged schools were unlikely to catch up during the grade R year. These results point to socio-economic differences in school quality that are already apparent during grade R, and constitute the first quantitative evidence from South Africa that inequality in school quality begins as early as grade R.

The aim of this report is to present the findings from the third wave of data collection, that is, when the Roots and Shoots learners were in grade 2¹. The report builds on the findings from the second wave, this time using EGRA and EGMA scores as outcome measures. This report serves as a precursor to the final report (to be released in 2026), which will investigate how inequalities in school readiness translate into inequalities in literacy and mathematics achievement at the end of the Foundation Phase.

¹ 39 out of the 367 learners in the sample (11%) had repeated either grade R or grade 1 and were thus in grade 1 at the time of the wave 3 assessment.

The main results presented in the report are as follows:

Socio-economic gaps in learning outcomes increased in magnitude between wave 2 and wave 3. As was the case in both previous waves of the study, we find evidence of large achievement differences between learners in socio-economically disadvantaged schools compared to their wealthier counterparts. Worryingly, the observed socio-economic gaps are larger in wave 3 than the previous two waves. Although the wave 2 and wave 3 assessments are not directly comparable, this evidence does suggest that socio-economic achievement gaps widen as children move through the early grades from the start of grade R.

We begin to see evidence of the emergence of a pro-girl achievement gap in wave 3. We found no evidence of a gender gap in achievement either at the start of formal schooling or at the start of grade 1. In wave 3, however, we observe that girls outperformed boys in literacy. Interestingly, there was no gender gap in mathematics performance. This is a noteworthy result since it shows despite boys and girls in the Roots and Shoots sample starting school on equal footing, girls develop an advantage in literacy somewhere between the start of grade 1 and the middle of grade 2. This result is strongly suggestive that, at least for this sample of learners, there is something specific about the early schooling experience that girls respond to better than boys. Importantly, that experience specifically affects the development of literacy skills, and not mathematics.

isiXhosa learners outperformed Afrikaans learners in the literacy assessment. When comparing overall averages on the EGRA by language, isiXhosa learners exhibit a slight advantage which is not statistically significant. When limiting the sample to socio-economically disadvantaged schools, however, Afrikaans learners are at a clear disadvantage: The average literacy score for Afrikaans learners in socio-economically disadvantaged schools was 54%, compared to the 67% achieved by isiXhosa. This is a novel result that requires further investigation.

Early advantage fades in some socio-economically disadvantaged schools. One of the key questions we sought to investigate in the Roots and Shoots study is what happens to those who start school developmentally on track but attend low-quality schools. Do they maintain their advantage? Or does their achievement regress towards their school average? The wave 3 results show that learners in low-quality schools who initially performed well fell behind over time. This is a novel result suggesting that many children in low-quality schools who start school with an advantage regress to their school's (low) average achievement. By contrast, learners in wealthier schools who started school developmentally on track maintained or improved their performance.

Acknowledgments

The Roots and Shoots study is funded by the Mr Price Foundation. Many thanks to Genesis Analytics and DataQuest for expertly managing data collection, and the dedicated enumerators who assessed the learners. Thank you to the caregivers of the participants who provided their support for this study by consenting to their children being assessed. Thank you also to the caregivers and teachers who generously volunteered their time to complete the surveys. Thank you to Funda Wande for providing administrative support.



1. Introduction

1.1. Overview of the Roots and Shoots study

It is now widely acknowledged that most South African learners do not acquire foundational literacy and mathematics by the end of grade 3 (Spaull and Taylor, 2022) and that this is one of the binding constraints to progress in South Africa (Van der Berg *et al.*, 2016). While we know that poor-quality schooling certainly contributes to these poor schooling outcomes, evidence from a wide range of disciplines including biology, human development, educational psychology, cognitive science and economics has shown that there is a strong link between the skills that children enter school with and their later outcomes (Heckman, 2011) equity and efficiency are viewed as competing goals. One can be fair in devising a policy, but it often happens that what is fair is not economically efficient. Conversely, what is efficient may not be fair. What is remarkable is that there are some policies that both are fair--i.e., promote equity--and promote economic efficiency. Investing in the early years of disadvantaged children's lives is one such policy. A large body of data from economics, biology, and psychology shows that educational equity is more than a social justice imperative; it is an economic imperative that has far-reaching implications for the nation. Taking a hard look at the economic value of efforts to create human capital helps people see where best to invest their resources in education to achieve its ideal--equalizing opportunity to build greater and enduring value for all. The evidence is quite clear that inequality in the development of human capabilities produces negative social and economic outcomes that can and should be prevented with investments in early childhood education, particularly targeted toward disadvantaged children and their families. (Contains 2 footnotes and 11 endnotes.. Recognising this evidence, there has been a global effort toward investing in early childhood as a strategy for improving children's later life outcomes.

Despite this evidence, we still know very little about the skill formation of learners growing up in the global South, where low quality schooling often dominates explanations for learners' poor educational outcomes, and crowds out other potential explanations such as low levels of school readiness among children when they enter school. The Roots & Shoots study aims to contribute to efforts aimed at addressing this gap by measuring a sample of South African children's early skills as they enter school, and following them across time to understand the link between these early skills and later schooling outcomes. By collecting data on children as they first enter school and then following these same children over time, we can determine to what extent the patterns of performance seen in grade 3 can be traced back to trends already there on the first day of school.

The Roots & Shoots study aims to answer the following questions:

- What are the foundational skills levels of learners when they first enter school?
- To what extent can the patterns of performance seen in grade 3 be traced back to trends already there on the first day of school?

1.2. Purpose of this report

This report is the third in series of four that present the findings from each wave of the Roots and Shoots study. Results from the [first wave](#) point to clear socio-economic gaps in school readiness, with children from more disadvantaged backgrounds being much more likely to be developmentally behind at the start of grade R compared to their wealthier counterparts. This echoes findings from the nationally representative Thrive by Five study (Giese *et al.*, 2022). Results from [wave 2](#) show that while there was some evidence of catch-up among learners who were developmentally behind at the start of grade R, these learners were mostly concentrated in historically advantaged schools. Learners who were behind at the start of grade R and attending historically disadvantaged schools were unlikely to catch up during the grade R year. These results point to socio-economic differences in school quality that are already apparent during grade R, and constitute the first quantitative evidence from South Africa that inequality in school quality begins as early as grade R.

The aim of this report is to present the findings from the third wave of data collection, that is, when the Roots and Shoots learners were in grade 2². The report builds on the findings from the second wave, this time using EGRA and EGMA scores as outcome measures. This report serves as a precursor to the final report (to be released in 2026), which will investigate how inequalities in school readiness translate into inequalities in literacy and mathematics achievement at the end of the Foundation Phase.

² 39 out of the 367 learners in the sample (11%) had repeated either grade R or grade 1 and were thus in grade 1 at the time of the wave 3 assessment.

2. Study design and methods

2.1. Sampling

2.1.1. The Afrikaans sample

The Roots and Shoots study takes advantage of an existing research study that aims to evaluate the impact of an intervention jointly implemented by a Non-Governmental Organisation (Funda Wandé) and the Western Cape Education Department (WCED) that targeted foundational literacy and mathematics in 50 treatment schools, whose outcomes were compared with 50 control schools. Within each educational district, statistical techniques were used to select the comparison schools such that they matched the treatment schools as closely as possible on performance on the grade 3 systemic assessments from 2017 to 2019. Roots & Shoots assessed the early learning skills of grade R children as they entered formal schooling (i.e. in Term 1) in 50 schools that were part of the evaluation study (i.e. half of the schools in the *Funda Wandé evaluation study*)³. These schools are all located in the four Metro and Cape Winelands education districts (i.e. five of the eight districts in the province). 366 Afrikaans learners were assessed in the first wave of data collection. Of these, 236 were assessed again in the first term of 2023 – that is, 64% of the original Afrikaans sample were retained in the third wave of data collection.

2.1.2. The isiXhosa sample

In addition to the 50 Afrikaans schools, Roots & Shoots assessed grade R children in 25 schools with isiXhosa as the language of learning and teaching (LOLT) in the Western Cape. All 25 schools are located in Cape Town since this is where isiXhosa LOLT schools are concentrated in the province. The sample frame was further restricted to schools with at least 30 grade R learners and excluded schools that had participated in the *Funda Wandé* pilot study in 2021. Schools were stratified in quintiles of their average grade 3 Systemic Evaluation performance between 2017 to 2019 and then within each stratum, five schools were randomly selected. The final isiXhosa sample consisted of 197 grade R learners. Of these, 131 learners could be tracked into the third wave of data collection, implying a retention rate of 66% for the isiXhosa sample.

³ Unfortunately the results of the evaluation of the Funda Wandé intervention in the Western Cape have not yet been released, thus it is not possible to determine how participation in the intervention might influence the results presented here. We maintain, as Wills, Ardington and Sebaeng (2022) do, that even if the intervention did improve literacy skills, the effect size of the intervention is unlikely to be large enough to significantly bias an analysis of reading levels.

2.2. Sample retention

Of the 563 grade R learners that were assessed in wave 1 (2022), 440 were assessed again in wave 2, and 367 of these were assessed again in wave 3 (2024). This implies a retention rate of 78% between waves 1 and 2 and 65% between waves 1 and 3. Although there were 33 learners who were assessed in waves 1 and 3 and not wave 2, these learners are excluded from the analysis presented in this report as the focus of the report is on learners who were assessed in all three waves of the study.

Given this relatively high attrition rate of 35% between waves 1 and 3, it is important to consider whether learners who dropped out of the study differ systematically from those who were retained in the sample. To do so, we consider differences in key baseline characteristics between retained and attrited learners, shown in Table 1.

The results in Table 1 indicate that retained and attrited learners do not differ significantly in terms of age, sex, language of learning and teaching (LOLT) of the school, or school fee status. Retained learners do differ from attrited learners, however, in that they achieved statistically significantly higher test scores in wave 1. That is, learners who were retained in the study through to wave 3 had higher ELOM 4&5 scores than learners who attrited between wave 1 and wave 3 (60% compared with 56%). This means that there is selection bias in the results presented in this report, since the wave 3 results represent learners who were academically stronger at the start of grade R. This selection bias is likely to affect the results in the following ways:

- i. **Overestimation of learning gains.** Since lower-performing learners were more likely to drop out of the study, the remaining sample may appear to show greater learning progress than what actually occurs in the full population. The wave 3 results could therefore **overestimate** the average learning gains between waves, as weaker learners are underrepresented in later waves.
- ii. **Underestimation of learning inequality.** Since learners with lower wave 1 scores are disproportionately missing from wave 3, the results may **understate** the extent of inequality in learning trajectories. If these learners were struggling early on, their continued challenges (had they remained in the sample) might have led to **even larger socio-economic gaps** in outcomes.

These caveats should be kept in mind when interpreting the results presented throughout this report.

Table 1: Baseline characteristics of retained vs. attrited learners

	Retained (367 learners)	Attrited (197 learners)
Age (months)	65.7	65.0
Female (%)	50%	48%
Afrikaans (%)	65%	64%
No-fee (%)	73%	72%
Low-fee (%)	16%	23%
Mid-fee (%)	12%	6%
wave 1 score	59.7***	55.7

Notes: Asterisks indicate statistically significant differences according to a two-tailed t-test such that *** $p < 0.01$.

2.3. Measures

2.3.1. Learning outcomes

Literacy skills were assessed one-on-one by enumerators using the Early Grade Reading Assessment (EGRA). The tool was developed by Research Triangle International (RTI) and adapted for use in Afrikaans (Ardington, Mohohlwane and Barends, 2022) and isiXhosa (Ardington *et al.*, 2020) by local experts. The adapted EGRA contained seven tasks that tested learners in letter-sound recognition, complex consonants and diacritics, phonemic awareness, familiar word reading, oral reading fluency, reading comprehension and listening comprehension. Scores on each task were converted to a percentage by calculating the number of correct answers by the total number of items on a task. A total literacy score was obtained by calculating the unweighted average score across all seven tasks.

Mathematics skills were assessed in a group setting using the written Early Grade Mathematics Assessment (EGMA), also developed by RTI and translated into Afrikaans and isiXhosa by local experts. The EGMA contained seven tasks that tested number recognition, number comparison, single-digit addition, single-digit subtraction, double-digit addition and subtraction, number patterns and word sums. As was the case with literacy, each task consisted of a number of items. For example, learners were given 20 single-digit subtraction sums and five word sums. Scores on each task were converted to percentages by dividing the number of correct items on each task by the total number of items on that task. Total mathematics scores were obtained by calculating the unweighted average across all seven tasks.

2.3.2. Other measures

Learners' age and gender were obtained from school records in wave 1 and confirmed by enumerators during the child assessments. Learners' grade in wave 3 was obtained from school records and also confirmed during the assessments. School fee was obtained from administrative records provided by the WCED. As per the previous two Roots and Shoots reports, schools were split into three groups: No-fee (schools that do not charge fees), low-fee (schools that charge fees less than R3,000 per annum), and mid-fee (schools that charge fees in excess of R3,000 per annum). These three groups roughly match school quintiles, where no-fee schools represent quintile 1-3 schools, low-fee schools represent quintile 4 schools, and mid-fee schools represent quintile 5 schools⁴.



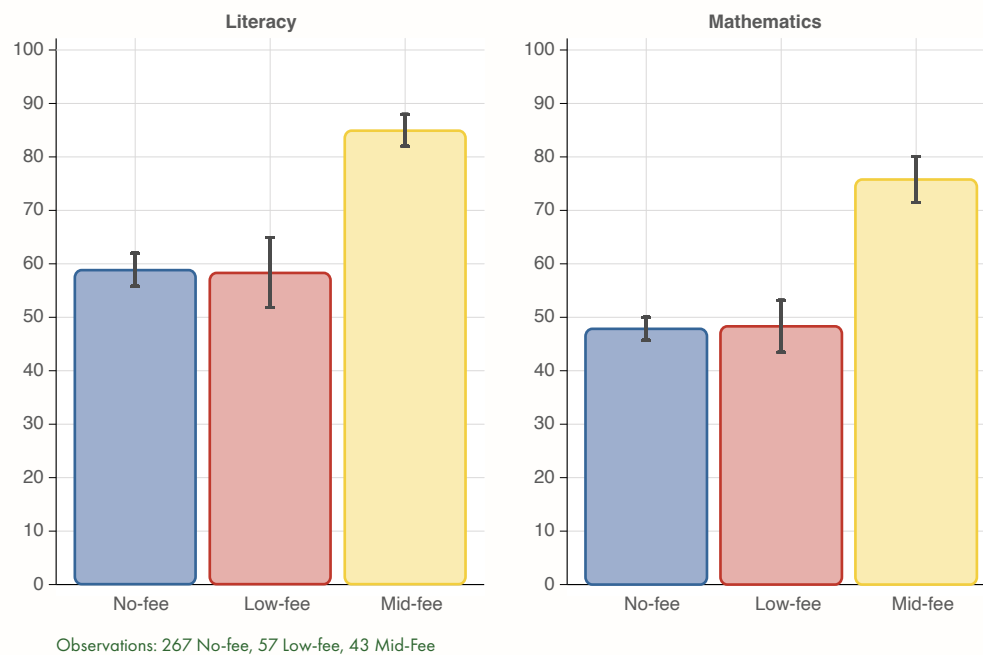
⁴ School fee status is used instead of official DBE quintiles since evidence presented in the first two Roots and Shoots reports show that there were many quintile 5 schools that did not in fact charge any fees. We therefore hold that school fee status is a better measure of socio-economic conditions of the school than official quintile status, at least for this sample of schools.

3. Cross-sectional results

3.1. Overall performance on the EGRA and EGMA

Figure 1 shows performance on the literacy (EGRA) and mathematics (EGMA) assessments by school fee group. It clearly demonstrates that learners in mid-fee schools outperformed those in no-fee and low-fee schools in both literacy and mathematics assessments, with the latter two groups achieving roughly the same results. On average, learners in mid-fee schools scored 85% in literacy, compared to 59% and 58% for learners in no-fee and low-fee schools, respectively. In mathematics, learners in mid-fee schools achieved an average score of 75%, whereas learners in no-fee and low-fee schools scored 48% and 49%, respectively. These results show that the inequalities observed between learners in no-fee and low-fee schools, on the one hand, and those in mid-fee schools, on the other, in the first two waves of the study were maintained in the third wave. Section 4 further examines the size of the gap between these groups of learners across study waves.

Figure 1: Overall EGRA and EGMA scores by school fee group



Notes: School fee groups as follows: No-fee: R0 p.a.; Low-fee: R1-R3,000 p.a.; mid-fee: >R3,000 p.a.

We next consider language differences in the literacy and mathematics assessments. Importantly, since there are no mid-fee isiXhosa schools in the sample, results would be biased if we considered the entire sample. That is, the results of Afrikaans learners in mid-fee schools would pull up the average achievement of the Afrikaans sample, masking important language differences between schools that are socio-economically similar but teach in different languages. To obtain a better comparison group, therefore, we limit our comparison of achievement by language to only learners in no-fee and low-fee schools. Results are shown

in Figure 2. The figure clearly shows that isiXhosa learners in no-fee and low-fee schools achieved significantly higher literacy scores than their counterparts in Afrikaans schools: The average score for Afrikaans learners in no- and low-fee schools was 54%, compared with the 67% achieved by isiXhosa learners. This is a novel result that, to our knowledge, has not been documented elsewhere in the literature. The reasons behind this gap, and why it only emerges in grade 2, deserve further investigation. isiXhosa learners performed similarly to Afrikaans learners in mathematics, however.

Figure 2: Overall EGRA and EGMA scores by LOLT

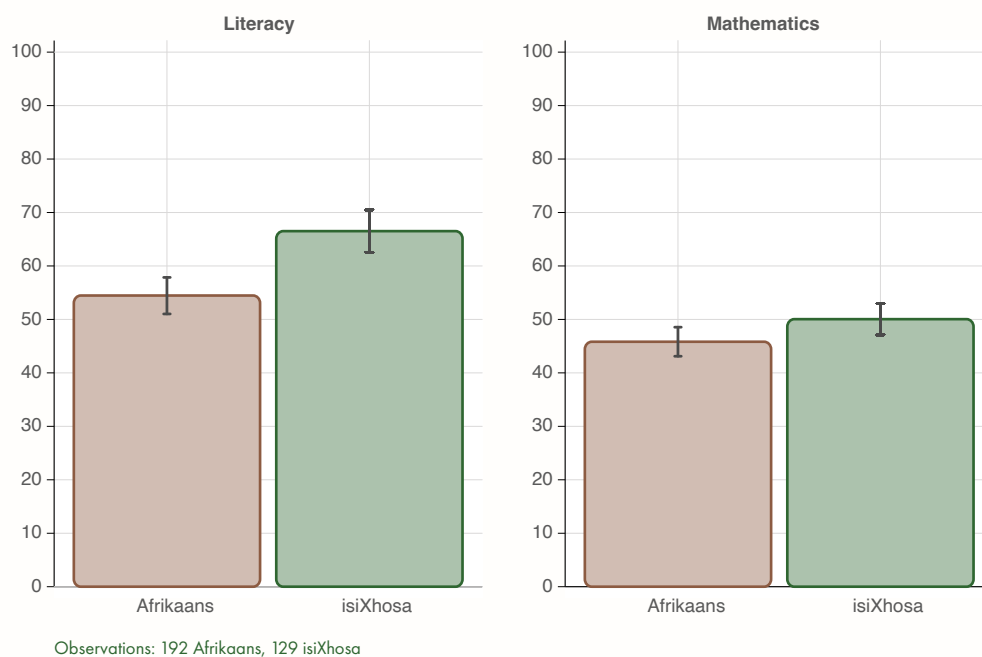
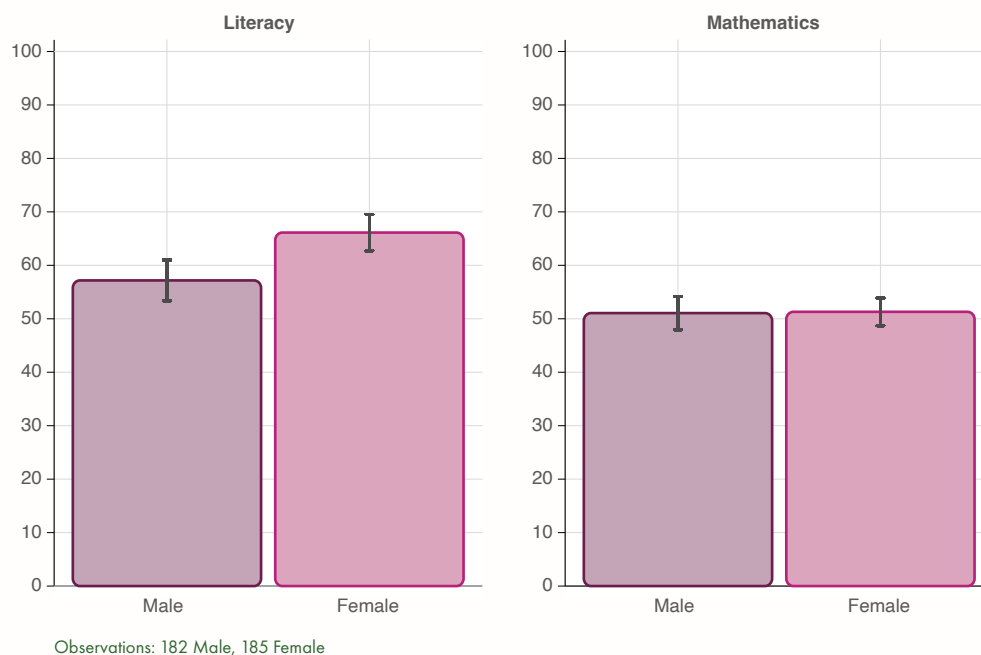


Figure 3 shows wave 3 literacy and mathematics scores by sex. Girls outperformed boys in the literacy assessment, but not in the mathematics assessment. The existence of a pro-girl gap in literacy is particularly interesting, as no such gap was observed in the previous two waves of the Roots and Shoots study. This marks the first time in the study that a pro-girl gap has been observed. South Africa’s pro-girl gap in educational outcomes is well-documented (Spaull and Makaluza, 2019; Hofmeyr, 2022), and this evidence suggests that boys begin to fall behind somewhere between the start of grade 1 and the middle of grade 2. In other words, since no pro-girl gap is observed at the start of grade R or grade 1 in the Roots and Shoots study, it appears that something occurs between the start of grade 1 and the middle of grade 2 that causes boys to fall behind. It is important to note that whatever causes this pro-girl gap to emerge in literacy achievement does not occur in mathematics. The pro-girl gap that emerges between grade 1 and grade 2 is exclusive to literacy achievement.

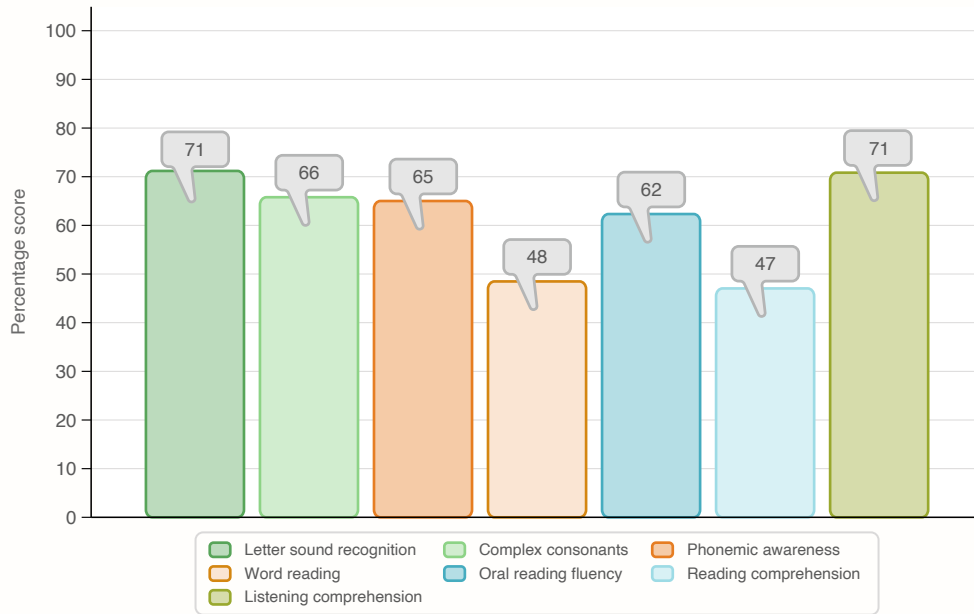
Figure 3: Overall EGRA and EGMA scores by sex



3.2. Performance on the EGRA and EGMA tasks

We next consider performance on the different sub-tasks of the literacy and mathematics assessments to investigate whether specific tasks pose particular challenges for learners. Figure 4 presents scores on the EGRA sub-tasks, highlighting that the most challenging tasks were word reading and reading comprehension. The fact that learners performed better in oral reading fluency (ORF) than in word reading aligns with existing evidence showing that children often find it easier to read passages than isolated words. The relatively low performance on reading comprehension (47%), compared to an average score of 62% on the ORF task, suggests that even when learners can successfully read aloud, they do not necessarily understand what they are reading. Research indicates that learners need to reach a specific ORF threshold – a certain number of words per minute - to read with comprehension (Ardington et al 2020, 2021 and 2022; Mohohlwane et al., 2022, Wills et al., 2022). The DBE has developed these benchmarks for South African languages, and if learners do not reach these thresholds by the end of grade 2 and 3, they are unlikely to comprehend what they read by the end of grade 4. Slow readers rarely achieve full comprehension. This relationship underscores the foundational role of early reading skills, such as letter sounds, phonemic awareness, and decoding complex consonants, in supporting comprehension. Since performance on these foundational skills was relatively weak, it is not surprising that comprehension scores were lower. Reading comprehension builds upon these earlier skills, reinforcing the need to ensure that learners reach adequate fluency levels before expecting strong comprehension outcomes.

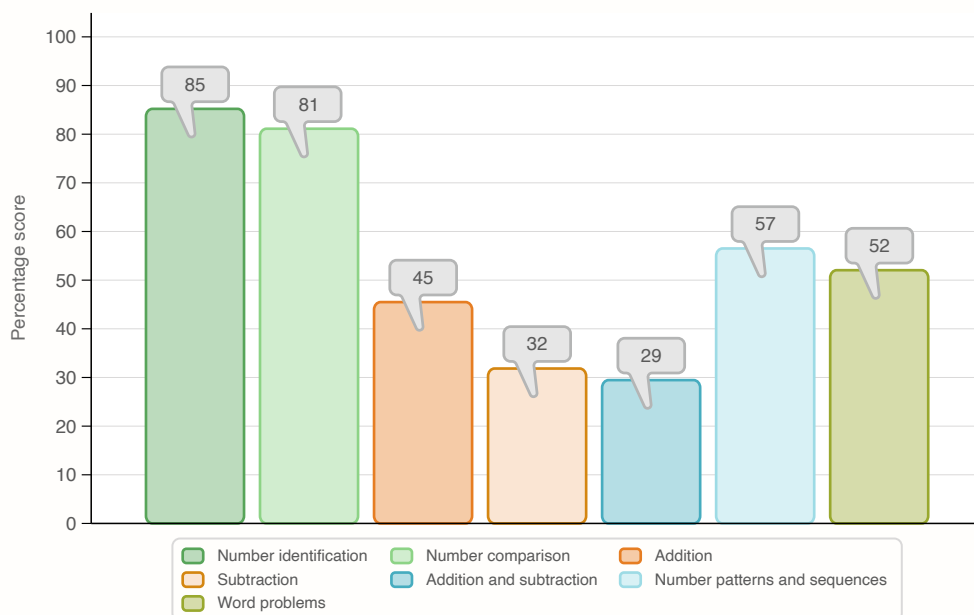
Figure 4: Overall scores on EGRA sub-tasks



Sample size: 367

Figure 5 shows the average performance on the different sub-tasks of the EGMA test. Overall, learners performed worst on the single-digit addition and subtraction tasks, as well as the task that included a mix of double-digit addition and subtraction problems. It is important to note that these tasks were timed, with learners given one minute to complete 20 problems. The low scores on these tasks may therefore reflect slow working speed rather than an inability to solve the problems. In contrast, learners performed very well in number identification and number comparison and moderately well in number patterns and word problems.

Figure 5: Overall scores on EGMA sub-tasks

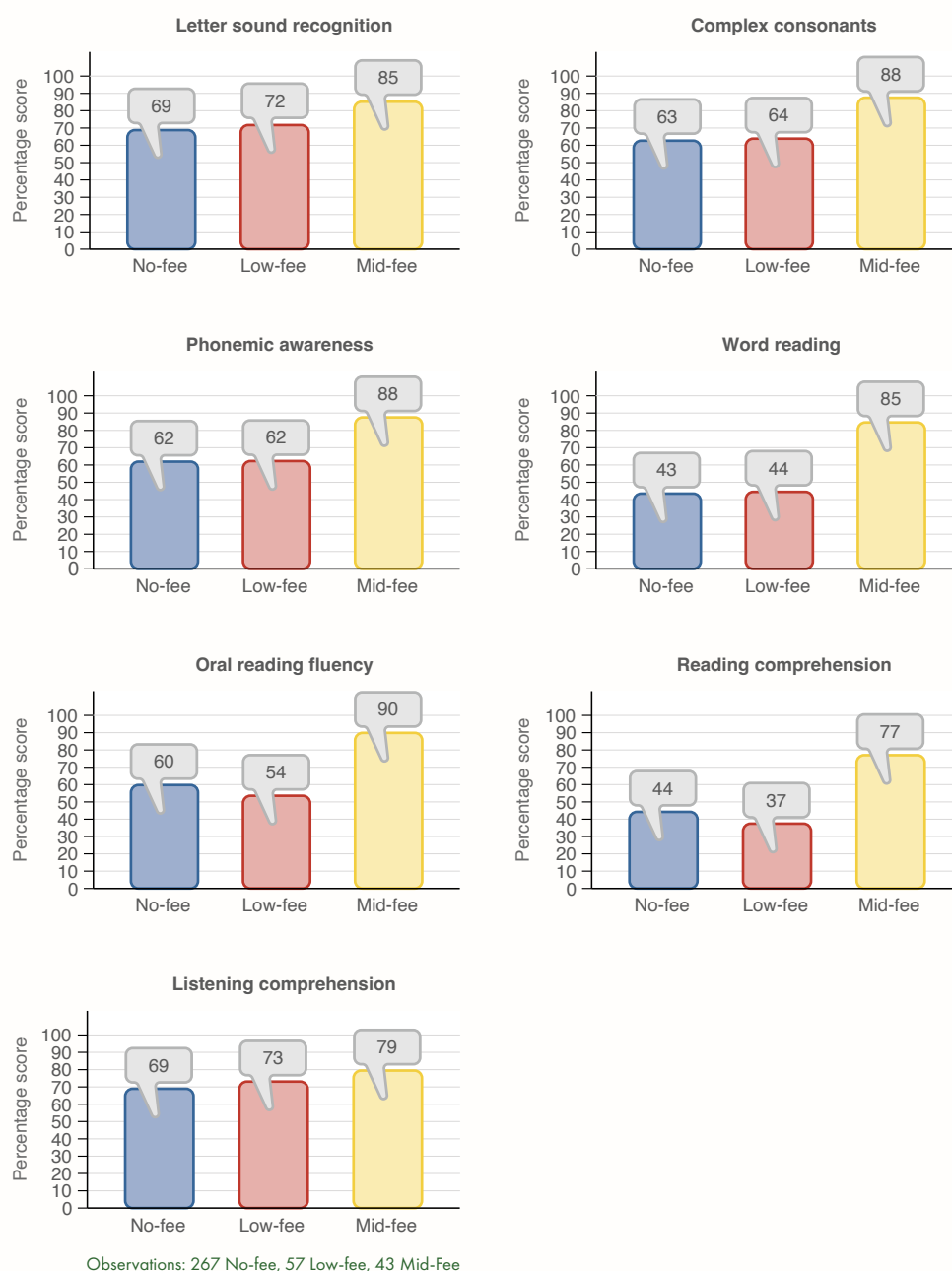


Sample size: 367

3.2.1. Task performance by school fee group

We next consider differences in performance on the specific tasks of the EGRA and EGMA by school fee status. We are specifically interested in investigating whether there are specific tasks in both the EGRA and EGMA where learners in no-fee and low-fee schools performed particularly poorly compared to learners in mid-fee schools. Results for the EGRA are shown in Figure 6. The graph indicates that certain tasks show particularly large gaps between learners from different school types. Word reading exhibits the largest differences, with learners in no-fee and low-fee schools achieving 43% and 44%, respectively, compared to 85% in mid-fee schools. Similarly large differences are observed in oral reading fluency (60% and 54% compared to 90%) and reading comprehension (44% and 37% compared to 77%). It is notable that listening comprehension scores are similar across all school fee categories. Since listening comprehension is a key predictor of reading development, the absence of wealth-related disparities in this skill is encouraging (Wills et al., 2022). However, differences in oral reading fluency (ORF) across school fee groups may be explained by disparities in foundational skills such as phonemic awareness (mid-fee: 88%, low-fee: 62%), letter-sound knowledge (mid-fee: 85%, low-fee: 69%), and complex consonant recognition (mid-fee: 88%, low-fee: 63%). Learning to read follows a developmental sequence: children first develop the ability to hear and distinguish sounds in spoken language (phonemic awareness). They then learn to associate these sounds with letters (letter-sound knowledge) and blend them together to form words. Over time, this process becomes more automatic, allowing for fluent reading. The gaps observed in phonemic awareness and letter-sound knowledge among learners from different school fee categories likely contribute to the differences in ORF, highlighting the role of early foundational skills in reading development (Ardington et al 2020, 2021 and 2022; Mohohlwane et al., 2022, Wills et al., 2022).

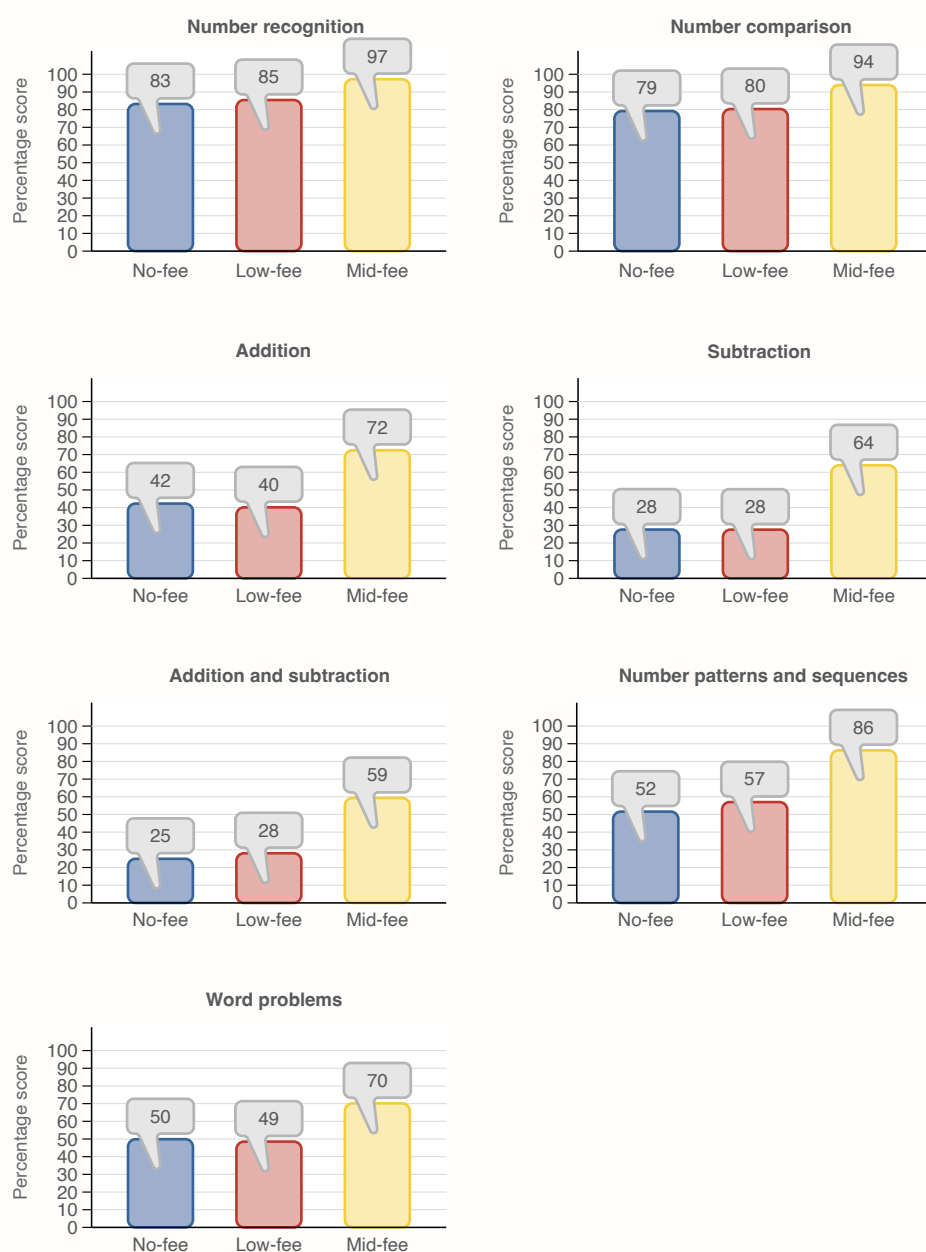
Figure 6: EGRA sub-task scores by school fee group



Turning now to EGMA tasks, Figure 7 shows that the largest socio-economic gaps were observed in the tasks with the lowest overall performance - single-digit addition and subtraction and double-digit addition and subtraction. Learners in no-fee and low-fee schools performed particularly poorly on the single-digit subtraction task, achieving only 28%. This stands in sharp contrast to learners in mid-fee schools, who achieved 64% on the same task. Similarly large socio-economic differences are evident in the double-digit addition and subtraction task, where learners in no-fee and low-fee schools achieved 25% and 28%, respectively, compared to 59% in mid-fee schools. These low scores, coupled with significant socio-economic inequalities, are particularly concerning given that addition and subtraction form the foundation of most mathematical problems learners will encounter throughout their schooling. The results highlight major deficits in basic arithmetic skills among learners in no-fee and low-fee schools as early as grade 2. Findings from Spaul et al. (2022) further underscore the severity of these gaps. Their analysis of TIMSS

2019 data at the grade 5 level revealed that three in four learners (75%) were unable to correctly answer a grade 3-level subtraction problem ($700 - 28 = __$). Among the wealthiest learners (Q5), 42% answered correctly, while only 20% of the poorest learners (Q1) managed to do so. Similarly, for a basic addition problem ($47 + 25 = __$), 65% of learners answered correctly overall, with 82% in Q5 and 59% in Q1 achieving the correct answer. Given these patterns, it is surprising that, in our analysis, addition scores were not substantially higher than subtraction scores, particularly in mid-fee schools (72% vs. 64%). A similar trend is observed in no-fee and low-fee schools, where learners scored approximately 40% for addition and 30% for subtraction. These results suggest that learners may struggle with basic number operations more broadly in the earlier grades, rather than subtraction being uniquely difficult. Furthermore, the persistence of these gaps into grade 5, as seen in the TIMSS data, suggests that early inequalities observed in grade 2 do not close over time but instead deepen as learners progress through school.

Figure 7: EGMA sub-task scores by school fee group



Observations: 267 No-fee, 57 Low-fee, 43 Mid-Fee

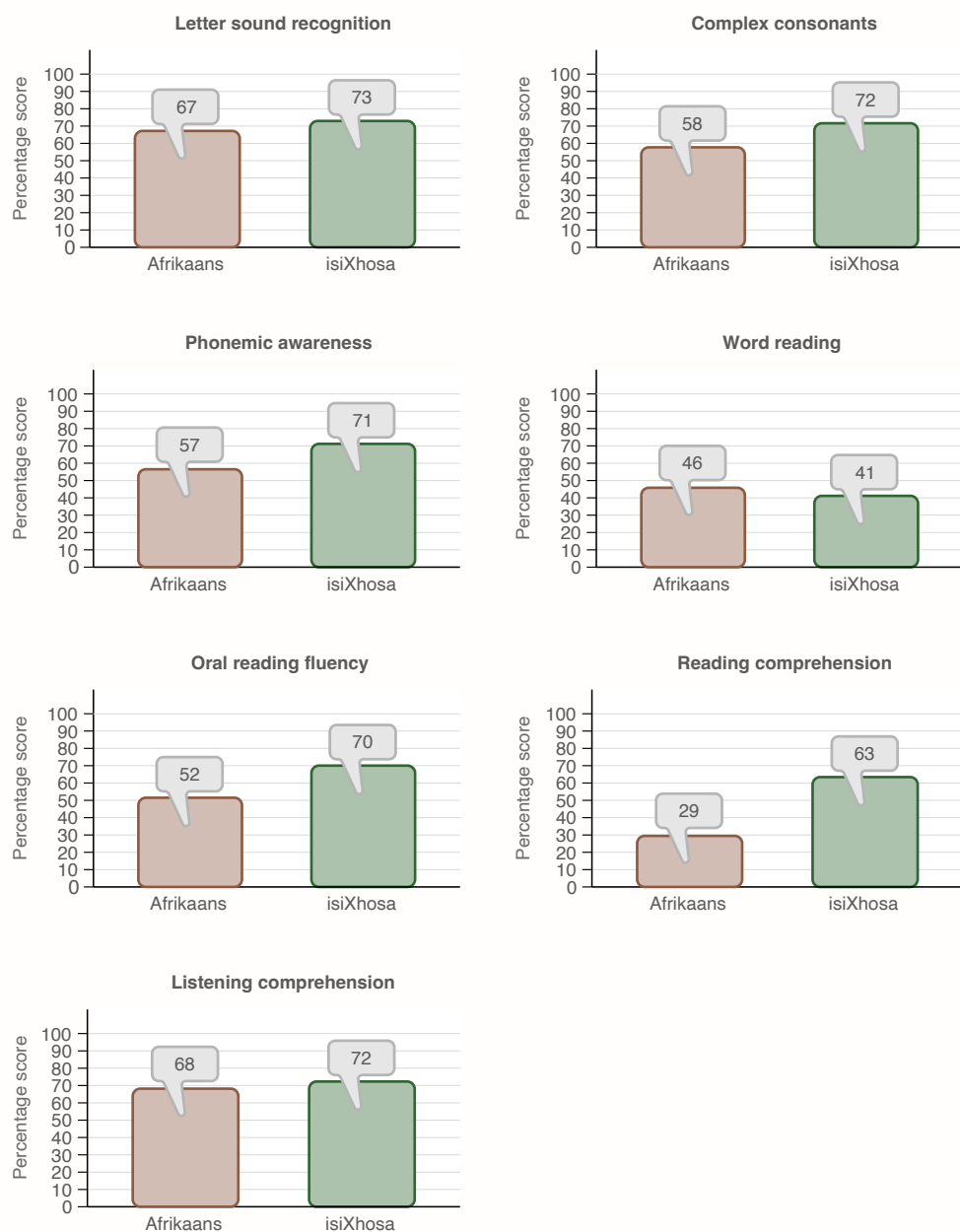
3.2.2. Task performance by language

Next, we consider whether there are observable differences in the performance of the different EGRA and EGMA sub-tasks for learners attending Afrikaans and isiXhosa LOLT schools. As before, we limit the sample to only learners in no- and low-fee schools to enable a fair comparison between groups. The results are displayed in Figure 8 and Figure 9. The literacy task with the largest language disparity was reading comprehension, where Afrikaans learners achieved 29%, compared to the 63% achieved by isiXhosa learners. It should be noted that the Afrikaans and isiXhosa Oral Reading Fluency passages and the comprehension questions based on them differed⁵, so these scores do not reflect a direct comparison. However, the poor performance of Afrikaans learners, compared to the decent performance of isiXhosa learners on this task, is noteworthy. isiXhosa learners outperformed Afrikaans learners in every other task with the exception of word reading, where their performance was similar. In numeracy, isiXhosa and Afrikaans learners performed similarly overall, with isiXhosa learners slightly outperforming Afrikaans learners across most tasks. The largest gap was in Number Comparison, where Afrikaans learners scored 76%, while isiXhosa learners achieved 84%.



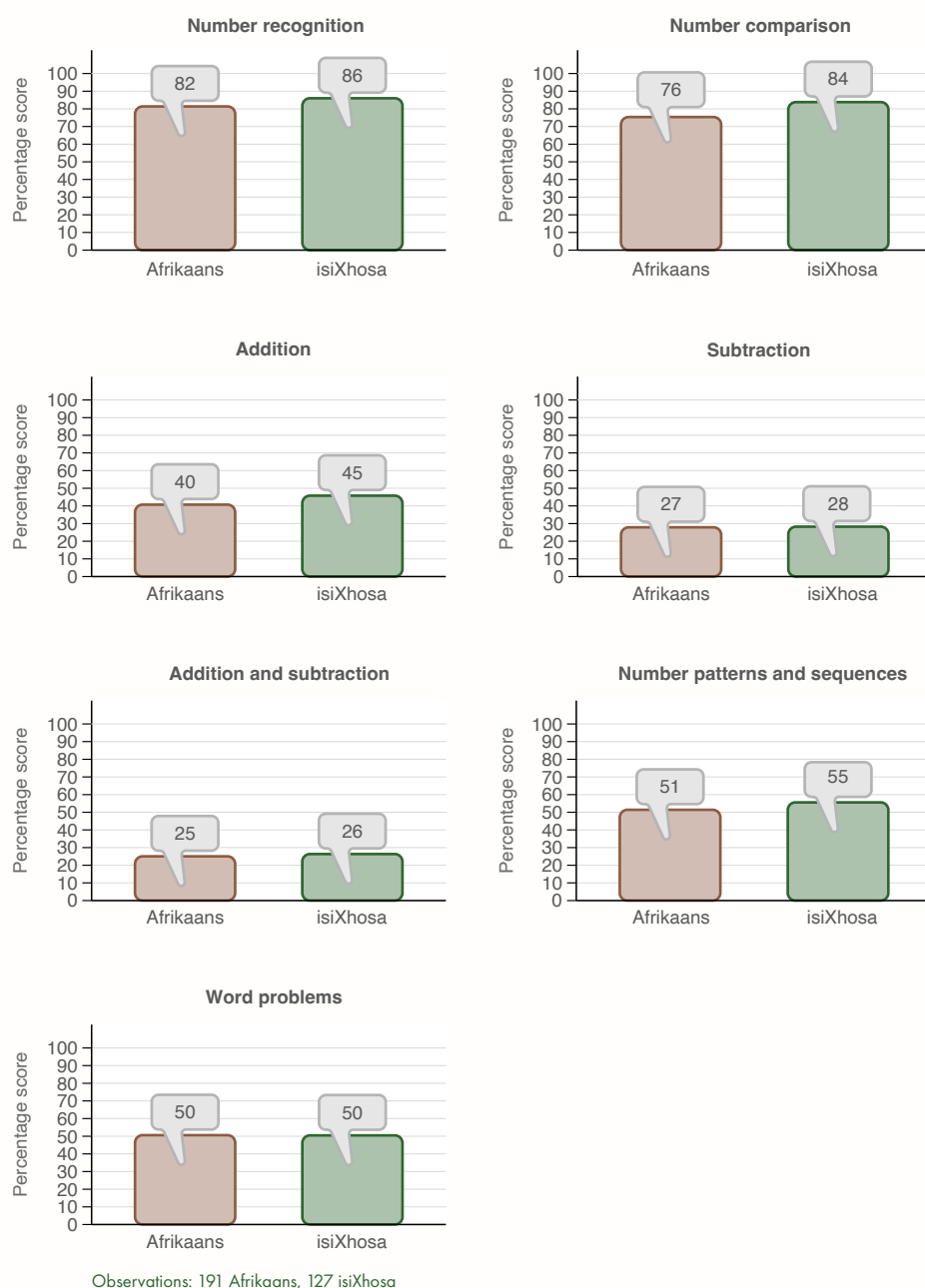
⁵ Each passage was selected based on its difficulty level and relevance within the culture that was being assessed. Simple translation of a single passage was not appropriate as that would have resulted in words appearing in the passage that were not appropriate for the grade being assessed.

Figure 8: EGRA sub-task scores by LOLT



Observations: 191 Afrikaans, 127 isiXhosa

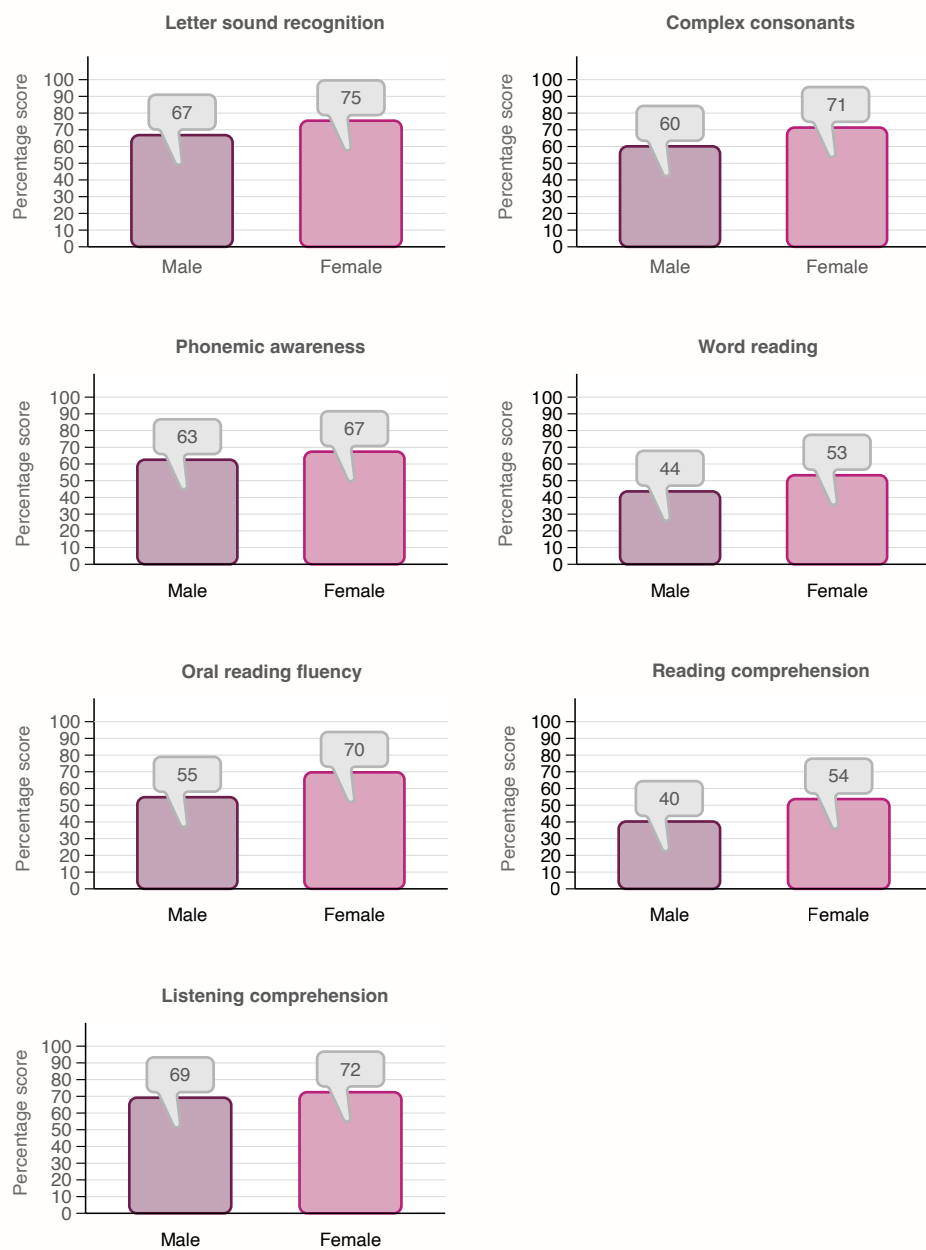
Figure 9: EGMA sub-task scores by LOLT



3.2.3. Task performance by sex

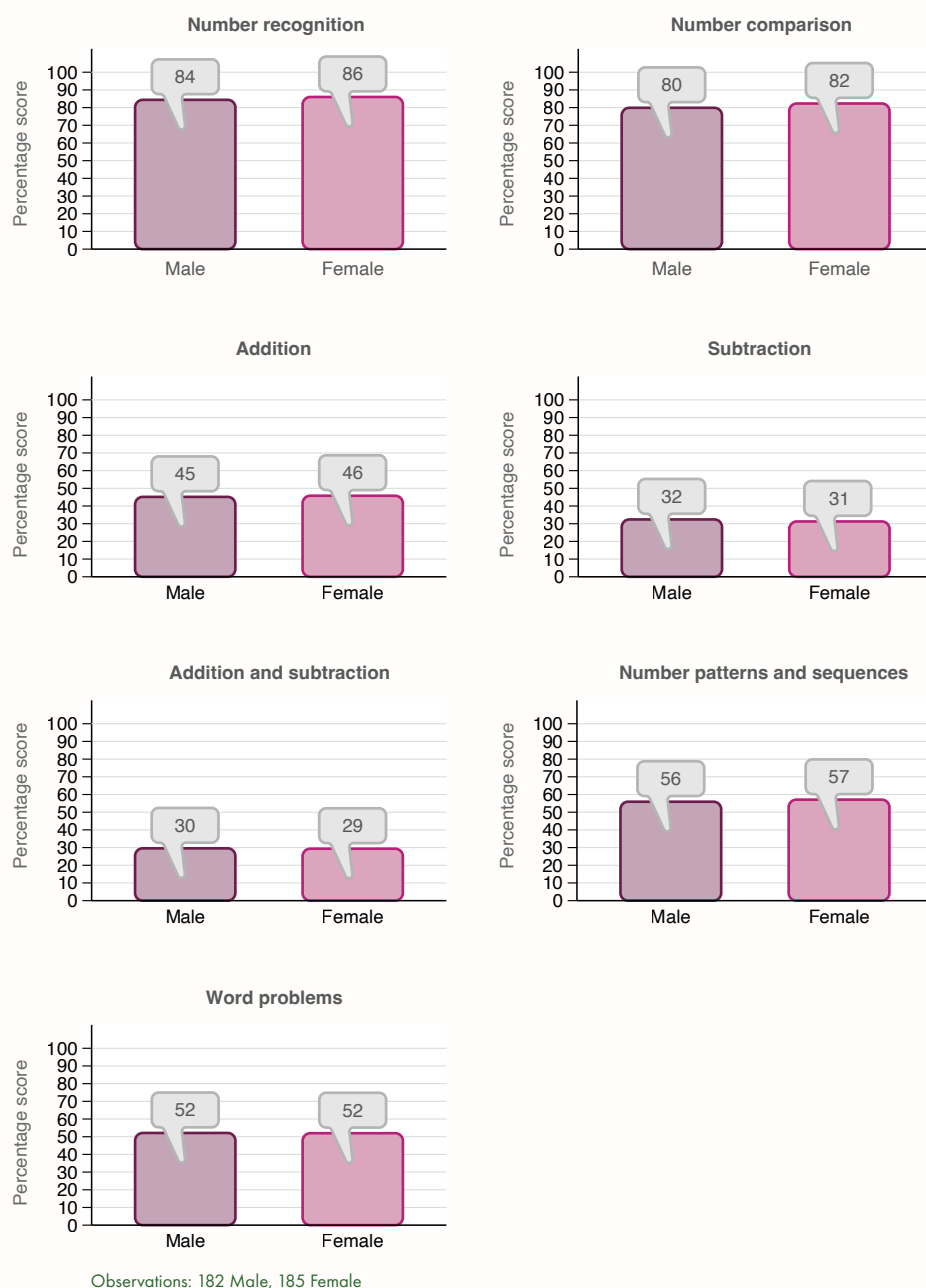
Next, we examine whether there are noticeable performance differences between boys and girls across the various EGRA and EGMA sub-tasks. As can be seen in Figure 10, girls consistently outperformed boys in the literacy sub-tasks, with the largest gaps observed in Oral Reading Fluency (55% vs. 70%), Reading Comprehension (40% vs. 54%), Complex Consonants (60% vs. 71%), Word Reading (44% vs. 53%), and Letter Sounds (67% vs. 75%). In mathematics, however, boys and girls performed similarly in all tasks. This can be seen in Figure 11.

Figure 10: EGRA sub-task scores by sex



Observations: 146 Afrikaans, 118 isiXhosa

Figure 11: EGMA sub-task scores by sex



3.3. Benchmarking reading performance

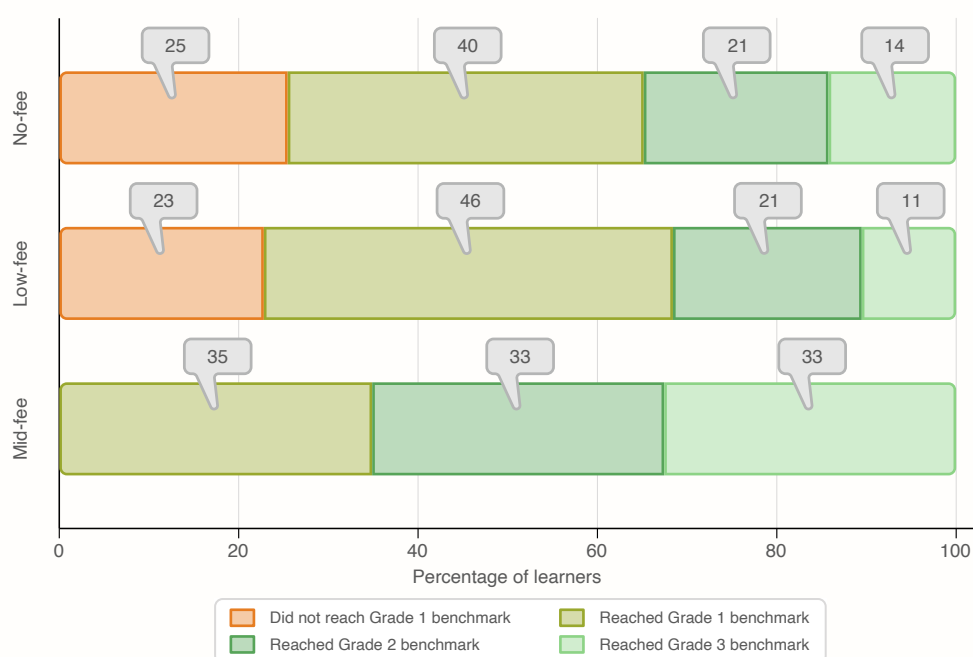
Due to the efforts of the Department of Basic Education (DBE) to establish early-grade reading benchmarks for all South African languages, it is possible to determine how learners in the Roots and Shoots sample performed in reading relative to where they should be given their grade level. This section considers performance at the Afrikaans and isiXhosa reading benchmark levels as determined by Ardington, Mohohlwane and Barends (2022) and Ardington *et al.* (2020). The benchmarks set by these authors are as follows:

Table 2: DBE Benchmarks for Afrikaans and isiXhosa learners

	Afrikaans (Ardington, Mohohlwane and Barends (2022))	isiXhosa (Ardington <i>et al.</i> (2020))
Grade 1	40 correct letter sounds per minute	40 correct letter sounds per minute
Grade 2	50 correct words per minute	25 correct words per minute
Grade 3	80 correct words per minute	35 correct words per minute

Figure 12 shows the proportion of learners achieving the different reading benchmarks by school fee status. Roughly a quarter (between 23% and 25%) of learners in no-fee and low-fee schools did not reach the grade 1 benchmark. By contrast, all learners in mid-fee schools reached the grade 1 benchmark. 40% of learners in no-fee schools reached the grade 1 benchmark only, meaning that altogether 65% of learners in no-fee schools did not reach the grade 2 benchmark (their current grade). This proportion was similar for learners in no-fee schools (69%), but it was a lot higher than learners in mid-fee schools (35%). While a third of the learners in mid-fee schools were a grade level ahead in terms of where they should be in reading (they reached the grade 3 benchmark despite being in grade 2), it is concerning that 35% of mid-fee learners did not reach the grade 2 benchmark. Respectively, only 14% and 11% of learners in no-fee and low-fee schools reached the grade 3 benchmark.

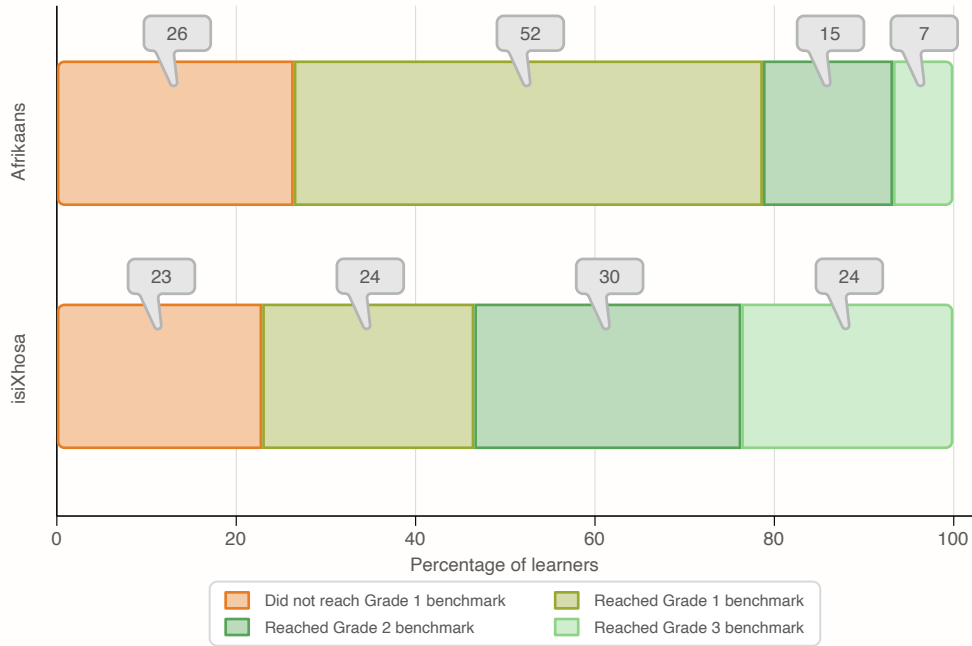
Figure 12: Percentage of learners reaching benchmarks by fee-status



Sample size: 267 No-fee, 57 Low-fee, 43 Mid-fee

We now consider the proportion of learners reaching the reading benchmarks by language. Results are shown in Figure 13. Again the sample is limited to learners in no-fee and low-fee schools to enable a more direct comparison between the two languages. It is noteworthy that a much larger proportion of isiXhosa learners reached the grade 2 reading benchmark (54% compared with only 22% of Afrikaans learners).

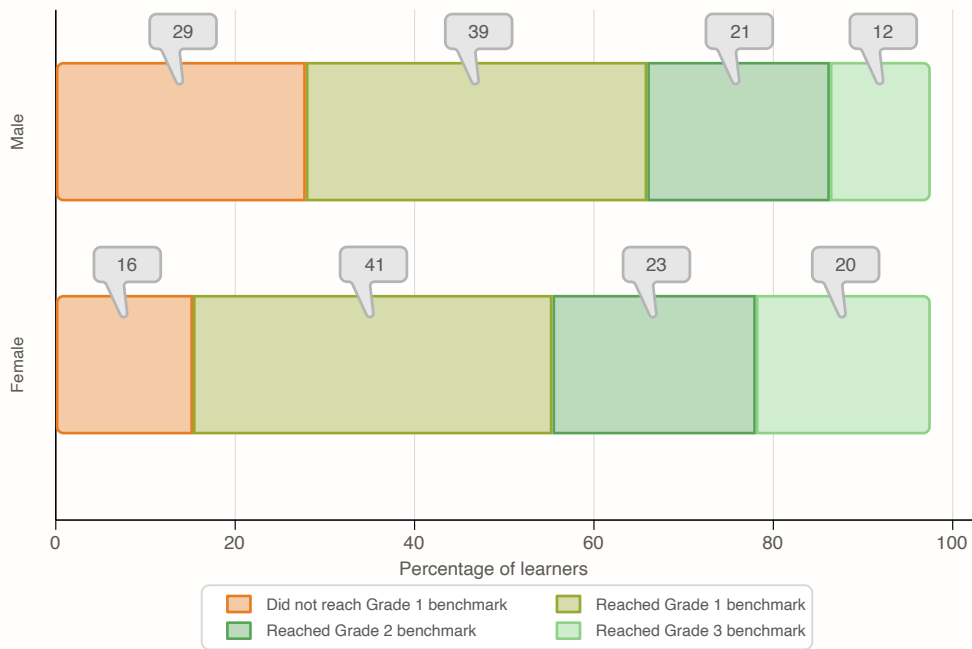
Figure 13: Percentage of learners reaching benchmarks by LOLT



Sample size: 193 Afrikaans, 131 isiXhosa

Figure 14 shows the proportion of learners reaching the reading benchmarks by sex. As is expected given girls' superior overall performance in the reading assessment, a larger proportion of girls reached the grade 2 benchmark (43%) compared to boys (33%).

Figure 14: Percentage of learners reaching benchmarks by sex



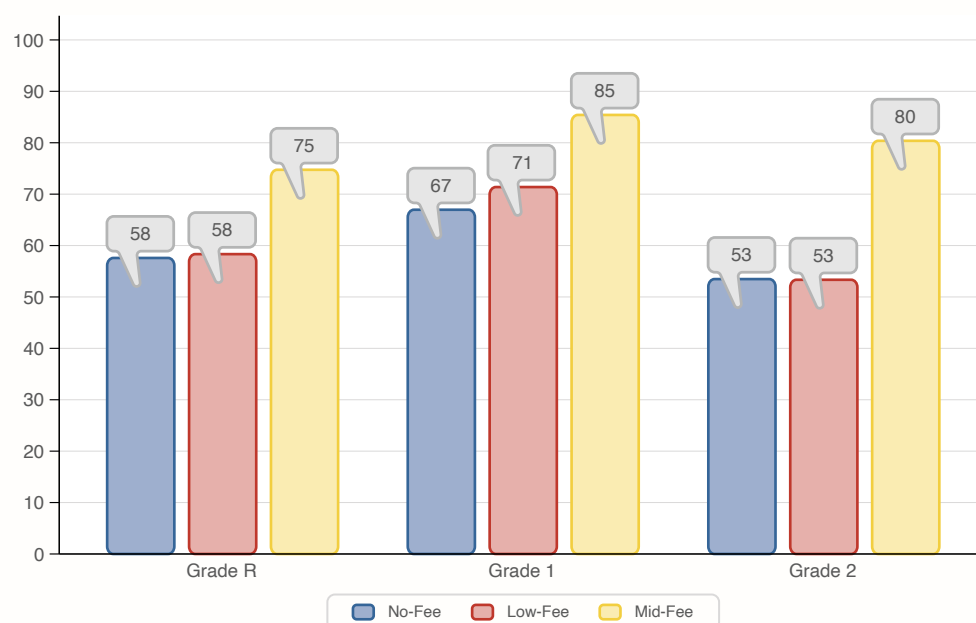
Sample size: 182 Male, 185 Female

4. Longitudinal results

In this section we consider how learning outcomes changed over time for the Roots and Shoots sample. First we investigate achievement gaps between learners in schools of differing quality across the three waves of the study. This is shown in Figure 15, which compares the average scores in grade R, grade 1, and grade 2 across different fee schools. In grade R, the test administered was ELOM 4&5, in grade 1 it was ELOM 6&7, and in grade 2 it was EGRA and EGMA, with the grade 2 score representing the average of the EGRA and EGMA scores. In grade R, learners in low-fee and no-fee schools had identical scores, while learners in mid-fee schools scored 17 percentage points higher than both low-fee and no-fee schools. In grade 1, learners in low-fee schools scored 4 percentage points more than those in no-fee schools, showing only a slight improvement. Mid-fee learners again outperformed both low-fee and no-fee schools, this time by 14 percentage points. In grade 2, learners in low-fee and no-fee schools had the same score once again, while mid-fee learners were 27 percentage points ahead. This evidence is suggestive of widening socio-economic achievement gaps between learners between the start of grade R and the middle of grade 2.

However, because the tests differed across years, it is difficult to make direct comparisons. For instance, in grade 1, the low-fee score was 71%, but in grade 2, it dropped to 53%. This may be due to the nature of the EGRA/EGMA tests, which could be more challenging than the ELOM 4&5 and ELOM 6&7 assessments. Additionally, it is unclear if a 5-percentage point gap in EGRA/EGMA scores is equivalent to a 5-percentage point gap in ELOM 4&5 scores. Nevertheless, we can generally conclude that learners in low-fee and no-fee schools performed similarly each year, while learners in mid-fee schools consistently outperformed the others by a significant margin.

Figure 15: Average wave 1, 2, 3 score by school fee status



Observations: 267 No-fee, 57 Low-fee, 43 Mid-Fee

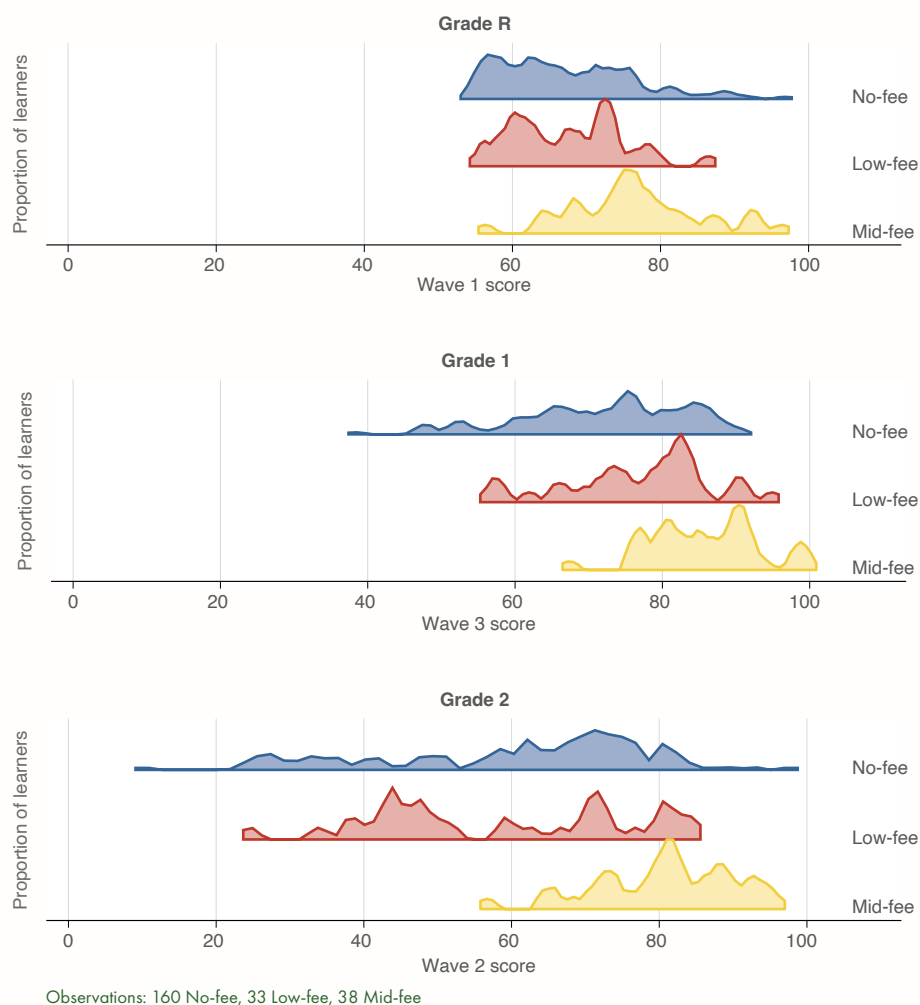
5. What happened to on-track learners in different types of schools?

One of the key questions we sought to investigate in the Roots and Shoots study is the effect of low quality schooling on learners' developmental trajectories. More specifically, we are interested in understanding what happens to learners who start school developmentally "on track" but attend low-quality schools. "On track" learners, as measured by the ELOM 4&5 assessment, are children who have achieved the expected developmental standards for their age across key domains, indicating readiness for formal schooling. Does low quality schooling erode the advantage these learners had at the start of school?

To investigate this question, we consider what happened to the test scores of learners who were developmentally on track at the start of grade R but attended schools of differing quality. This information is shown in Figure 16, which plots the distributions of test scores in each wave by school fee group for the subset of on track grade R learners over the next three years. In grade R, the on-track learners across all fee groups performed similarly. However, by grade 1, noticeable differences began to emerge. For mid-fee learners, scores remained concentrated between 70 and 100, with the majority of learners achieving scores of between 80 and 90. By contrast, the distributions for no-fee and low-fee learners started to stretch leftward, indicating that more learners in these groups achieved lower test scores. The low-fee group ranged from 55 to 100, peaking just above 80, while the no-fee group had a broader spread from 45 to 100, with a slightly longer left tail than the low-fee group.

By grade 2, these differences had widened further. The distribution for the mid-fee group stretched slightly, ranging between 60 and 100 and peaking around 80. Meanwhile, the distributions for low-fee and no-fee learners had flattened significantly and shifted to the left, now spanning from 20 to 85. That is, there were some learners in no-fee schools who had been developmentally on track initially but achieved only 20% overall in the reading and mathematics assessments in grade 2. Further analysis reveals that more than a quarter of learners (29%, or 56 out of 193) in no-fee and low-fee schools who had been on track at the start of grade R achieved an average score of less than 50% in the wave 3 assessments. Not a single mid-fee learner in a mid-fee school fell behind like this. These results suggest that among learners who started with similar potential in grade R, those in low-fee and no-fee schools struggled to keep pace. While there are a host of factors that could confound the association between school quality and the probability of falling behind between wave 1 and wave 3, this result is suggestive that low quality schooling may cause learners who start school on track to fall behind as they move through the early grades.

Figure 16: Distribution of test scores by school fee status across waves for learners who were developmentally on-track at the start of grade R



The next question to consider is whether the learners who fell behind between wave 1 and wave 3 were all concentrated in the same schools, or whether they were distributed across a number of schools. That is, it is instructive to consider whether learners falling behind over time is a school-level or an learner-level phenomenon. Further analysis reveals that the 56 learners who fell behind between wave 1 and wave 3 were distributed across 34 schools. The majority of these schools had only one learner who fell behind, however there were three schools where four or more learners had fallen behind. It should be kept in mind that a maximum of eight learners were assessed in each class, thus 4 falling behind constitutes half of the assessed learners in a school. This indicates that learners falling behind is mostly a learner-level phenomenon, but there are clear instances where many learners in the same school fell behind between wave 1 and wave 3.

6. Conclusion and main findings

The Roots and Shoots study is a longitudinal research project designed to track a cohort of learners in South Africa from grade R through the Foundation Phase. The study aims to explore how early learning inequalities emerge and persist over time, particularly in relation to socio-economic status (SES). The first wave of data collection took place in the first term of 2022, assessing 563 grade R learners across 75 primary schools in the Cape Town area using the Early Learning Outcomes Measure (ELOM) 4&5, which measured developmental readiness in six domains. In 2023, a follow-up assessment was conducted in grade 1, using the ELOM 6&7, which focused on early literacy and numeracy skills. The third wave of data collection in 2024 involved 367 learners, with assessments in literacy and numeracy using the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA). A final assessment will take place in 2025.

The main findings presented in this report are as follows:

Socio-economic gaps in learning outcomes increased in magnitude between wave 2 and wave 3. As in previous waves, learners in low- and no-fee schools continued to trail behind learners in mid-fee schools, but the gap appears to have widened further in wave 3. While direct comparisons across waves are limited due to differences in assessment tools—ELOM 4&5 in wave 1, ELOM 5&6 in wave 2, and EGRA/EGMA in wave 3—the trend remains clear. By wave 3, mid-fee learners were scoring 17 percentage points higher than their low- and no-fee counterparts on EGRA/EGMA tasks, indicating that socio-economic disparities in achievement persist and may intensify as children progress through the early grades.

We begin to see evidence of the emergence of a pro-girl achievement gap in wave 3. At the start of formal schooling and grade 1, there was no clear gender gap in achievement. However, the end of grade 2, girls had pulled ahead in literacy while boys trailed behind. In contrast, there was no measurable difference between boys and girls in mathematics performance. This suggests that, although boys and girls in the Roots and Shoots sample began school with similar skills, girls gained an advantage in literacy between the start of grade 1 and the middle of grade 2. Notably, girls outperformed boys across all literacy sub-tasks, with the largest gaps seen in Oral Reading Fluency, Reading Comprehension, Complex Consonants, Word Reading, and Letter Sounds. Moreover, 43% of girls reached the grade 2 benchmark by the end of grade 2 compared to 33% of boys. These findings suggest that something in the early schooling experience may better support literacy development for girls than for boys, while having no apparent impact on mathematics performance.

isiXhosa learners outperformed Afrikaans learners in the literacy assessment.

When looking at overall EGRA averages by language, isiXhosa learners had a slight advantage over Afrikaans learners, though the difference was not statistically significant. However, when focusing on socio-economically disadvantaged schools, a clear gap emerged: Afrikaans learners performed notably worse in literacy than their isiXhosa peers. The largest language disparity was in reading comprehension, where Afrikaans learners struggled the most. IsiXhosa learners outperformed Afrikaans learners in nearly all literacy tasks, except for word reading, where their performance was similar. In numeracy, overall performance between the two groups was comparable, though isiXhosa learners had a slight advantage in most tasks, particularly in Number Comparison. Notably, a much higher proportion of isiXhosa learners (54%) reached the grade 2 reading benchmark compared to Afrikaans learners (22%), highlighting a significant gap that warrants further investigation.

Early advantage fades in some socio-economically disadvantaged schools.

A key question in the Roots and Shoots study was whether learners who start school developmentally on track but attend low-quality schools can maintain their advantage. The wave 3 results suggest that they do not. Learners in no-fee and low-fee schools who initially performed well fell behind over time, with their score distributions shifting left, indicating a decline in performance. In contrast, their mid-fee peers maintained or even improved their achievement. Further analysis shows that nearly a third of on-track learners in low-fee and no-fee schools later scored below 50% in wave 3, while no mid-fee learners experienced such a decline. This pattern suggests that, despite starting with similar potential in grade R, learners in lower-quality schools struggled to keep pace, likely due to differences in school resources and support.

This report builds on the findings from earlier waves of data collection and offers important insights into how inequalities in school readiness at the start of formal schooling contribute to persistent gaps in literacy and numeracy achievement by the end of grade 2.

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