Learning Losses from COVID-19 in the Western Cape

EVIDENCE FROM SYSTEMIC TESTS

2019
2021

Research on Socio Economic Policy (Resep), Stellenbosch University

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RESEP
Research on Socio-Economic Policy

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forward together
sonke siya phambili
saam vorentoe

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Table of Contents

Abstract

Most learners in South African schools missed at least three-quarters of a school year over the course of 2020 and 2021, due to the Covid-19 pandemic, lockdowns, school closures and rotational timetables that were introduced to maintain social distancing in classrooms. These lost school days are known to have affected learning, but lack of data has thus far limited attempts at measuring learning losses. The only two studies measuring learning loss thus far were limited to fairly small samples of learners in relatively poor schools, to reading and only to the lower grades.

This study considers a much larger sample, virtually all public schools in the Western Cape, across Grades 3, 6 and 9 in both Language and Mathematics, comparing 2021 performance with that in 2019. It thus offers a more comprehensive picture of learning losses that also has relevance in other parts of South Africa, particularly when also considering patterns across quintiles and schools with different language policies.

The findings are indeed extremely concerning: Losses in Mathematics tend to be the largest (consistent with international experience), and even when using a relatively conservative measure (assuming that a year's learning is as much as 40% of a standard deviation in primary and 30% in secondary schools), the losses indicate that learners in 2021 had fallen more than a year of learning behind learners in the same grade in 2019. In Language, losses are smaller, around three-quarters of a year equivalent in terms of learning.

Most South African learners are taught in their home langue in the Foundation Phase (up to Grade 3), but then transition to being taught through the medium of English for all subjects (except their home language) in Grade 4 and beyond. The pandemic has made this difficult language transition even more difficult. In Grade 6 Language, learners are tested in the school's LOLT (Language of Learning and Teaching), which could be either English or Afrikaans. Performance declines in Language in Grade 6 between 2019 and 2021 are much larger in schools that experience this language transition. These same schools also experienced the largest learning losses in Mathematics performance in Grade 6, perhaps because poor language skills also limit learning in Mathematics.

Two policy areas require special attention: The first is to find more time for Mathematics, to overcome the deficit that has accumulated during the Covid years. For instance, Grade 9 learners in 2021 are performing more than a year behind Grade 9 learners two years earlier, so they must catch up a full year before they write matric. This requires that they progress more than four years in the three years before they write matric. In Language, the big challenge is to ensure that reading has been mastered in the Foundation Phase, while at the same time giving urgent attention to ease the language transition. Weak reading skills and English vocabulary can inhibit all further learning for the majority of learners who have to make this language transition.

Executive Summary

1 Due to the Covid-19 pandemic and the associated school lockdowns and rotational timetables that were applied in many schools, most learners in South African schools had far lower exposure to school in 2020 and 2021 than in normal years. This inevitably gave rise to learning losses.

2 By investigating performance in the Western Cape Systemic Tests that are written in Grades 3, 6, and 9 in both Language and Mathematics, this study was able to compare performance of the same schools on the same questions in 2021 to performance in 2019.

A Introduction

3 Western Cape administrative (TREPS) data show an average of 155 school days lost in 2020 & 2021.

Table ES1 Number of school days lost due to lockdowns or rotational timetabling in 2020 and 2021

	% of Grade 3 learners (for schools providing data)
Less than 140 days	2%
140–150 days	71%
150–160 days	12%
160–200 days	7%
200+ days	8%

4 Current information on learning loss in SA is limited to small samples of schools. Ardington *et al* (2021) found learning losses in Gr2 and 4 reading in no-fee schools of 56 to 81% of a school year in 2020, while Kotzé *et al* (2022) found more than a year's worth of lost learning in Setswana reading over 2020 and 2021.

Summary table: Performance declines in Systemic Tests, 2019–2021

		Gr3 Lan	Gr6 Lan	Gr9 Lan	Gr3 Mat	Gr6 Mat	Gr9 Mat
Average Score	2019	42.4%	50.5%	59.1%	59.5%	55.7%	37.7%
	2021	38.7%	45.0%	56.2%	50.7%	47.3%	31.5%
Decline (ppt)		3.6	5.4	2.9	8.8	8.4	6.2
By LOLT: Decline as % of a standard deviation	All	15%	27%	14%	36%	39%	32%
	Afrikaans	17%	26%	15%	39%	37%	34%
	English	19%	28%	14%	36%	38%	26%
	Xhosa-to-English	12%	32%	14%	36%	49%	36%
Not achieving pass (50%)	2019	56%	44%	31%	32%	36%	74%
	2021	61%	53%	36%	47%	52%	80%
Not achieving low benchmark (30%)	2019	32%	15%	7%	13%	10%	39%
	2021	41%	24%	10%	25%	20%	55%

Figure ES1 Learning loss by grade and subject, 2019–2021
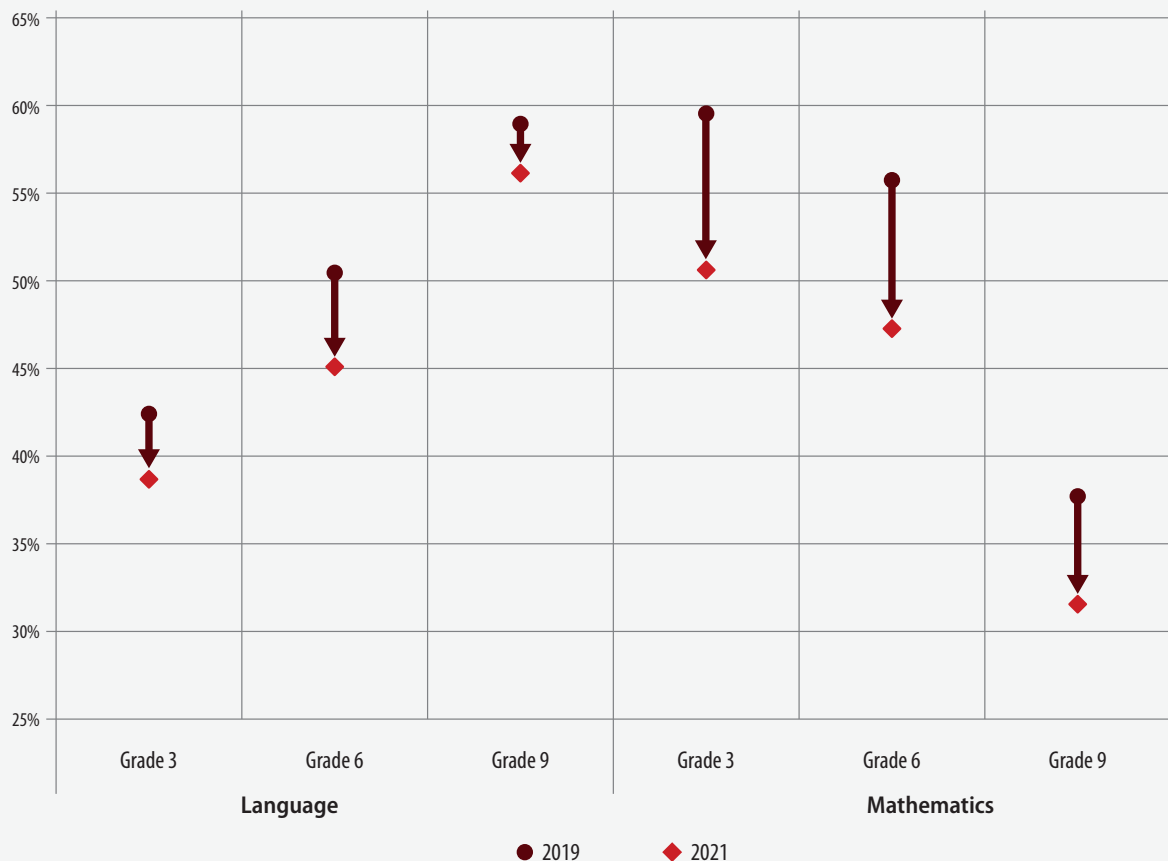
(B) Test performance and learning losses

1   Low average marks were evident already in 2019 for Gr3 Language (42.7%) and Gr9 Maths (37.7%), despite many multiple choice questions.

2   Learning losses in Maths are particularly large (there is little room for Gr9 Mathematics to fall further). Maths requires a specialised knowledge base that is not easily informally acquired when schools are closed.

3   2019 performance in Gr3 Mathematics and Gr9 Language was high, indicating easier tests. Even after losses, Gr9 Language remains easy (stronger performers even improved).

4   Conservatively estimated, learners have fallen <u>40% to 70% of a school year</u> behind earlier cohorts in Language and much more, <u>95% to 106% of a school year</u>, in Mathematics.

8   Afrikaans LOLT schools performed poorly and experienced large learning losses, except in Quintile 5 schools.

9   Xhosa-to-English LOLT schools experienced major problems in both Gr6 tests; Covid has exacerbated the already difficult LOLT transition.

10   Quintile 5 experienced much smaller learning losses than other quintiles in all tests.

11   Quintile 1 performs extremely poorly across all tests and grade levels.

12   Quintile 4 performance is surprisingly weak, usually not significantly better than Quintiles 2 and 3.

Grade 3 Language performance by Quintile in 2021[1]

Figure ES2 — Grade 3 Language performance by Quintile in 2021

X-axis: Score in percentage (0 to 100)
Y-axis: Cumulative share of learners (0 to 100%)

Legend: ● Quintile 1 ● Quintile 2 ● Quintile 3 ● Quintile 4 ● Quintile 5
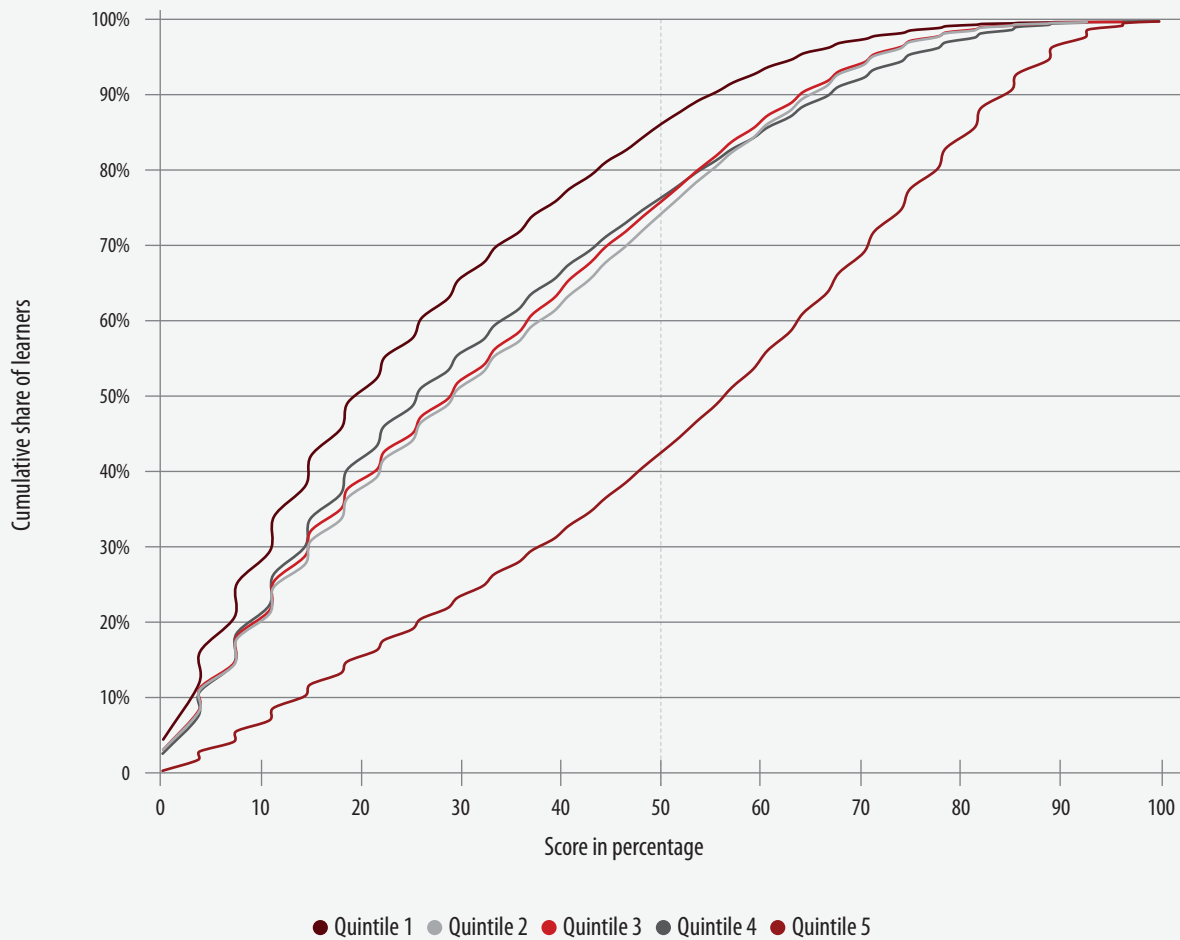
13 In most tests, girls significantly outperform boys. In Gr9, boys experienced greater learning losses, wiping out the pro-boy advantage in Mathematics.

B.1 GRADE 3 LANGUAGE

14 Low initial Grade 3 Language scores, despite almost half the questions being multiple choice, show that reading problems predate Covid-19. Relatively modest learning losses in this subject in Grade 3 may be due to floor effects or may indicate some catch up or learning at home.

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1   The proportion <u>below</u> the pass mark cannot directly be read off the 50% line, as the 50% line includes those that attained exactly 50%. With a relatively low number of common items, the intersection with the 50% line would be at a slightly higher proportion than those shown not reaching this benchmark in Table ES3.

Table ES3 Performance measured against benchmarks, 2019 vs 2021, Gr3 Language

	Not achieving pass mark			Not achieving low benchmark		
	2019	2021	Increase (percentage points)	2019	2021	Increase (percentage points)
Total	**56%**	**61%**	**4**	**32%**	**41%**	**9**
Afrikaans LOLT	64%	69%	5	39%	50%	11
English LOLT	43%	50%	7	22%	32%	10
Xhosa LOLT	65%	67%	2	36%	43%	7
Quintile 1	75%	82%	6	47%	60%	13
Quintile 2	63%	68%	5	36%	45%	10
Quintile 3	68%	71%	2	39%	47%	8
Quintile 4	63%	71%	8	37%	50%	13
Quintile 5	32%	36%	4	15%	20%	5

B.2 GRADE 6 LANGUAGE

15 There is considerable learning loss in Gr6 Language, especially in schools with LOLT changes. The percentage failing rose sharply from 44% to 53% overall, and in Xhosa-to-English schools from 59% to 71%.

Table ES4 Performance measured against benchmarks, 2019 vs 2021, Gr6 Language

	Not achieving pass mark			Not achieving low benchmark		
	2019	2021	Increase (percentage points)	2019	2021	Increase (percentage points)
Total	**44%**	**53%**	**10**	**15%**	**24%**	**9**
Afrikaans LOLT	48%	58%	10	18%	28%	10
English FP	29%	38%	9	8%	14%	5
Xhosa FP	59%	71%	12	21%	35%	14
Quintile 1	65%	75%	10	27%	42%	15
Quintile 2	57%	68%	11	21%	32%	12
Quintile 3	55%	66%	11	19%	31%	12
Quintile 4	46%	58%	12	16%	26%	10
Quintile 5	20%	26%	6	5%	8%	3

B.3   GRADE 9 LANGUAGE

16 Performance levels in Grade 9 Language are much higher than for other subject-grade combinations, reflecting a very easy test. The 12% of a standard deviation decline is low. Afrikaans LOLT schools (except in Quintile 5) experienced the largest losses.

Table ES5 Performance measured against benchmarks, 2019 vs 2021, Gr9 Language

	Not Achieving pass mark			**Not achieving low benchmark**		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**31%**	**36%**	**6**	**7%**	**10%**	**3**
Afrikaans LOLT	34%	41%	7	8%	11%	3
English HL	12%	15%	4	2%	3%	1
Xhosa HL	49%	56%	7	13%	18%	5
Quintile 1	52%	59%	7	15%	21%	6
Quintile 2	51%	59%	8	13%	19%	6
Quintile 3	45%	51%	6	11%	14%	3
Quintile 4	35%	41%	6	8%	10%	2
Quintile 5	11%	14%	3	2%	3%	1

B.4   GRADE 3 MATHEMATICS

17 There were extreme learning losses in Grade 3 Mathematics, with average marks dropping from a relatively high 59% to 50%. Those not achieving a pass mark increased from 32% to 47%, and those not reaching the low benchmark doubled. Afrikaans LOLT schools, already weakest in Maths in 2019, lost the most – equivalent to a full school year – and Xhosa LOLT schools the least. 57% of Afrikaans LOLT learners failed to achieve a pass mark.

Table ES6 Performance measured against benchmarks, 2019 vs 2021, Gr3 Mathematics

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**32%**	**47%**	**15**	**13%**	**25%**	**12**
Afrikaans LOLT	41%	57%	16	19%	35%	16
English LOLT	23%	37%	14	9%	18%	10
Xhosa LOLT	31%	47%	16	11%	23%	12
Quintile 1	48%	66%	19	22%	41%	19
Quintile 2	35%	51%	17	13%	27%	13
Quintile 3	38%	54%	16	16%	30%	14
Quintile 4	39%	57%	19	17%	32%	16
Quintile 5	16%	25%	9	6%	11%	5

B.5 GRADE 6 MATHEMATICS

18 Learning losses were large in Grade 6 Mathematics. Conservatively estimated, learners who wrote in 2021 performed more than a year behind those who wrote in 2019. The proportion failing to achieve a pass mark rose greatly from 36% to 52%. Even the Quintile 5 decline converts to around three-quarters of a year's learning lost. Schools with LOLT changes lost at least 1.2 years of learning, while those failing to pass rose from 40% to 61%.

Table ES7 Performance measured against benchmarks, 2019 vs 2021, Gr6 Mathematics

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**36%**	**52%**	**17**	**10%**	**20%**	**11**
Afrikaans LOLT	45%	62%	17	14%	27%	13
English FP	23%	39%	15	5%	12%	7
Xhosa FP	40%	61%	21	11%	25%	14
Quintile 1	56%	75%	18	18%	36%	17
Quintile 2	41%	63%	22	12%	26%	14
Quintile 3	45%	62%	17	13%	25%	12
Quintile 4	41%	60%	20	11%	23%	13
Quintile 5	16%	26%	10	3%	7%	4

B.6 GRADE 9 MATHEMATICS

19 The Grade 9 Mathematics test showed the lowest performance in 2019 (38%) and a considerable decline in 2021. Almost three-quarters of learners failed this test in 2019, rising to 80% in 2021. Learning loss was at least 106% of a year's learning, and 120% in schools where the LOLT change from Xhosa in the Foundation Phase to English in subsequent grades. Performance of Quintile 4 schools was as weak as that of Quintile 1, 2 and 3.

Table ES8 Performance measured against benchmarks, 2019 vs 2021, Gr9 Mathematics

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**74%**	**80%**	**6**	**39%**	**55%**	**17**
Afrikaans LOLT	75%	81%	5	41%	59%	18
English HL	61%	67%	6	26%	39%	14
Xhosa HL	89%	94%	4	51%	70%	19
Quintile 1	92%	96%	4	55%	74%	20
Quintile 2	92%	95%	3	54%	73%	19
Quintile 3	89%	94%	5	50%	71%	21
Quintile 4	87%	93%	5	48%	67%	19
Quintile 5	51%	56%	5	20%	31%	10

C Language performance by learning areas

1 A range of local and international tests show that performance for the Western Cape in reading and language at levels below the NSC can be characterised as low. Only roughly half the learners in the province demonstrate adequate reading proficiency. Performance on the annual WCED Learner Systemic Tests in Language has been stable and low.

C.1 COVID CURRICULUM CHANGES

2 Through the Covid period of 2020 and 2021 there were minimal changes to Language curriculum policy, and thus it was unlikely to affect the outcomes of the 2021 tests. A reduction in the 'Writing' tasks across the three grade levels would have given learners less specific instruction in this curriculum area in 2020. The reduction in the number of assessment tasks in 2020 would also have meant less formal writing practice, including that taking place under test conditions. This lack of practice may have knocked on to 2021, the year in which the Systemic Tests analysed in this document were written.

C.2 FRAMEWORK FOR ANALYSIS OF 2019–2021 LEARNING LOSSES

3 Test results were analysed in relation to three curriculum areas: 'Lexical comprehension' (vocabulary); 'Writing'; and 'Reading comprehension'. 'Reading comprehension' was considered in relation to four types of understanding required by questions: 'Focus on and Retrieve Explicitly Stated Information'; 'Straightforward inferences'; 'Interpret and Integrate Ideas and Information'; and 'Evaluate and Critique Content and Textual Elements'. Consideration was also given to the testing of engagement with fictional and informational texts that represent the two key purposes for reading at school: for literary experience and for retrieving information.

C.3 GRADE 3 LANGUAGE PERFORMANCE BY LEARNING AREAS

4 The greatest changes from 2019 to 2021 at the Grade 3 level were for 'Lexical comprehension' and 'Writing' (a decline of 4 percentage points for each component). 'Reading comprehension' declined by 3 percentage points from an average of 43% to 40%. Declines were similar across 'Reading comprehension' processes (also round 3 points).

5 Although students performed similarly in 'Reading comprehension' whether based on fictional or informational texts, they showed a much greater decline in 'Writing' that required them to use information to construct a text (a decline of 6 percentage points) compared to those requiring them to use their imagination only (a 2 percentage point decline).

C.4 GRADE 6 LANGUAGE PERFORMANCE BY LEARNING AREAS

6 Table ES9 below shows performance levels and decline in Grade 6 for three Language components. Declines were much larger in Grade 6 than Grade 3, although off a higher performance base. Declines were most severe in 'Writing' (8 percentage point decrease) where performance was already the lowest in 2019.

Table ES9 Performance levels and decline in Grade 6 for three Language components, 2019 to 2021

		2019	2021	Decline (percentage points)
COMPONENT AREA	**Lexical Comprehension**	55%	48%	7
	Reading Comprehension	57%	51%	5
	Writing	41%	32%	8

7 In relation to comprehension questions, the greatest declines were for 'Retrieve Explicitly Stated Information' followed by 'Make Straightforward Inferences'. Learners maintained very low performance (between 36% and 38%) on the higher order comprehension processes ('Interpret and Integrate Ideas and Information' and 'Evaluate Texts') between 2019 and 2021.

8 Overall performance in 'Reading comprehension' and 'Writing' based on informational text was lower than that based on fictional text, across 2019 and 2021. The extent of the decline for the text types was however similar.

C.5 GRADE 9 LANGUAGE PERFORMANCE BY LEARNING AREAS

9 Performance and declines at the Grade 9 level showed quite different patterns to the Grade 3 and Grade 6 levels. Firstly, performance on this test was much higher in both 2019 and 2021 than in the two other grades. Secondly, although there were losses across most language components and question types, these were less severe than at the other grade levels. There were no items measuring 'Writing' in the analysis as the test items had to be removed given their lack of comparability (the 2021 test 'Writing' items had been changed from 2019). The decline in 'Lexical comprehension' was 1 percentage point and in 'Reading comprehension' 3 points. These declines were off a 58% and 61% base respectively.

10 Table ES10 shows there was a small improvement in performance on items that required students to 'Make Straightforward Inferences' (2 percentage points), and a small decline in those that required students to 'Retrieve Explicitly Stated Information' and 'Evaluate texts'. The greatest decline was found in the more challenging questions where students were required to 'Interpret & Integrate Ideas & Information' (a decrease of 6 percentage points). Students showed a similar decline in questions based on informational texts and those based on fictional texts, which was 3 and 2 points respectively.

Table ES10 Performance levels and decline in Grade 9 for different comprehension question types, 2019 to 2021

		2019	2021	Decline (percentage points)
COMPREHENSION QUESTION TYPES	**Retrieve Explicitly Stated Information**	71%	69%	2
	Make Straightforward Inferences	41%	43%	−2 (improvement)
	Interpret & Integrate Ideas & Info	53%	47%	6
	Evaluate texts	56%	54%	2

D Mathematics performance by learning areas

D.1 GRADE 3 MATHEMATICS PERFORMANCE BY LEARNING AREAS
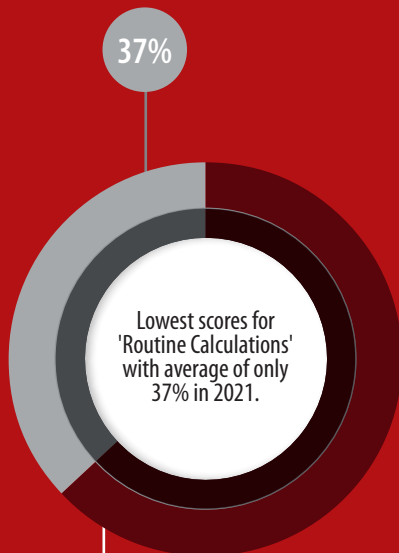
1 'Number Operations and Relationships' is the most fundamental content area in Foundation Phase Mathematics, thus it is extremely concerning that the average marked dropped from 57% in 2019 to 48% in 2021.

2 Performance in 'Measurement' was the lowest in both 2019 and 2021, with performance dropping to 26% in 2021. Poor performance in 'Measurement' is also an indicator of low proficiency in 'Number Operations and Relationships'.

3 Within 'Number Operations and Relationships', the lowest performance was for 'Routine Calculations' in both 2019 and 2021, with an average score of only 37% on these items in 2021. The low performance for 'Routine Calculations' is likely an indicator of learners struggling to get to grips with the symbolic 'language' of Mathematics and understanding and applying the four basic operations.

4 Performance was also poor for 'Word Sums', with an average score of only 40% in 2021. This poor performance on 'Word Sums' is no doubt related to poor reading performance levels in Grade 3, specifically, reading for learning, but is also likely a consequence of low proficiency in 'Routine Calculations' in cases where a question has been correctly interpreted.

5 Across all three LOLT groups, performance in 'Measurement', 'Routine Calculations' and 'Word Sums' was below 50%, with the poorest performance in Afrikaans LOLT schools in all three content areas.
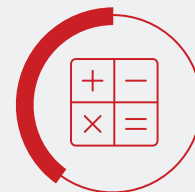
6 Q1–3 and Q4 schools scored below 50% in 'Number Operations and Relationships', compared with 63% of learners in Q5 schools. In the sub-topic 'Routine Calculations', the average scores were below 30% in Q1–3 and Q4 school, compared with 51% for learners in Q5 schools.

D.2 GRADE 6 MATHEMATICS PERFORMANCE BY LEARNING AREAS

7 In Grade 6 Mathematics, average performance levels dropped to below 50% in 2021 for 'Data Handling', 'Number Operations and Relationships' and 'Patterns, Functions and Algebra'.

8 Performance in 'Measurement' was the lowest in both 2019 and 2021, at a 38% average mark in 2021.

MATHEMATICS PERFORMANCE BY LEARNING AREAS

40%
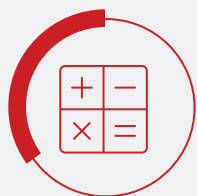
Average Grade 3 score in 2021 for 'Word Sums'

<50%

Q1–3 and Q4 schools scored below <50% in Number Operations and Relationships in Grade 3

38%

Average mark in 'Measurement', the lowest of all learning areas in Grade 6 in 2019 and 2021

GRADE 6 MATHEMATICS PERFORMANCE BY LEARNING AREAS

<35%

'Solving Problems with Fractions, Decimals and Percentages' 2021

48%

In Q5 schools, average scores only fell below 50% in 'Solving Problems with Fractions, Decimals and Percentages'

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9   Within 'Number Operations and Relationships', the greatest learning losses were for 'Whole Number Sense' and 'Recognising and Comparing Fractions, Decimals and Percentages'.

10   Performance in 'Solving Problems with Fractions, Decimals and Percentages' dropped from a low 40% in 2019 to below 35% in 2021.

11   Across both LOLT groups, average scores were below 50% for 'Data Handling', 'Measurement', and 'Number Operations and Relationships'. In addition, Afrikaans LOLT learners scored less than 50% on average for 'Patterns, Functions and Algebra'.

12   In both Q1–3 and Q4 schools, average scores were less than 50% in all the content areas except Geometry. In Q5 schools, average scores only fell below 50% in 'Solving Problems with Fractions, Decimals and Percentages'.

D.3   GRADE 9 MATHEMATICS PERFORMANCE BY LEARNING AREAS

13   In Grade 9 Mathematics, the greatest learning loss (15 percentage points) was for 'Number Operations and Relationships', where average performance dropped below 20% in 2021. This was followed by 'Patterns, Functions and Algebra' (8 point loss), where the average score was below 40%.

14 The extremely low performance in 'Measurement' is again apparent in Grade 9, where the average performance was below 10% in both 2019 and 2021.

15 Within Grade 9 'Patterns, Functions and Algebra', average scores were below 50% in all four sub-topics, with the lowest performance for 'Graphs' in both 2019 and 2021. The very poor performance in these sub-topics suggests Grade 9 learners are struggling to grasp basic principles of algebraic language.

16 Average scores were below 50% for both English and Afrikaans LOLT groups across all the content areas and sub-topics.

17 The most significant differences in learning losses across quintile groups was for 'Numbers Operations and Relationships' and 'Patterns, Functions and Algebra'.

18 While learners in Q5 schools scored an average of 55% in 'Number Operations and Relationships' in 2021, a decline of 4 points, this was far higher than the 29% and 28% average scored in the other quintile groupings.

LANGUAGE TESTS FRAMEWORK

An extremely low performance in 'Measurement' apparent in Grade 9

Grade 9 learners are struggling to grasp basic principles of algebraic language

The lowest performance for both LOLT groups was 'Measurement'

AREAS REQUIRING SPECIAL ATTENTION

FOUNDATION PHASE READING PERFORMANCE

READING SKILLS AND VOCABULARY IN ENGLISH FOR LEARNERS IN THE INTERMEDIATE PHASE (ESPECIALLY IF THERE WAS A LOLT TRANSITION)

MATHEMATICS AT ALL LEVELS

QUINTILE 4 SCHOOLS

1 The very difficult Gr3 Language test that leads to floor effects plus the multiple choice questions, hide the full extent of the **weak performance in Foundation Phase reading** and its consequences for the Intermediate Phase.

2 Time lost due to the pandemic has made **the LOLT transition** even more difficult. It also affects other subjects (as demonstrated in the Grade 6 Maths test). Special attention is required to ensure sufficient reading skills and vocabulary in English in the Intermediate Phase.

3 Mathematics deficits due to lost time amount to at least a year of learning in all grades. **Extra time is required for Mathematics** at all levels to catch up the year lost.

4 The weak performance of Quintile 4 schools needs special attention and is also partly reflected in large learning losses in many Afrikaans LOLT schools.

5 Mathematics and Language are **gateway subjects**, forming the basis for learning in all other subjects. Additional time for catch up in these subjects should be sought. Where feasible, time allocations for other subjects should be reduced or non-core subjects suspended or integrated into other subjects in order to free up time for Language and Mathematics (for example, as was done in 2020 in Foundation Phase with the integration of Life Skills into home language).

6 Any catch up programme requires additional time. One way that this can be achieved is to **strengthen the use of existing instructional time**. As schools return from the disruptions of the past two years they need to be supported in maintaining regular school days and normal timetables. Shorter days (for Foundation Phase or on Fridays) should not be permitted. Careful regulation of school days during examination times must be undertaken to ensure that terms run their full course and a maximum number of school days are utilized for instruction. The district and circuit managers have a crucial role to play here.

7 Attention to addressing backlogs in reading and number sense in the **Foundation Phase** is a priority. Teachers must be supported in utilising existing resources and making sure that learners have the opportunity to take reading material home.

8 In subsequent phases, the overfull curriculum and homework tasks in other subjects should be reduced to allow learners to give more attention to catching up in Mathematics and Language. In other words, the **instructional load** of all subjects apart from Mathematics and Language needs to be reduced. This will require discussion and coordination amongst staff in schools across subjects and grades.

9 **Diagnostic assessments** of learners' knowledge to identify gaps should be done by individual teachers. The DBE/provinces/districts could assist teachers by providing quality benchmark assessments and assistance to teachers in interpreting results of these tests.

10 The work of Phase 3 of the Presidential Youth Employment Initiative (PYEI) beginning in April 2022 should focus on assisting individual learners with catching up content in Mathematics and Language. The sole task of the **educator assistants** should be to work through the previous year's DBE Rainbow workbook with individual learners. This will provide (especially struggling) learners with one-on-one instructional and affective support.

11 The DBE needs to attend to the **trimming** of the curriculum as a matter of urgency. Certain learning areas/topics should be omitted or consolidated, and others delayed. The focus should be on mastering those skills and concepts that are necessary for progression in learning in subsequent grades. As an example, in Mathematics, definitions of three-dimensional shapes can be left for later grades while core foundational content is mastered.

COVID-19 PANDEMIC
IMPACT ON EDUCATION

LOCKDOWNS, SCHOOL
CLOSURES AND ROTATIONAL
TIMETABLES INTRODUCED IN
SOME COUNTRIES AND
CONTEXTS TO REDUCE
CROWDING IN CLASSROOMS

THERE IS ALSO MEMORY
LOSS, DUE TO WEAKER
INTERNALISATION OF WHAT
HAS BEEN LEARNT

IN THE WESTERN CAPE,
ADMINISTRATIVE DATA
SHOW A LARGE LOSS
OF SCHOOL DAYS IN
2000 AND 2021 DUE TO
LOCKDOWNS AND
ROTATIONAL TIMETABLING

1 Introduction

1.1 CONTEXT

The Covid-19 pandemic has had a severe impact on education across the world. Lockdowns, school closures and rotational timetables introduced in some countries and contexts to reduce crowding in classrooms have given rise to learning losses compared to previous years. The available literature shows that learning losses are often greater than simply the part of the curriculum not covered: There is also memory loss, due to weaker internalisation of what has been learnt, and losses in the efficiency of learning as learners returning to school have to get back into a routine.

In South Africa, the number of days lost in different grades and schools varied because of the way the lockdown was imposed and return to school was scheduled and managed, particularly in 2020[2], and the way rotational timetabling was implemented, particularly in 2021. In the Western Cape, administrative (TREPS[3]) data show a large loss of school days in 2000 & 2021 due to lockdowns and rotational timetabling. Some schools did not provide usable data. Such schools may be a little more likely than average to have missed school days.[4]

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2   In late 2020, Mohohlwane, Taylor and Shepherd (2020) estimated that up to that point of that year, Grade 6 learners would have lost 67 school days (33% of the total days), and Grade 3 and Grade 9 learners 82 days (41%). This does not even account for lack of readiness for reopening that delayed opening of some schools, children or teachers being positively tested for the virus leading to many schools closing again for a period, and also that, to manage social distancing, many schools have adopted a system of alternating (rotational) attendance, where children in each grade would alternate attending school on a daily or weekly basis. Thus these numbers completely under-estimate the number of school days lost.

3   "Temporary Revised Education Plans".

4   Regression analysis shows that such schools performed about 1½ percentage points weaker in Grade 9 language than one would expect based on the other characteristics of the school, such as quintile, LOLT and education district. This could reflect greater than average days missed, or a weaker than average administrative culture.

Table 1 Number of school days loss in 2020 and 2021 due to lockdowns or rotational timetabling
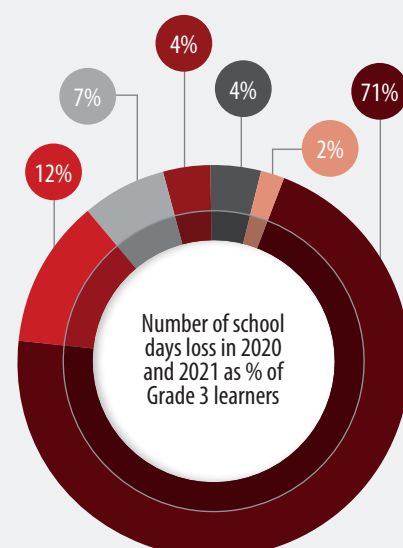
	% of Grade 3 learners (for schools providing data)
Fewer than 140 days	2%
140 – 150 days	71%
150 – 160 days	12%
160 – 200 days	7%
200 – 250 days	4%
250+ days	4%

Source: *Own analysis of TREPS data.*

Number of school days loss in 2020 and 2021 as % of Grade 3 learners

- Fewer than 140 days
- 140 – 150 days
- 150 – 160 days
- 160 – 200 days
- 200 – 250 days
- 250+ days

School closures, rotational timetables and learning loss

At the end of 2020, the first year of the pandemic, the Minister of Basic Education highlighted the loss of school days and the consequences for learning and for planning for 2021:

" We are all aware that many days of schooling has been lost this year, especially in the early grades. This could lead to long term learning losses, and increase the inequality in learning outcomes even further. This situation makes it more urgent than before to provide sufficient support to teachers in teaching reading. All teachers know that catching-up lost learning, or learning recovery, is not an easy quick activity but requires a lot of dedicated time. This will include a concerted effort by both parents and teachers and will need to extend into the 2021 academic year. To allow for this, we have revised the Annual Teaching Plans to extend to next year.' " (Motshekga, 2020)

Information about the extent of learning loss in South Africa is limited, and largely confined to experiences in single schools or small samples of schools (see Ardington, Wills & Kotze, 2021; Kotze, Wills, Ardington, Taylor, Mohohlwane & Nuga Deliwe 2022). Ardington et al. (2021) find learning losses in reading in Grades 3 and 4 to be between 1.0 and 1.4 times the proportion of a year lost. Not only is learning loss often greater than simply the part of the year lost for teaching and learning, the relationship between days lost and learning may also be non-linear.[5] In addition, children's socio-economic backgrounds are likely to be strongly related to factors such as internet access, having educated parents who could offer assistance with home learning, and the likelihood of support for home learning by the schools they attend. Indeed, the first major study of learning loss during the Covid-19 pandemic found learning losses amongst Flemish children in a grouping of Belgian Catholic schools to be large, but also differing between as well as within schools along socio-economic lines (Maldonado & De Witte, 2020). In that study, the overall impact of the 2020 disruption of the Belgian school year was to reduce Mathematics performance in Grade 6 by between 19% and 25% of a standard deviation. Soudien, Reddy and Harvey (2021) apply these reductions to South African TIMSS 2019 data and conclude that the 41% of Grade 9 learners that had acquired basic Mathematical skills in TIMSS 2019 could have regressed to perhaps around 34% at the end of 2020, similar to the 2015 level (see also Reddy 2021).

Soudien et al (2022: 315) refer to other studies that have considered the effect of long summer breaks, absence from school and gaps in instructional time, through memory decay and limited learning opportunities, and then summarise the implications as that there will be learning losses, that these will be higher for Mathematics than for reading, and that they will not be uniform but will affect already disadvantaged learners most.

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5   Gustafsson & Nuga Deliwe (2020) assume linearity for simplicity's sake, but acknowledge that this is not necessarily true.

1.2 THE WESTERN CAPE EDUCATION SYSTEM

Public schools in the Western Cape are divided into quintiles, based largely on the poverty or affluence of the community they serve. Even at national level, these quintiles are not equal in size, as one would tend to think. The distribution of learners in Grade 3 language as in Table 2, gives a good approximation of the relative size in the Western Cape. Although these numbers are somewhat different in different grades, and also do not include the few small schools not participating in the Systemic Tests, they give an accurate enough picture of the general pattern. Notable is that the largest numbers, approximately 30% each, are in the two least poor quintiles, Quintiles 4 and 5, while the poorest quintile, Quintile 1, contains only 9% of learners, mainly concentrated in relatively small farm schools, with high poverty levels. Quintiles 2 and 3 are about half as large as Quintiles 4 and 5.

Distribution of learners by quintile, Gr3 Language 2021

- Quintile 1
- Quintile 2
- Quintile 3
- Quintile 4
- Quintile 5

Table 2   Distribution of learners by quintile, Gr3 Language 2021

Quintile	% of students
Quintile 1	9%
Quintile 2	14%
Quintile 3	15%
Quintile 4	31%
Quintile 5	31%

Source: *Calculated from 2021 Grade 3 Language data*

The language of learning and teaching, commonly known as the LOLT, is shown in Table 3 for Grade 3 (some schools offer more than one language as LOLT, but for current purposes that distinction is not shown). In Grade 3, 23% of learners have Xhosa as the LOLT. In Grade 4, they switch to English as LOLT. However, typically learners in such schools continue to have Xhosa as home language and English as first additional language (EFAL). Because the language switch has obvious implications for performance in Grade 6 and 9, this report often draws a distinction between English LOLT schools where most learners have English as LOLT throughout and those where most learners in both primary and secondary school had to make the language switch after Grade 3, which would influence the ease with which they learn English and also may affect their understanding of questions in Mathematics. More details about the quintile, LOLT and home language distribution of learners are provided in Tables 3, 4 and 5.
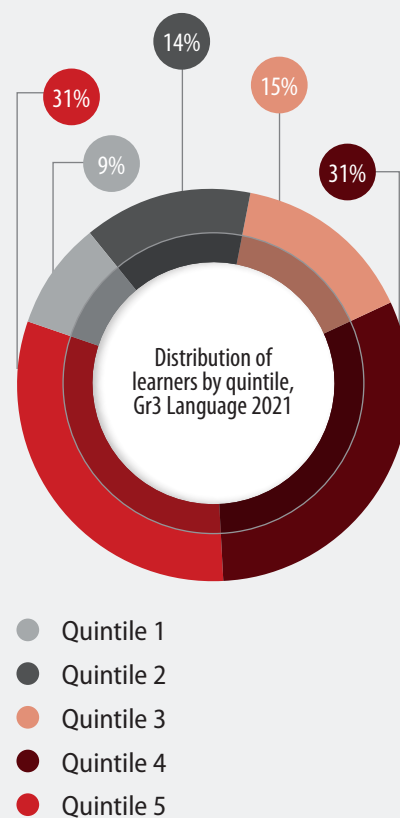
Table 3 Distribution of learners by LOLT, Gr3 Language 2021

LOLT	
Afrikaans	37%
English	41%
Xhosa	23%

Source: Calculated from 2021 Grade 3 Language data

Table 4 Distribution of learners by LOLT and quintile, Gr3 Language, 2021

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Afrikaans	14.0%	11.7%	16.4%	33.4%	23.6%	100 %
English	0.4%	2.4%	3.2%	41.4%	52.5%	100%
Xhosa	17.1%	40.7%	34.6%	7.1%	0.5%	100%
Total	9.4%	14.3%	14.9%	30.9%	30.5%	100%

Source: Calculated from 2021 Grade 3 Language data

Table 5 Distribution of learners by LOLT and home language, Gr3 Language, 2021

LOLT	Afrikaans	English	Xhosa	Other	Total
Afrikaans	97.80%	0.56%	1.50%	0.20%	100%
English	1.70%	85.00%	11.10%	2.20%	100%
Xhosa	0.50%	0.20%	98.50%	0.80%	100%
Total	36.60%	34.70%	27.50%	1.10%	100%

Source: Calculated from 2021 Grade 3 Language data

1.3 THE WCED SYSTEMIC TESTS AND THE DATA ANALYSED

The Western Cape Education Department is the only provincial education department to conduct its own systemic tests. These tests are annually undertaken in Mathematics and Language in Grade 3, 6 and 9 in almost all Western Cape public schools in both language and Mathematics[6], but did not take place in 2020, as the pandemic made large scale testing difficult. Since 2011, the tests have been undertaken with the help of the Centre for Evaluation and Assessment (CEA) at the University of Pretoria. The tests are intended to identify specific areas where further work is required and to measure whether progress is being made in learning (Schäfer, 2020). These tests are therefore well suited to determining how much learning has been lost due to the pandemic, the lockdown, school closures and rotational timetables and what the implications may be for policy. Resep has done a deeper analysis than usual of the 2021 and 2019 Systemic Tests, for the Western Cape Education Department, to determine the extent and distribution of learning loss in 2020 and 2021. Resep obtained funding for this purpose from the Millennium Trust. Understanding such losses has major implications for policy, for instance regarding curriculum adjustments and the extent to which learners have mastered basic competencies that may be necessary in 2022 and beyond. This analysis should also be of value for other provinces, given the lack of such information nationally. Even other African countries that do not have tests that would allow them to assess the extent of learning loss in their context may be able to learn from experiences in South Africa rather than from developed countries with better-functioning education systems and greater possibilities for implementing online learning.

WCED STSTEMIC TESTS

Annual Language and Mathematics tests written in Grade 3, 6 and 9 in almost all Western Cape public schools

Intended to identify specific areas where further work is required

This analysis should also be of value for other provinces, given the lack of such information nationally

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6 Due to logistical difficulties, the tests are not conducted in some very small schools. Some independent schools also participate, but their results are not included in the aggregate analysis.

The tests in both 2019 and 2021 were written in two booklets for both Mathematics and Language in all three grades. Within each class, learners were randomly allocated either Book A or Book B. This allowed the test to be broader in coverage, and because these tests were not analysed at the level of the individual learner, differences in test difficulty between Book A and Book B would not affect conclusions drawn at the level of the school or even at higher levels of aggregation, due to the random sampling.[7] Tests included a fair number of multiple choice questions.[8] The administration and the marking of the test was done under the auspices of the Schools Development Unit at UCT. These teams have been involved in the Systemic Tests for a number of years, so consistency across test years is not a great concern.

To ensure that learning losses could be measured as accurately as possible, the analysis focuses only on those questions that were common across the two test years, 2019 and 2021. Because of the need to estimate learning losses, it was decided beforehand to include many questions from 2019 in the 2021 tests. The small number of schools (mainly independent or private schools) that did not participate in both tests were excluded from the analysis. Moreover, in all the aggregate analysis, all independent schools were excluded.

Apart from the aggregate performance of learners, discussed in Chapter 2, this performance across learning areas is analysed for Language (Chapter 3) and Mathematics (Chapter 4) in all three grades. This analysis is aimed at determining learners' knowledge and also gaps in their knowledge, in comparison with previous tests. An important part of this analysis is to investigate what competencies learners have mastered and in which learning areas they have weaknesses. In those two chapters, diagnostic frameworks were used to assess performance and learning loss by learning area. For Language, separate analyses were necessary for three languages in Grade 3 (English, Afrikaans, Xhosa), and for two languages (English and Afrikaans) in Grade 6 and 9. But for English, an important distinction within English LOLT schools was also made in Chapter 2 between children who have been educated in English from Grade 1 and those whose LOLT changed from Xhosa in Grade 3 to English in subsequent grades.

“ An important part of this analysis is to investigate what competencies children have mastered and in which learning areas they have weaknesses. **”**

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7   Literally, learners were asked to stand in a queue and then alternate booklets were handed out to them as they entered the test venue (usually the class).

8   Of the items included in the analysis, for Language the proportion of the paper that was multiple choice was 28% in Gr3, 39% in Gr6 and 33% in Gr9, whilst in Mathematics only 4% of the Gr3 paper, 42% of the Gr6 and 29% of the Gr9 paper were multiple choice questions.

As the number of questions within each learning area is small, one cannot draw too strong conclusions, but it offers some insight into issues of curriculum coverage, memory loss and cognitive levels in the very difficult circumstances that have arisen through the pandemic and the consequent policy and other responses by education authorities and schools.

1.4 RESEARCH QUESTIONS

The central research question is already clear: How did learners in each of the three grades perform in each of the tests compared to performance on the same tests in previous years? Most of the further analysis will break this central question down in different ways, such as the following:

◗ **Variation between schools:** Is there greater *variation in performance between schools* than in other years? If so, to what extent does this reflect socio-economic or language differences in performance?

◗ **Variation across the curriculum**: How did performance for different *parts of the curriculum* decline relative to past years, what does that indicate in terms of the mastery of basic competencies, and how did this affect different quintile or language groupings of schools?[9] These effects may also differ by grade and subject.

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9   Later parts of the curriculum were trimmed, so one would expect results to reflect this; but international evidence also shows that long absence leads to memory loss of some work covered and competencies attained earlier in the year, so performance may have declined even for some parts of the curriculum covered before school closures.

2 Aggregate performance and losses by grade and subject

2.1 MEASUREMENT – YEARS WORTH OF LEARNING

If the learning over the course of a year was measured before the pandemic and is then again measured during the pandemic , it is relatively easy to measure what part of a year's learning was lost, and as a typical year contains almost 200 schooldays, it can also be measured in days of learning lost. Thus, for instance, Ardington et al (2021) found that learning losses in Gr2 and 4 in reading in no-fee schools were 56% to 81% of a year's learning, or approximately ± 110–160 days, while Kotze et al. (2021 found that the pandemic gave rise to more than a year's worth of lost learning in Setswana reading (both these studies were in no-fee schools).

Learning gains or losses are often expressed as percentage of a standard deviation, but this is difficult to interpret and not helpful for policy makers. If there was agreement on a common metric, this could perhaps be converted and expressed relative to a year of learning. To do so, requires knowing how much children learn in a year, expressed in standard deviations. In the international literature, typical estimates for primary schools range between 0.30 – 0.60 SD. Figure 1 and Annexure Table 45 show some estimates from a variety of sources of how much learning occurs in a year, expressed as standard deviations. The way the data is arranged in this figure makes it clear that many estimates are around 30 to 40% of a standard deviation (0.30 SD to 0.40 SD).

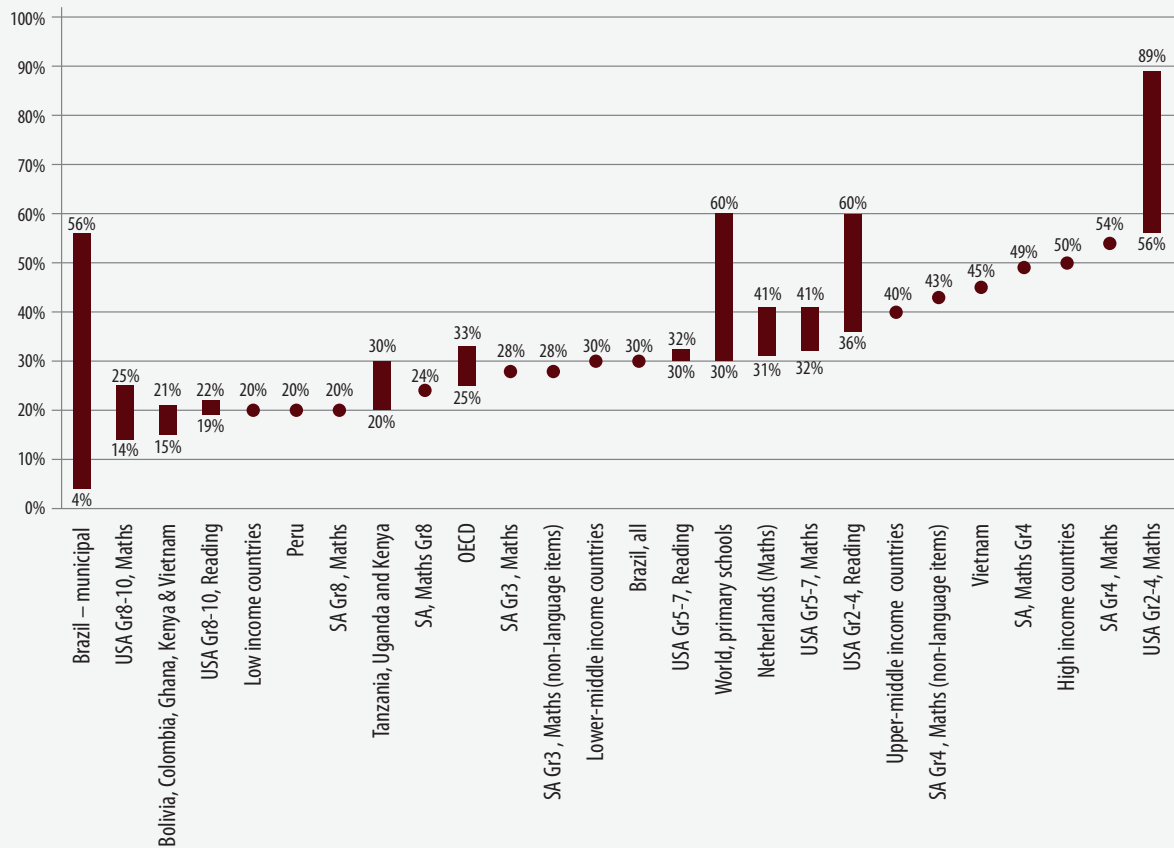Figure 1 Estimates of a year's worth of learning expressed in standard deviations

See Table 45: Estimates of a year's worth of learning expressed in standard deviations in the Annexure for further statistics.

Intrisically, though, there is no clear reason why learning would vary with the standard deviation. In TIMSS Grade 5, for instance, South Africa's high standard deviation of 100 far exceeds that of Finland, at 71, yet clearly Finnish children learn more per year than South Africans. Thus the standard deviation yardstick is not a very accurate one for converting learning losses into years of learning. To be conservative in terms of measurinmg losses in years of learning, this report will provide estimates based on an optimistic 0.40 SD of learning assumed to occur in primary education, and 0.30 SD in secondary education. If these measures were set lower, it would imply that learning losses indeed are larger in terms of the days lost.

Some international estimates of learning losses expressed relative to SD are 0.19 to 0.25 SD found in Belgium in Maths in 2020 (Maldonado and De Witte, 2020), i.e. after only one year of the pandemic. A lower estimate of learning loss was found for Maths in the Netherlands, at 0.08 SD (which was assumed to be one-fifth of a school year), a situation described as *"a best-case scenario due to the country's short school closures, high degree of technological preparedness, and equitable school funding."* (Engzell et al 2021: 4).

2.2   BROAD FINDINGS

Analysing only questions that were asked in both 2019 and 2021 and only in those schools that participated in both years, overall results as presented in Table 6 are found.

The first three rows show average scores in 2019 and 2021 and how much they have declined; this is also graphically presented in Figure 2. Note here the low average marks in 2019 for Gr3 Language (40.7%) and even more so for Gr9 Mathematics (33.3%). In terms of declines, the standouts are Gr3 and Gr6 Mathematics; there was little scope for Gr9 Mathematics to fall further from its low starting level. Learning losses in Maths are particularly large. This is consistent with the international literature (see earlier reference to Soudien et al. 2022) and makes intuitive sense, given that Mathematics rests on a far more specialised knowledge base that is unlikely to be informally acquired when schools close.

Performance in 2019 in Gr3 Maths and Gr9 Language was quite high. In the case of Gr 3 Mathematics, that reflects quite easy questions. For Gr 9 Language, however, this is partly because 'Writing' could not be analysed, as the 2019 and 2021 tests differed. Usually, writing is the part of the Gr 9 Language test in which performance is weakest. For the remaining items, scores were high and did not show strong declines. In fact, amongst the stronger performers there was even a net improvement in Grade 9 Language compared to previous years.

Table 6 Summary table: Performance declines in Systemic Tests, 2019–2021

		Gr3 Lan	Gr6 Lan	Gr9 Lan	Gr3 Mat	Gr6 Mat	Gr9 Mat
Average Score	2019	42.4%	50.5%	59.1%	59.5%	55.7%	37.7%
	2021	38.7%	45.0%	56.2%	50.7%	47.3%	31.5%
Decline (ppt)		3.6	5.4	2.9	8.8	8.4	6.2
By LOLT: Decline as % of a standard deviation	All	15%	27%	14%	36%	39%	32%
	Afrikaans	17%	26%	15%	39%	37%	34%
	English	19%	28%	14%	36%	38%	26%
	Xhosa-to-English	12%	32%	14%	36%	49%	36%
Not achieving pass (50%)	2019	56%	44%	31%	32%	36%	74%
	2021	61%	53%	36%	47%	52%	80%
Not achieving low benchmark (30%)	2019	32%	15%	7%	13%	10%	39%
	2021	41%	24%	10%	25%	20%	55%
Quintile 1 not achieving pass mark	2019	75%	65%	31%	48%	56%	92%

Figure 2 Performance decline by grade and subject, 2019–2021
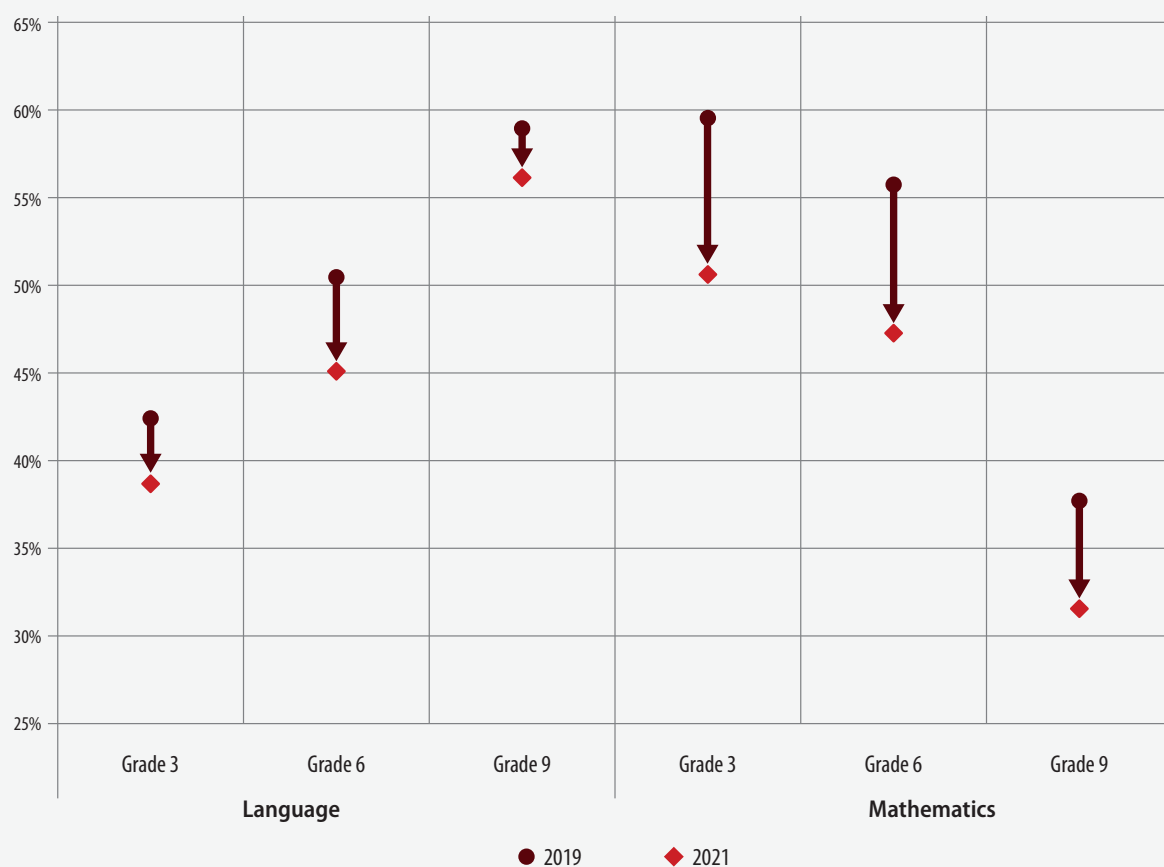
The second part of Table 6 shows declines measured in standard deviations. Using a conservative yardstick, it is useful to think of the schooldays equivalent loss as 5 times the percentage of a standard deviation lost in primary schools. This is based on assuming that 40% of a standard deviation is the normal extent of learning in a year in primary schools, so that five times that gives 200 schooldays, a full school year. By far the biggest declines were in Gr3 Mathematics and Gr6 Mathematics around 185 and 215 school days equivalent. Thus Gr6 Maths learners had fallen more than a year behind the 2019 Gr6 cohort.

> ❝By far the biggest declines were in Gr3 Mathematics and Gr6 Mathematics, around 185 and 215 school days equivalent.❞

The patterns across LOLT groups are interesting. As earlier explained, a distinction is drawn here within the English LOLT group in Grades 6 and 9 between schools where the LOLT had been English throughout, and those schools where the Grade 3 LOLT was Xhosa.[10] Apart from the extremely large learning losses in Gr3 Mathematics across all LOLT groups, the two other important losses are in Gr6, in both Language and Mathematics, for schools where the LOLT had switched from Xhosa in the Foundation to English in the Intermediate Phase. In contrast, the learning losses for all LOLT groups were low in Gr9 Language, though much higher for schools with Afrikaans LOLT.

In all the tests, a 50% mark is considered achieving the appropriate grade standard; it will be referred to as a pass level, while 30% will serve as a low benchmark level. Those failing to achieve a pass level and also to achieve the low benchmark level in Gr3 Language and Gr9 Mathematics is very high even in 2019. This confirms that these are tests that children in those grades have always struggled with.[11] Gr3 and Gr6 Mathematics show the largest learning losses, but Gr6 Language also shows a strong rise in the proportion failing, especially in LOLT-switching schools. The proportion below the low benchmark show a similar rise across the two years.

The final row shows, for 2019, the proportion of Quintile 1 learners failing to achieve a pass score. Gr9 Mathematics is an extreme example of a test that has limited usefulness for analysing a potential decrease in performance, as 92% of Quintile 1 learners were already not achieving a pass in 2019. Gr3 Language is almost as bad, where 75% of this quintile do not pass, despite some help from multiple choice questions.

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10 For Grade 6, this was based on the Grade 3 LOLT, while for Gr9 the main home language was used to identify schools with English LOLT where English would mainly be the first additional language (EFAL).

11 For the former, taking into consideration the large multiple choice component of the test makes the actual situation even worse than reflected in this proportion

2.3   GRADE 3 LANGUAGE

Grade 3 Language saw a decline in average performance, from 42% to 39%. This amounts to more than 40% of a school year or at least 80 school days over the last two years, even when taking a somewhat optimistic view of how much Western Cape learners normally learn in a year. The 80 days loss is less than the average loss of around 150 days in attendance derived from the administrative TREPS data. This may indicate that some catch-up has occurred or that, at least for reading in the LOLT, some home learning did occur.

However, this finding should be tempered by the fact that the test was already found extremely difficult by a large segment of learners since 2012. In 2019, 56% of learners could not achieve a 50% mark on the test; by 2021 this had gone up to 61%. This may indicate a major problem in reading that predates Covid-19.

Interestingly, if anything, Xhosa LOLT schools experienced a smaller learning loss than average, particularly noticeable in Quintile 3. Afrikaans LOLT schools in Quintile 5 performed even better than in 2019. Girls outperform boys by about 9 percentage points; the gap remained unchanged between the two years.

Figure 3   Performance and learning losses by LOLT and quintile, Grade 3 Language
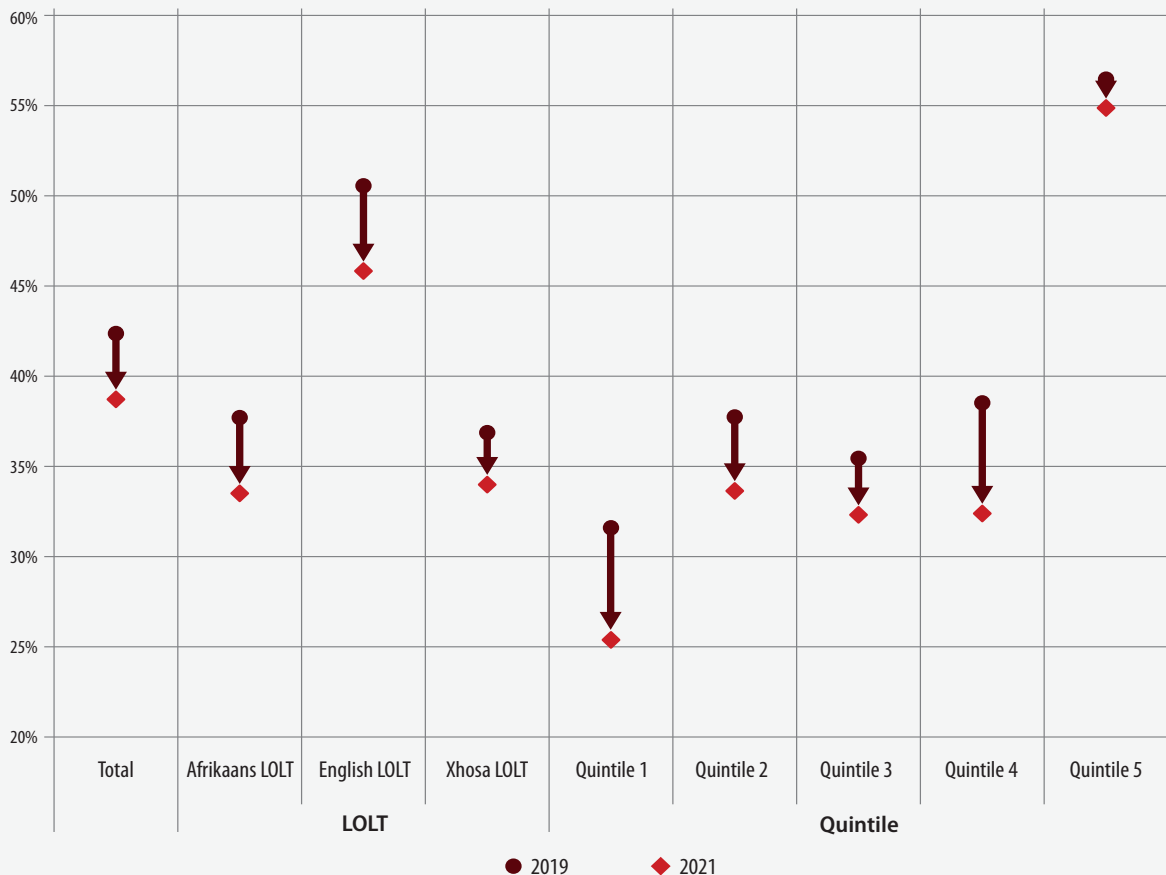
Performance measured against benchmarks, 2019 vs 2021, Gr3 Language

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**56%**	**61%**	**4**	**32%**	**41%**	**9**
Afrikaans LOLT	64%	69%	5	39%	50%	11
English LOLT	43%	50%	7	22%	32%	10
Xhosa LOLT	65%	67%	2	36%	43%	7
Quintile 1	75%	82%	6	47%	60%	13
Quintile 2	63%	68%	5	36%	45%	10
Quintile 3	68%	71%	2	39%	47%	8
Quintile 4	63%	71%	8	37%	50%	13
Quintile 5	32%	36%	4	15%	20%	5

Figure 4 Grade 3 Language by quintile, 2021: Cumulative distribution of performance
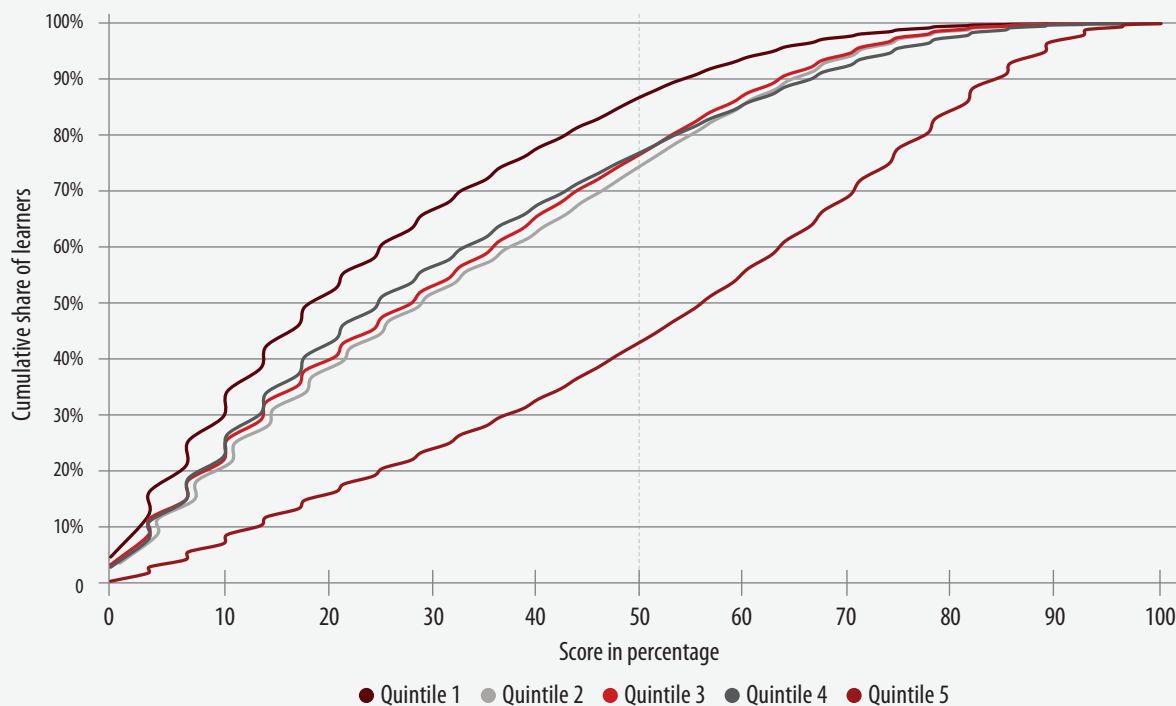
The Gr3 language test is experienced as very difficult. Low performance was already extremely frequent in 2019, and became more so in 2021.

2.4 GRADE 6 LANGUAGE

In Grade 6 Language there was a considerable learning loss, causing average scores to decline from 51% to 45%. This converts to 28% of a standard deviation, which, conservatively estimated, is equivalent to 140 days of learning – 70% of a school year and slightly less than the actual average number of days lost over 2020 and 2021, according to the administrative data. (A less conservative estimate to convert learning loss to school-days equivalent would see the latter at more than 90% of a school year.)

In schools where the intermediate phase LOLT is English but the Foundation Phase LOLT was Xhosa, the learning loss was even higher from an already low 2019 base (see also Table 8). Where the LOLT for Gr6 and Gr9 is indicated as Xhosa, it is actually English, but these are schools where most learners had been taught through the medium Xhosa in the Foundation Phase. Where 44% of all learners did not achieve a pass mark in 2019, this rose sharply to 53% in 2021, while for schools with Foundation Phase Xhosa LOLT, this percentage rose from an already high 59% to 71%. For all four the bottom quintiles, this proportion increased by 10 percentage points or more, while for Quintile 5 schools it rose only from 20% to 26%.

Figure 5 Performance decline in average scores by LOLT and quintile, Gr6 Language
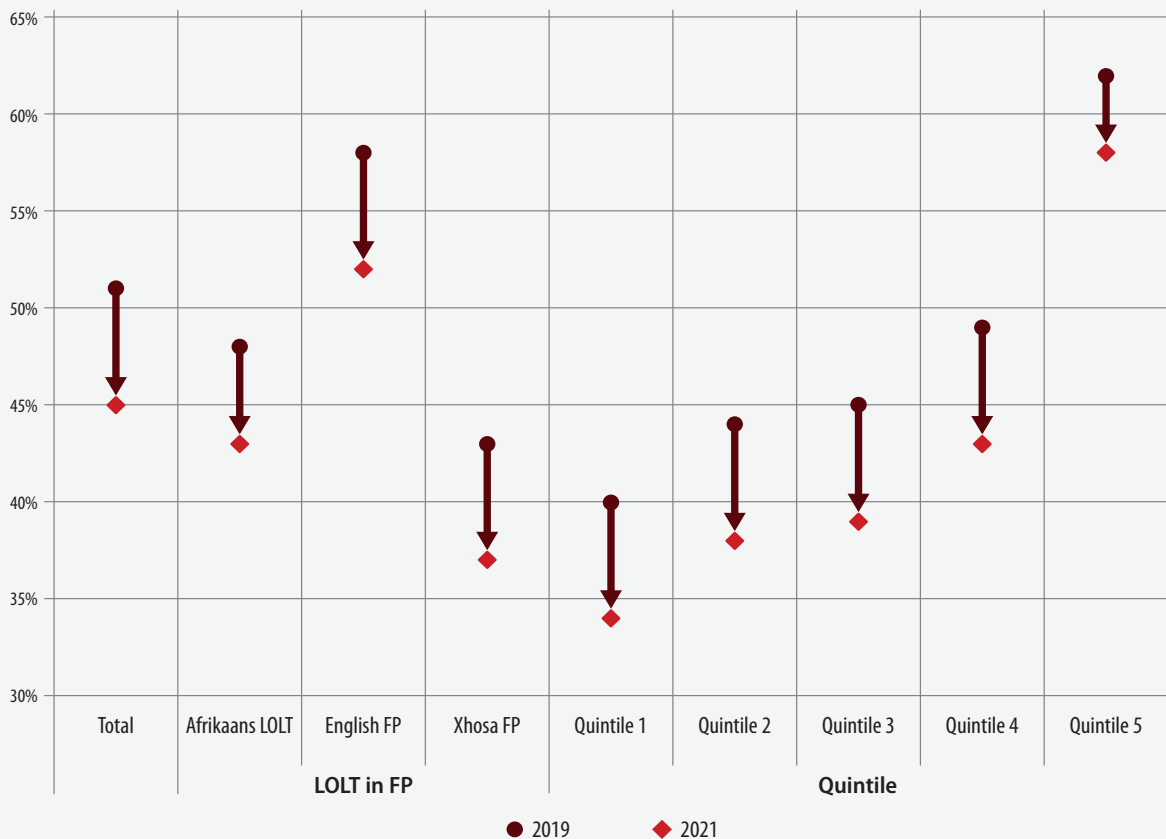
Table 8   Performance measured against benchmarks, 2019 vs 2021, Gr6 Language

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**44%**	**53%**	**10**	**15%**	**24%**	**9**
Afrikaans LOLT	48%	58%	10	18%	28%	10
English FP	29%	38%	9	8%	14%	5
Xhosa FP	59%	71%	12	21%	35%	14
Quintile 1	65%	75%	10	27%	42%	15
Quintile 2	57%	68%	11	21%	32%	12
Quintile 3	55%	66%	11	19%	31%	12
Quintile 4	46%	58%	12	16%	26%	10
Quintile 5	20%	26%	6	5%	8%	3

Girls outperformed boys by about 8 percentage points on average, a gap which widened slightly. Over-age learners (probably repeaters in this or previous grades) performed exceedingly badly (around 13 percentage points less than the average), raising the question whether they have really caught up with their younger peers. On the other hand, repeaters in Grade 6 actually experienced slightly smaller learning losses, which may indicate that the two years in that grade gave them a slight advantage compared to their peers in these abnormal circumstances.

2.5   GRADE 9 LANGUAGE

Performance levels in Grade 9 Language were generally much better than in other subject-grade combinations. In 2019 those failing to achieve a pass mark was only 31%, the lowest of all six the tests summarised in Table 9. This rose to 36% in 2021, still by far the best results in terms of the pass benchmark. The decline of 12% of a standard deviation is quite low compared to most of the other tests, even if one considers that it is normal for Grade 9 learners to learn less in a year when expressed in standard deviations – the learning loss conservatively is estimated as 80 days, rising to half a year (100 days) or even more with a less conservative assumption.

It is notable that learners in Afrikaans LOLT school experienced the largest losses in Gr9 Language, though yet again this does not extend to Quintile 5 Afrikaans schools. The learning losses in Quintile 1 and Quintile 4 were especially large in this language group.

Figure 6 Performance decline in average scores by LOLT and quintile, Gr9 Language
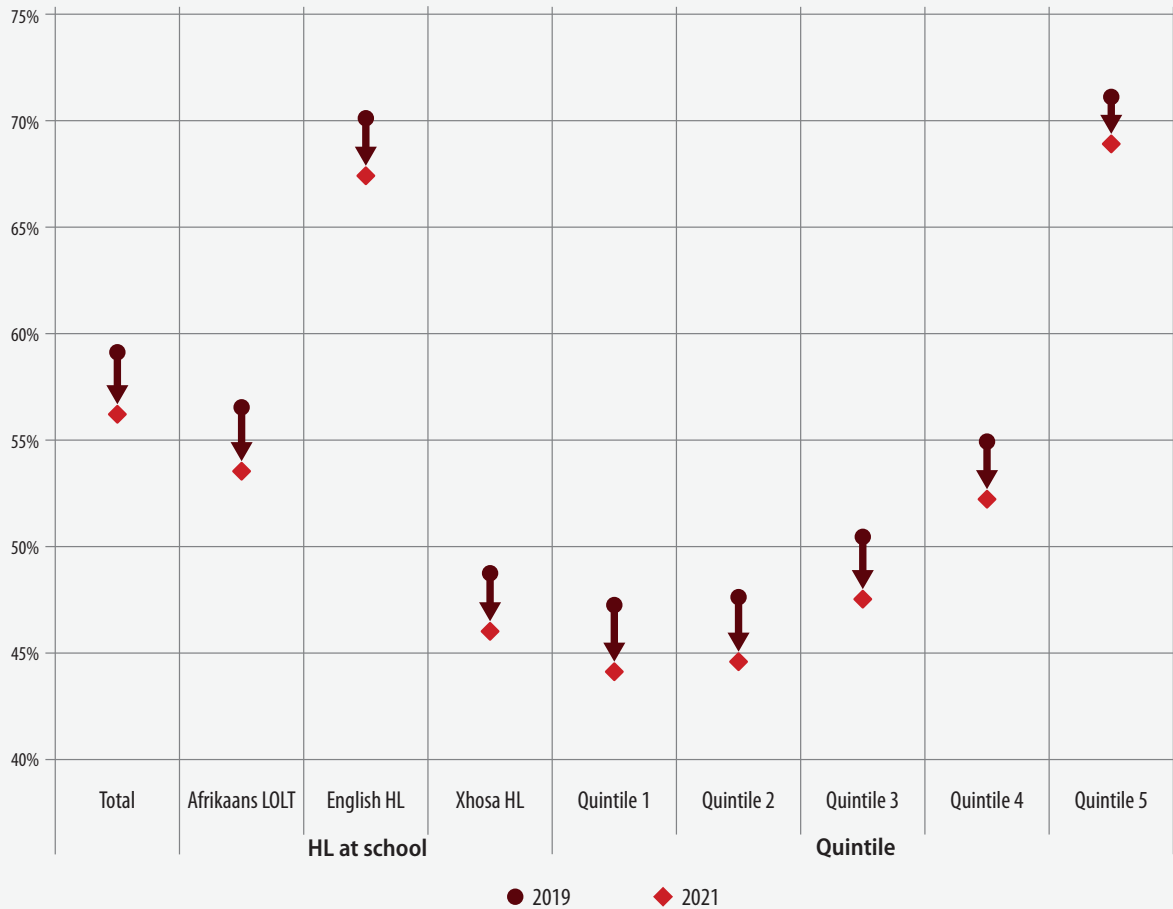
Table 9 Performance measured against benchmarks, 2019 vs 2021, Gr9 Language

	Not Achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**31%**	**36%**	**6**	**7%**	**10%**	**3**
Afrikaans LOLT	34%	41%	7	8%	11%	3
English HL	12%	15%	4	2%	3%	1
Xhosa HL	49%	56%	7	13%	18%	5
Quintile 1	52%	59%	7	15%	21%	6
Quintile 2	51%	59%	8	13%	19%	6
Quintile 3	45%	51%	6	11%	14%	3
Quintile 4	35%	41%	6	8%	10%	2
Quintile 5	11%	14%	3	2%	3%	1

Performance in Language in Grade 9
Comparing 2019 & 2021

2.6 GRADE 3 MATHEMATICS

In Grade 3 Mathematics, the situation is quite extreme. Average marks dropped from 59% to 50%. This loss, conservatively estimated, converts to around 190 school days, almost a full school year and considerably greater than the actual 155 days lost across 2020 and 2021 due to school closures or rotational timetabling. While 32% of learners could not achieve a pass mark in 2019, this rose to 47% in 2021, while those failing to reach the low benchmark of 30% doubled from 13% to 25%.

Surprisingly, considering historical and socio-economic legacies, there do not appear to be massive differences across LOLT groups, though Afrikaans LOLT schools, already the weakest in Mathematics in 2019, lost the most – equivalent to a full school year – and Xhosa LOLT schools the least. An exceptionally high 57% of children in Afrikaans LOLT school failed to achieve a pass mark: it was already the highest of all LOLT groups at 41% in 2019. (This appears to be very different across quintiles within this group of schools.)

There are strong differences in performances and learning losses across quintiles: The learning loss in Quintile 5 schools is much lower, but still a full 125 school days equivalent. While children in Afrikaans LOLT schools experienced serious learning losses, this was again far less in Afrikaans LOLT schools in Quintile 5. Surprisingly, as also found for Grade 3 language, Quintile 2, 3 and 4 schools had very similar performance patterns. (see Figure 8).

12 Such a kernel density curve can be considered as just a smoothed histogram or column chart, with the area below the graph at any particular x-axis value indicating the frequency of performance at this level.

Girls outperformed boys by about 4 percentage points in 2019, a gap that slightly narrowed to 3 percentage points in 2021, as girls experienced a slightly larger learning loss.

Figure 8 Performance decline in average scores by LOLT and quintile, Grade 3 Mathematics

Table 10 Performance measured against benchmarks, 2019 vs 2021, Gr3 Mathematics

	Not achieving pass level			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**32%**	**47%**	**15**	**13%**	**25%**	**12**
Afrikaans LOLT	41%	57%	16	19%	35%	16
English LOLT	23%	37%	14	9%	18%	10
Xhosa LOLT	31%	47%	16	11%	23%	12
Quintile 1	48%	66%	19	22%	41%	19
Quintile 2	35%	51%	17	13%	27%	13
Quintile 3	38%	54%	16	16%	30%	14
Quintile 4	39%	57%	19	17%	32%	16
Quintile 5	16%	25%	9	6%	11%	5

Figure 9 Grade 3 Mathematics by quintile, 2021: Cumulative distribution of performance

In Grade 3 Mathematics, performance patterns were very similar between Quintile 2, 3 and 4 schools, while Quintile 1 schools performed much weaker and Quintile 5 schools much better. But even in Quintile 5, one quarter of learners did not reach the pass threshold.

● Quintile 1   ● Quintile 2   ● Quintile 3   ● Quintile 4   ● Quintile 5

2.7   GRADE 6 MATHEMATICS

Conservatively estimated, learners who wrote the Mathematics Systemic Test in Grade 6 in 2021 performed more than a year behind those who wrote in 2019. This decline equivalent to 205 schooldays of learning (calculated based on the 41% of a standard deviation, as against the assumed 40% of a SD learning that occurs in a year) is far greater than the average of around 155 school days lost based on administrative records.

Quintile 5 schools performed much better than those in lower quintiles, while Quintile 1 schools perform exceedingly weakly. There is little difference between Quintiles 2, 3 and 4 in aggregate performance. The average score declined from 56% to 47%, and the proportion not reaching the pass mark increased greatly from 36% to 52%. Though the decline is a little smaller in Quintile 5 schools, it nevertheless converts to almost three-quarters of the amount learnt in a typical school year.

Schools where the LOLT changed from Xhosa to English between Foundation and Intermediate Phase experienced the largest learning losses, amounting to 1.2 years of learning. Those in such schools failing to achieve the pass mark increased from 40% to 61% in 2021, and those below 30% from 11% to 25%.

Figure 10 Performance decline in average scores by LOLT and quintile, Gr6 Mathematics
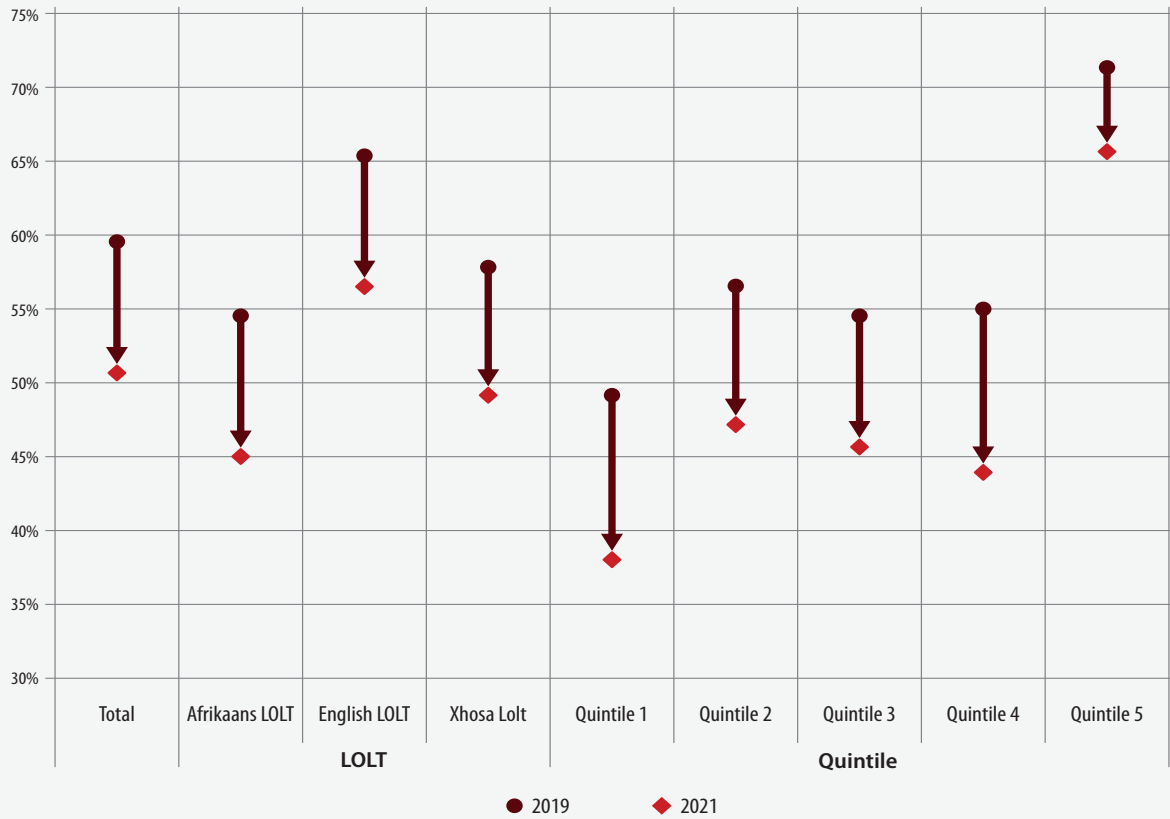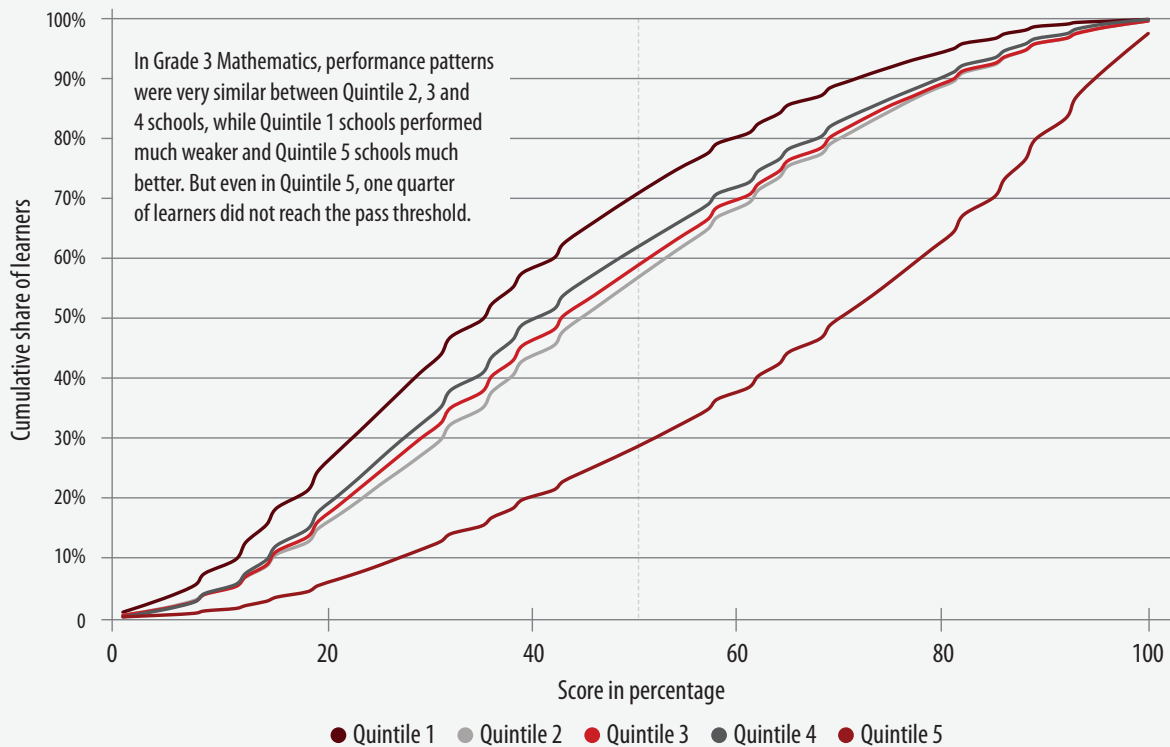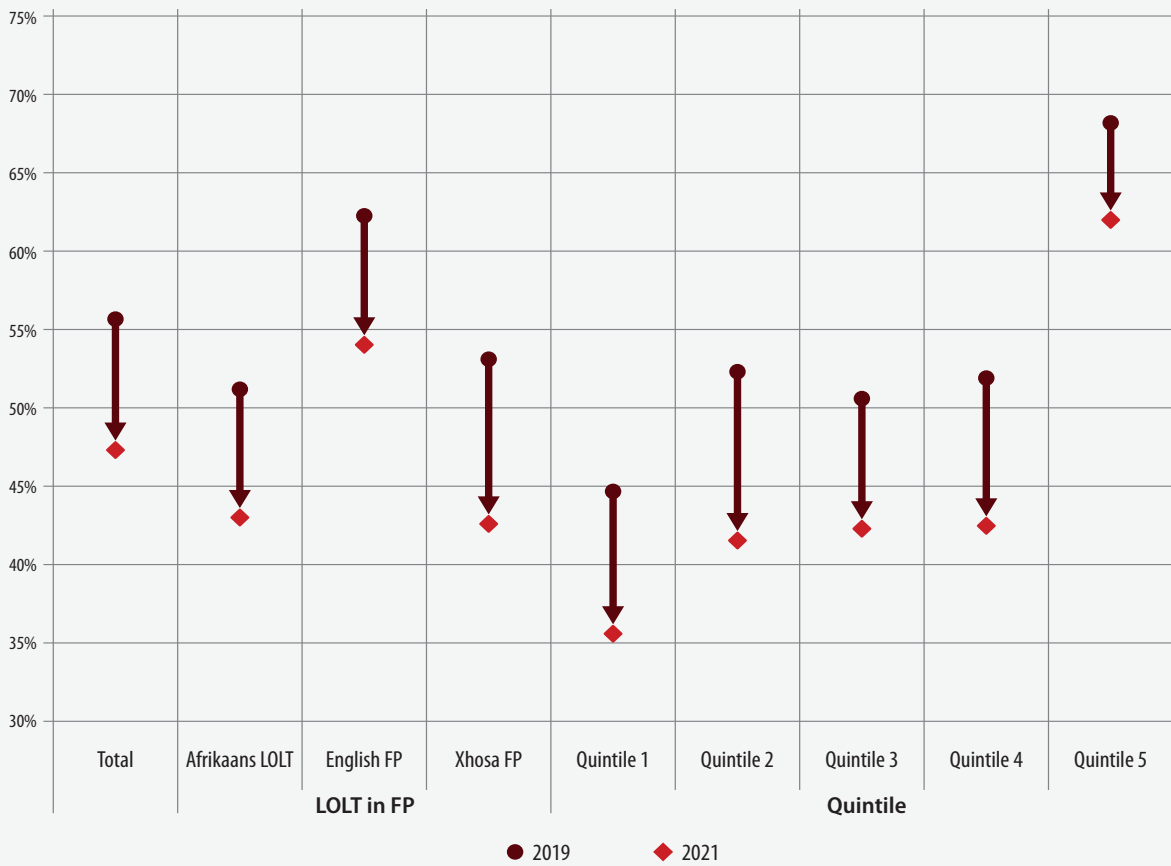
Table 11 Performance measured against benchmarks, 2019 vs 2021, Gr6 Mathematics

	Not achieving pass level			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**36%**	**52%**	**17**	**10%**	**20%**	**11**
Afrikaans LOLT	45%	62%	17	14%	27%	13
English FP	23%	39%	15	5%	12%	7
Xhosa FP	40%	61%	21	11%	25%	14
Quintile 1	56%	75%	18	18%	36%	17
Quintile 2	41%	63%	22	12%	26%	14
Quintile 3	45%	62%	17	13%	25%	12
Quintile 4	41%	60%	20	11%	23%	13
Quintile 5	16%	26%	10	3%	7%	4

Figure 11 Grade 6 Mathematics by quintile, 2021: Cumulative distribution of performance

Quintile 5 schools performed much better than those in lower quintile, while Quintile 1 schools perform exceedingly weakly. There is little difference between Quintiles 2, 3 and 4 in performance.

● Quintile 1   ● Quintile 2   ● Quintile 3   ● Quintile 4   ● Quintile 5

2.8   GRADE 9 MATHEMATICS

Grade 9 Mathematics is a test which showed not only the lowest level of initial performance (an average mark just below 38% in 2019), but also a considerable further decline in marks. Considering that the expectation is that learning in Grade 9 will be about 30% of a standard deviation, the 32% of a standard deviation decline that occurred here is, even against this conservative yardstick, well over a year of learning. The biggest decline was in the Xhosa-to-English LOLT schools, i.e. schools that typically offer English as first additional language rather than as home language. Such schools experience a decline that is at least 1.2 years, conservatively estimated, rising to 1.5 years, if one assumes lower annual learning of 24% of a standard deviation.

Because the performance levels in Mathematics Grade 9 were already so poor in 2019, declines in terms of the benchmarks appear not to be so large. With almost three-quarters of all learners falling this test in 2019, there was little scope for that to increase, but it nevertheless did, to 80%. A larger proportion crossed the lower benchmark, with the proportion falling below that benchmark rising from 39% to 55%.

Figure 12 Performance decline in average scores by LOLT and quintile, Gr9 Mathematics

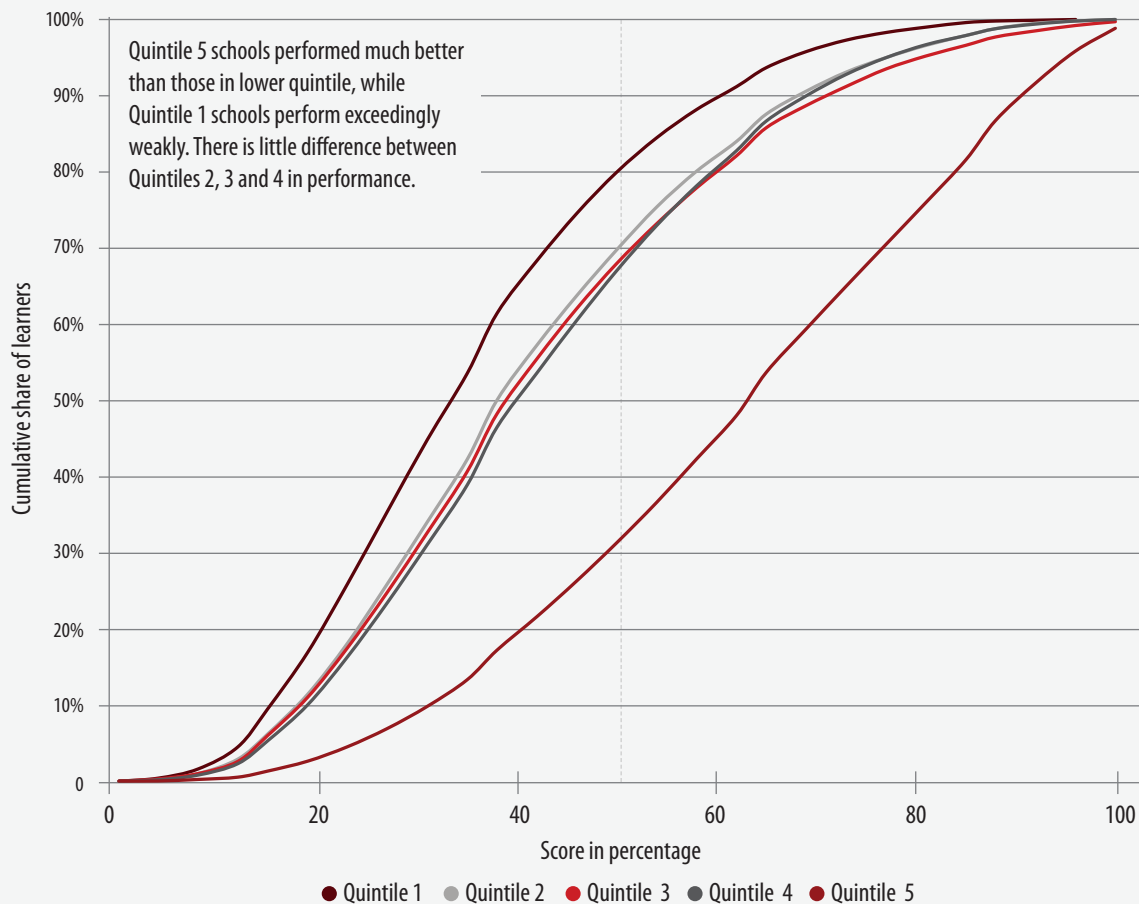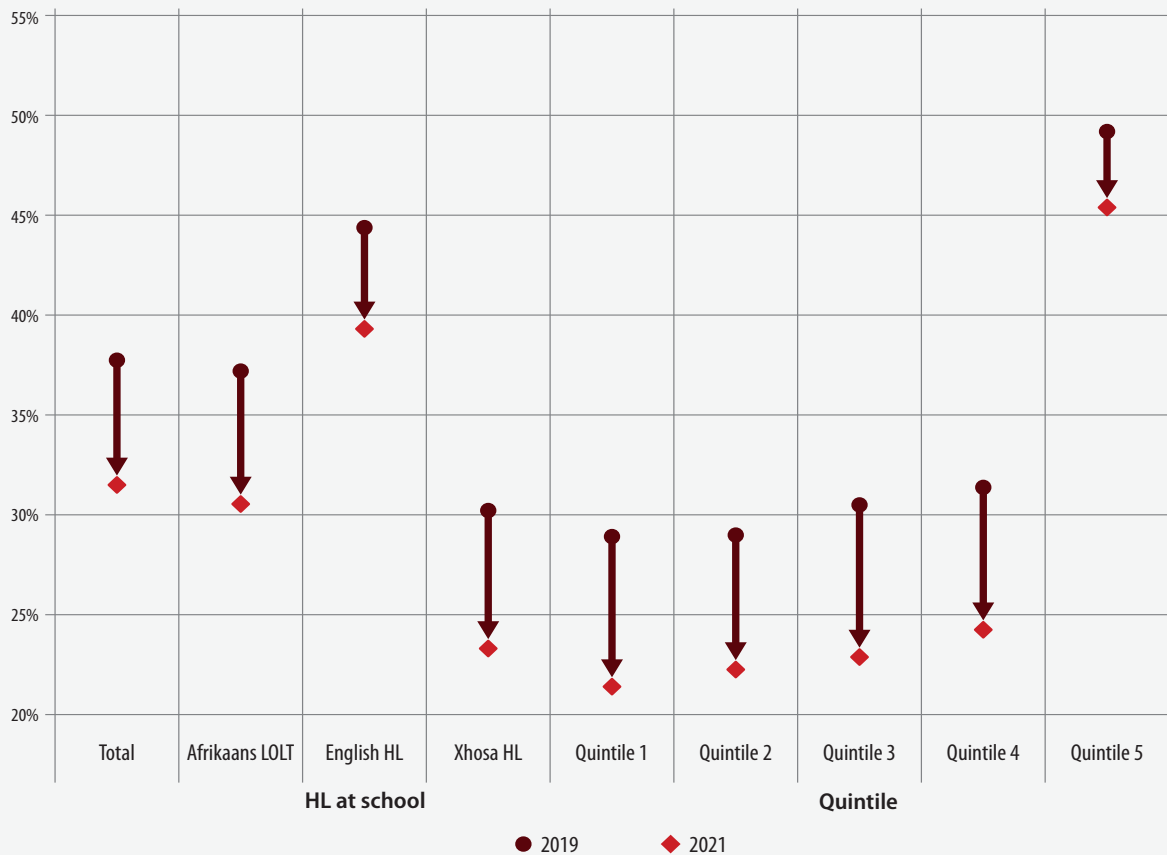**Table 12** Performance measured against benchmarks, 2019 vs 2021, Gr9 Mathematics

	Not achieving pass mark			Not achieving low benchmark		
	2019	**2021**	**Increase (percentage points)**	**2019**	**2021**	**Increase (percentage points)**
Total	**74%**	**80%**	**6**	**39%**	**55%**	**17**
Afrikaans LOLT	75%	81%	5	41%	59%	18
English HL	61%	67%	6	26%	39%	14
Xhosa HL	89%	94%	4	51%	70%	19
Quintile 1	92%	96%	4	55%	74%	20
Quintile 2	92%	95%	3	54%	73%	19
Quintile 3	89%	94%	5	50%	71%	21
Quintile 4	87%	93%	5	48%	67%	19
Quintile 5	51%	56%	5	20%	31%	10

Figure 13 shows that, even in 2019, performance in Mathematics in Grade 9 was extremely weak, judged by the questions analysed, and that this performance further deteriorated in 2021, with a leftward shift of the largest bulge. Even though the performance of the vast majority of learners decreased markedly in 2021, the number of high achieving learners (with test scores above 75%) also increased slightly.

Figure 13 Distribution of performance in Mathematics in Grade 9, 2019 and 2021
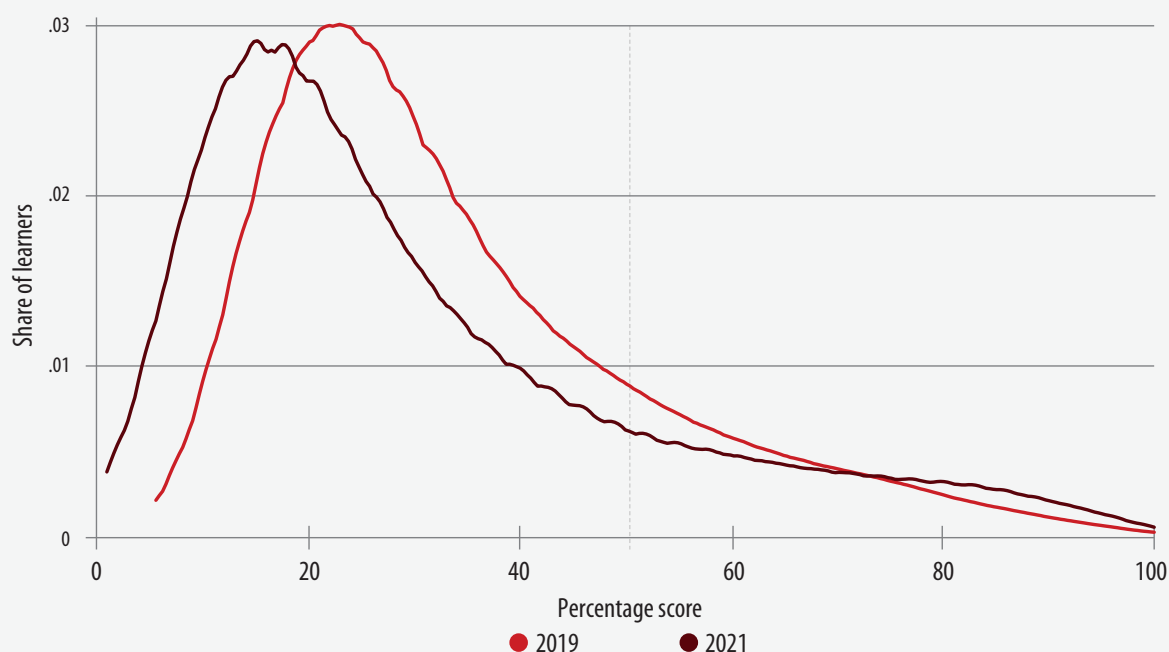
2.9   SUMMARY OF CHAPTER 2

This chapter has shown that the learning losses in Western Cape schools were widespread, and that even the most affluent quintile of schools has been severely affected by it. Yet, as expected, losses are the largest in poorer quintiles, and there are particular challenges for those learners that are in schools where the pandemic coincided with their transition in the LOLT from Xhosa to English

Learning losses have been expressed in terms of declines in average marks, proportions falling below the two benchmarks used (the pass mark of 50%, and a low benchmark set at 30% to pay particular attention the prevalence of very weak performance). In addition, the standard deviations decline has been converted to parts of a year or school day equivalents of learning lost, by assuming that normal learning in a year in primary schools is a relatively high 0.40 SD, or 0.30 SD in secondary schools. Using these declines and expressing learning losses in terms of the likely effect on performance in international assessments is another way of illustrating the magnitude of some of these losses, as was also done by Soudien et al (2021) with hypothetical learning losses.

Table 13 shows that the 0.39 SD decline in the Grade 6 Maths performance, if applied to Grade 5, may increase in the proportion of Western Cape learners not reaching the low international benchmark of 400 points in TIMSS from 37% to 50%. If the same learning loss were to occur in all of South Africa, this proportion would rise from 64% to 76%. Applying the Grade 9 Maths learning loss of 0.32 SD to TIMSS Mathematics performance would increase the proportion below the low international benchmark by a similar percentage in both the Western Cape and South Africa. The smaller (0.27 SD) learning loss in Grade 6 Language, if applied to the PIRLS Grade 5 Literacy test, would increase those failing to reach the low international benchmark from an already worrying 54% to 67%, and South Africa's reading dilemma would show up even more starkly: The 80% that could not read for meaning in the PIRLS tests in 2016 would rise to an astonishing 88%.

… APPLYING THE GRADE 9 MATHS LEARNING LOSS OF 0.32 SD TO TIMSS MATHEMATICS PERFORMANCE WOULD INCREASE THE PROPORTION BELOW THE LOW INTERNATIONAL BENCHMARK BY A SIMILAR PERCENTAGE IN BOTH THE WESTERN CAPE AND SOUTH AFRICA.

Table 13 Percentage below low international benchmarks in TIMSS 2019 and PIRLS 2016 and likely 2021 percentages based on WCED Systemic Test learning losses in Grades 6 and 9

Gr5 Maths	2019	2021
SA	64%	76%
WC	37%	50%
Gr9 Maths	**2019**	**2021**
SA	54%	66%
WC	39%	52%
PIRLS Gr5 Reading	**2016**	**2021**
SA	80%	88%
WC	54%	67%

44.9%

Grade 3

42.8%

Grade 6

53.6%

Grade 9

3 Performance and learning losses in Language

3.1 WHAT WE KNOW ABOUT LANGUAGE PERFORMANCE IN THE WESTERN CAPE

It is difficult to obtain assessment data that is disaggregated to the provincial level to gain a sense of language performance throughout the Western Cape system. For more than a decade, the annual WCED Learner Systemic Tests has fulfilled this function at the Grade 3, 6 and 9 levels. Performance in these tests at all three levels has been relatively stable and low. Between 2015 and 2019 the variation in the pass percentage was less than 2.5% across the three levels and on the whole the system showed very slight improvements. In sum, the WCED Systemic Tests show low average learner performance in Language with the majority of learners not able to pass the test. Three further sources of data are considered below.

At a national level, the most recent PIRLS data (2016) shows that 78% of South African Grade 4 children did not reach the Low International Benchmark. The South African PIRLS data does show an improvement in the percentage of Grade 4 learners reaching the Low International Benchmark over the last decade. This was 13% in 2006 (Howie at al., 2008: 26), increasing to 18% in 2011 and finally to 22% in 2016. Although there is some uncertainty around the 2011 figure (DBE, 2020: 69), the actual 2011 to 2016 trend, at 0.05 standard deviations improvement a year, appears to be among the steepest upward trends of all PIRLS participants. PIRLS and pre-PIRLS 2011 are not sampled to be representative at the provincial level but do point to a widespread problem regarding reading levels.

The Southern African Consortium for Monitoring Educational Quality (SACMEQ) 2007 test of Grade 6 learning in mathematics and language across fifteen SACMEQ ministries of education was explicitly stratified by region, reflecting data that is representative of Grade 6 students not only at the country level but at provincial level. According to the 2007 SACMEQ data, the Western Cape is among the highest performing of the South African provinces, but it performs substantially below Mauritius and also parts of Kenya. Overall, in SACMEQ III 27% of learners nationally were deemed functionally illiterate, i.e. unable to read a short and simple text and extract meaning (Spaull, 2012).

For SACMEQ IV there was an overall decrease in the percentages of learners who achieved at the lower reading levels of the SACMEQ hierarchies, and a remarkable increase in the percentages that achieve higher levels. For this round of testing, the highest percentages of learners who were functioning at Levels 7 and 8 (Analytical Reading and Critical Reading levels) in Reading were in Gauteng (35.2%) and Western Cape (56.0%) (DBE, 2017, 30). The Western Cape also had the highest provincial teacher reading score in SACMEQ III and SACMEQ IV. However, serious concerns were raised about the SACMEQ IV data and the reliability of the results (Spaull, 2016), inter alia because improvements were regarded as very large by international standards. A reanalysis of the data, using only questions (or items) which were common, meaning they were exactly the same across the two years, confirmed that there were improvements, although these were much more modest. Gains were strongest among the most disadvantaged schooling sectors (DBE, 2020), and the fact that TIMSS, PIRLS and SACMEQ all point to similar upward trends brought more certainty regarding the SACMEQ IV data (DBE, 2020).

A third measure for comparing learning outcomes is South Africa's National Senior Certificate (NSC) or matriculation outcomes – the NSC is the critical document that provides students with added advantage in accessing further education. In 2020 the pass rate for the Western Cape province was the third highest in the country (after Gauteng and Free State). When the more stringent measure of a 'university pass' is used, in 2020 Gauteng was the top province, registering a bachelor pass rate of 45.1%. Another two provinces that registered a Bachelor pass rate of above 40% were Free State (40.4%) and Western Cape (43.8%), although a smaller proportion of eligible students sat the exam in the Western Cape province than in a number of other provinces. No analysis and comparison in Language specifically is available at the provincial level.

LANGUAGE PERFORMANCE IN THE WESTERN CAPE

The Western Cape is among the highest performing of the South African provinces

In SACMEQ III 27% of learners in South Africa were deemed functionally illiterate

In 2020 the matriculation pass rate for the Western Cape province was the third highest in the country, after Gauteng and Free State

Wills et al (2019) conclude from a range of studies on the Western Cape's overall performance that although the Western Cape is a high-performing provincial department with respect to observed educational outcomes, this did not translate into its schools consistently being the best performers in the country. Depending on what educational outcome is considered, the grade level and the position at which performance is measured along the student socioeconomic profile, Gauteng or other provinces at times fare better (Wills et al. 2019: 155). While SACMEQ IV indicates greater proficiency, on the whole provincial performance in reading and language at the levels below the NSC can be characterised as low with roughly half the learners showing adequate reading proficiency.

3.2 CURRICULUM CHANGES

To mediate the impact of the pandemic on teaching and learning and support teachers in managing instruction within the reduced time, the DBE implemented a number of curriculum policy changes[13] in 2020 and 2021. These included some cuts to curriculum content and assessment, as well as some subject suspensions and integration in 2020. Specific changes for Language in the grades relevant to the testing in Grades 3, 6 and 9 are outlined below (thus, for 2020, also the preceding grades).

The 2020 curriculum changes for Grades 2 and 3 were minimal, with the only change being that Life Skills was to be integrated into the teaching of Home Language. The idea was that additional time gained from Life Skills be used for additional Group-guided Reading, and that Life Skills topics be used for comprehension and shared reading activities (Fundamentals (2020) (Annexure A)). For the 2021 'Recovery' curriculum, three weeks were allocated at the beginning of the first term to teach phonics that should have been taught in the previous year/grade. Planning for this period was relegated to the school level. Other than this, the curriculum remained unchanged.

At the Grade 5 and Grade 6 levels in 2020, curriculum trimming occurred mainly in relation to listening and speaking activities which were deemed contrary to social distancing requirements (such as debate, interview, dialogue, role-play). There was some reduction in writing tasks, with the scrapping of the Creative Writing project and a reduction in assessment in 2020. In 2021, pre-Covid curriculum requirements were adopted with no changes to reading or writing assessment tasks.

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13   DBE Circular S2 of 2020 issuing Revised annual teaching plans (ATPs); DBE Circular S3 (Distribution of Teacher Guidelines): Guided teachers to conduct context specific subject trimming, in consultation with officials; DBE National Assessment Circular 02 of 2020; DBE Circular E11 of 2020: Guided school-based assessment in phases and subjects; DBE circular S11 of 2020 for curriculum recovery in 2021; and CIRCULAR S13 OF 2020 recalling Circular S2 & S3 and releasing the curriculum recovery ATPs for 2021.

In 2020 in Grade 8, similar changes were made to those in Grade 5, with the removal of a number of 'Listening and Speaking' tasks and the removal of the Creative Writing project. The grade also did not write June examinations and the writing component of the end of year examination was changed to an in-class activity. In 2021, the Grade 9 'Recovery' curriculum made changes similar to those in other grades regarding 'Listening and Speaking' tasks, compromising social distancing. No changes were made to the 'Reading and Viewing' and 'Writing and Presenting' content requirements and the number of assessment activities reverted to the pre-Covid schedule.

> 66 In 2021, the Grade 9 'Recovery' curriculum made changes similar to those in other grades regarding 'Listening and Speaking' tasks, compromising social distancing. No changes were made to the 'Reading and Viewing' and 'Writing and Presenting' content requirements and the number of assessment activities reverted to the pre-Covid schedule. 99

Across all years and grades, no changes were made to the timetable allocations for home languages and first additional languages, apart from Foundation Phase in 2020, where additional time accrued from the integration of Life Skills was allocated to reading.

In summary, the minimal changes to curriculum policy during 2020 and 2021 were unlikely to have directly impacted on the outcomes of the tests, although a reduction in the Writing tasks would have given learners less specific instruction in this curriculum area in 2020. The reduction in the number of assessment tasks in 2020 would also have meant less formal writing practice, including that taking place under test conditions. This lack of practice may have knocked on to 2021, the year in which the Systemic Tests analysed in this document were written.

3.3 DIAGNOSTIC FRAMEWORK FOR LANGUAGE

3.3.1 Framework components

A framework was developed for the analysis of the Language tests comprised of three component areas:

◗ Reading comprehension
◗ Lexical comprehension
◗ Writing

Lexical comprehension (vocabulary) is not a separate category in PIRLS. It was included in the framework as there are a relatively large number of items which serve as a useful measure of levels of vocabulary. This was important given the likely effect of reduced exposure to the LOLT for second language learners across the two years.

Writing test items included those that required learners write a paragraph on a set topic and included topics that were both informational and narrative (fictional). The writing tasks required learners to write between four and five sentences in Grade 3, between five and six sentences in Grade 6 and between six and eight sentences in Grade 9.

Reading comprehension. In order to categorise the questions relating to reading comprehension, the framework drew on the PIRLS framework that identifies four levels of comprehension that reflect the four main types of processes involved in meaning construction and integration. These levels of understanding are based on different types of questions that range in cognitive demand from easy literal questions to more challenging inferential, integrative and evaluative questions. An initial process of coding the test items was undertaken, assigning questions to the relevant categories. The question type and its difficulty level were determined in relation to the task demands of the question and the source of the information needed to answer it. The four reading comprehension types are:

◗ Focus on and Retrieve Explicitly Stated Information
◗ Straightforward inferences
◗ Interpret and Integrate Ideas and Information
◗ Evaluate and Critique Content and Textual Elements.

Detailed descriptors of the comprehension processes used in PIRLS are provided in Box A, drawing on Mullis & Martin (2013).

BOX A Descriptors of the comprehension processes in PIRLS, drawing on Mullis & Martin (2013)

Focus on and Retrieve Explicitly Stated Information

- Recognise, locate and reproduce explicitly stated information in the text.
- May require the reader to focus on and retrieve pieces of information from several locations.
- The process needs little or no inferring or interpreting – the meaning is evident and stated in the text.
- Identifying the setting of a story (e.g., time and place);
- Searching for definitions of words or phrases;
- Finding the topic sentence or main idea (when explicitly stated).

Straightforward inferences

- Inferences based primarily on information that is contained in the text – readers need to connect two or more ideas or pieces of information. The ideas themselves may be explicitly stated, but the connection between them is not, and thus must be inferred.
- Inferring that one event caused another event;
- Concluding what is the main point made by a series of arguments;
- Identifying generalizations made in the text; and
- Describing the relationship between two characters.

Interpret and Integrate Ideas and Information

- More complete understanding of the text by integrating personal knowledge and experience with meaning that resides within the text.
- Draw on general knowledge, background knowledge and experiences.
- Discerning the overall message or theme of a text;
- Considering an alternative to actions of characters;
- Comparing and contrasting text information;
- Inferring a story's mood or tone; and
- Interpreting a real-world application of text information.

Evaluate and Critique Content and Textual Elements

- Shift from grasping meaning to critically considering the text itself. Step back from text to examine and critique.
- Counter or confirm claims made in the text or make comparisons with ideas and information found in other sources.
- Evaluating and critiquing elements of text structure and language, draw on knowledge of language usage, presentational features, and general or genre-specific features of texts.
- How text conveys ideas, feelings, and information.
- Judging the completeness or clarity of information in the text;
- Evaluating the likelihood that the events described could really happen;
- Evaluating how likely an author's argument would be to change what people think and do;
- Judging how well the title of the text reflects the main theme;
- Describing the effect of language features, such as metaphors or tone; and
- Determining an author's perspective on the central topic.

3.3.2 Reading purposes

The PIRLS framework identifies two key purposes that account for most of the reading that students do at school: for literary experience and for retrieving information. For most of the grade levels and booklets the test was comprised of a combination of fictional and informational texts. Book B of Grade 9 contained only information texts. All questions were categorised in relation to the purposes of the text to which they referred.

3.3.3 Items excluded from the framework

The framework is focused on reading and writing and therefore excludes items related to language structure (punctuation; spelling; tense) and figures of speech. These are referred to as 'taught content'. In this way, the framework is a measure of general reading ability in relation to reading processes and purposes.

Additional items were removed where the question had been reformulated between 2019 and 2021. In most cases questions had been changed in an attempt to clarify and improve on the 2019 formation. However, this compromised their comparability. Two errors were also identified in the Grade 9 test.

In Grade 3, items were mostly excluded because they only appeared in the 2019 test and were not repeated in 2021. In Grade 6 most of the items that were excluded had changed in their formulation between 2019 and 2021, generally making them easier in 2021. In Grade 9, the majority of items excluded only appeared in either the 2019 or 2021 test. Fourteen items were excluded because their formulation (and/or mark allocation) had changed between 2019 and 2021. The exclusions are shown in the table below.

Table 14 Number of Language test items excluded from analysis and reasons for exclusion

	Grade 3	Grade 6	Grade 9
Taught content	2	5	3
Change in question 2019–2021	5	14	14
Question only 2019	7	6	10
Question only in 2021	2	–	7
Errors in question	–	–	2
Total	16	25	36

3.4 GRADE 3 LANGUAGE: PERFORMANCE AND LEARNING LOSSES

Table 15 below shows the performance levels and losses for each of the component areas, 'Lexical Comprehension', 'Reading Comprehension' and 'Writing' in Grade 3.

Table 15 Performance and learning losses in Grade 3 for three Language components, 2019 to 2021

		2019	2021	Decline (percentage points)
Component Area	**Lexical comprehension**	41%	37%	4
	Reading comprehension	43%	40%	3
	Writing	35%	31%	4

Performance levels were lowest for 'Writing' in both 2019 and 2021. Losses between the two years were greatest for 'Writing' and for 'Lexical comprehension'. In relation to 'Writing' it is likely that students had much less opportunity for practicing extended writing during the time of school closures. Reliance on pre-prepared material for home learning, including workbooks, would have exacerbated this problem as these materials are generally reliant on single word or sentence long responses. The decline in 'Lexical comprehension' can likely be attributed to a lack of exposure to print material and vocabulary instruction.

Table 16 below shows the changes in performance for the component 'Reading comprehension', based on three of the four comprehension processes derived from the PIRLS framework (there were no questions relevant to 'Evaluate and critique content and textual elements'):

Table 16 Performance levels and losses in Grade 3 for different comprehension question types 2019 to 2021

		2019	2021	Decline (percentage points)
Comprehension question types	**Retrieve Explicitly Stated Information**	42%	39%	3
	Make Straightforward Inferences	45%	42%	3
	Interpret and Integrate Ideas and Info	44%	42%	2

Decline were slightly less for the higher order processes ('Make straightforward inferences' and 'Interpret and integrate ideas and information') than for 'Retrieve explicitly stated information'. However, there was only one test item that provided a measure for 'Interpret and integrate ideas and information' and therefore it is difficult to draw strong inferences from that.

Table 17 below shows the difference in decline for comprehension questions based on Imaginative (fictional or Literary) and Informational texts.

Table 17 Performance and losses across text types in Grade 3 Language

		2019	2021	Decline (percentage points)
Text type	Imaginative	45%	42%	3
	Informational	39%	36%	3

The table shows very little difference in the decline relevant to the different text and question types, although performance on questions based on fictional texts was higher across both years than those based on informational texts. All six comprehension questions based on the informational text were categorised as 'Retrieve Explicitly Stated Information'. However, all six were open-ended questions. Of the 19 questions based on the two fictional texts (each learner would answer a set of questions based on only one of these texts), 14 were multiple choice and 5 open-response.

" Learners showed greater decline in the writing tasks that required them to use information to construct a text compared to those requiring them to use their imagination only. "

Finally, Table 18 below shows the decline in performance from 2019 to 2021 within the component 'Writing', distinguishing between questions that required imaginative writing and those that were based on informational topics.

Table 18 Learning decline on component Writing: Imaginative and Informational tasks

		2019	2021	Decline (percentage points)
Text type	Imaginative	34%	32%	2
	Informational	36%	30%	6

Learners showed greater decline in the writing tasks that required them to use information to construct a text compared to those requiring them to use their imagination only. Future analyses of the tests would usefully explore writing proficiency in relation to (a) how students use texts, (b) their contextual understanding, (c) use of writing conventions, (d) handwriting skills, and (e) ability to follow the writing process. This would entail qualitative analysis of a sample of student responses. It is not clear from performance outcomes alone where the areas of weakness lie.

Figure 14 below provides a visual representation of the 31 test items and the change that occurred in performance on those items between 2019 and 2021.

Figure 14 Changes in performance in 31 test items in Grade 3 Language between 2019 and 2021
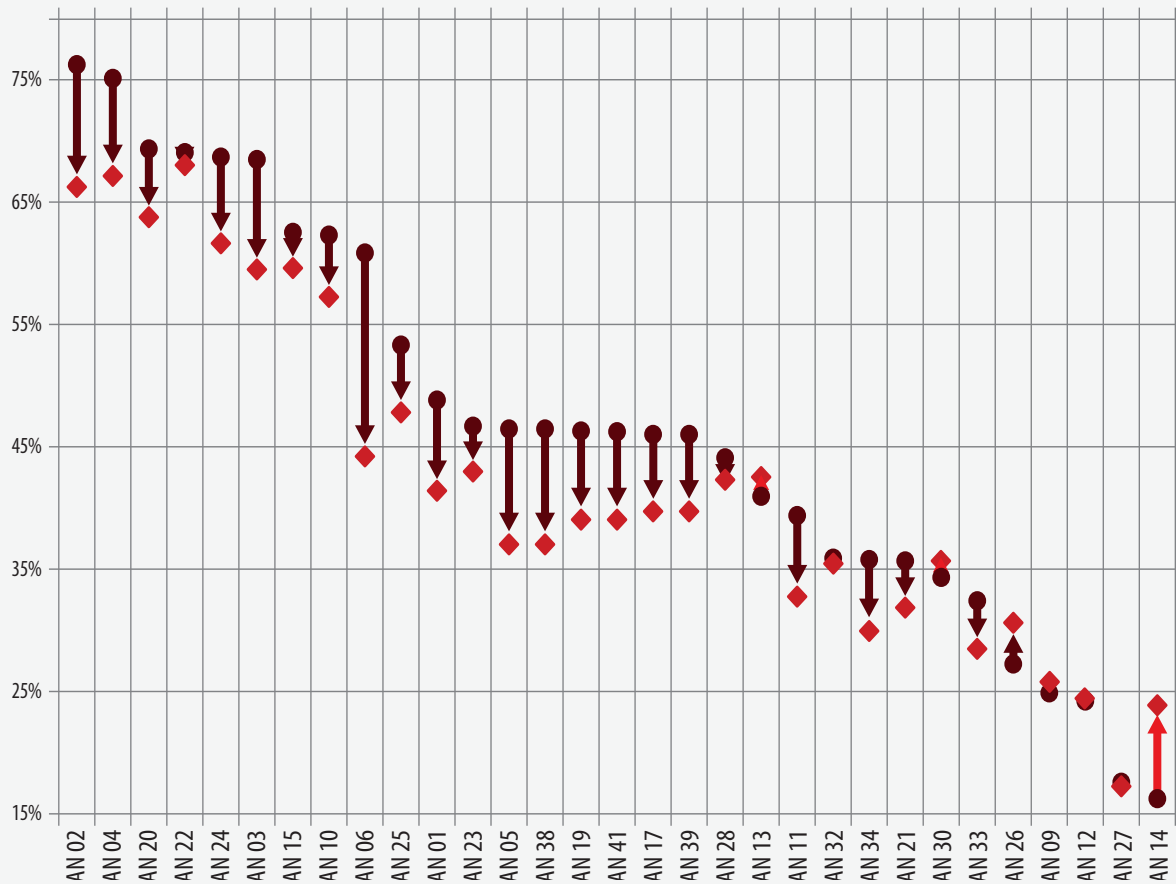
Items in the left corner of the figure that show relatively higher performance in 2019 and greater decline in 2021 included a range of question types (open-ended and multiple choice). They also included questions that required learners to retrieve explicitly stated information and those that required straightforward inferences. No discernible pattern was found amongst these items that showed the greatest decline from a relatively higher score in 2019. Likewise, for the cluster in the bottom right corner of the figure that show (usually minor) improvements between 2019 and 2021, there is no discernible commonality between these items. They included a mix of open-ended and multiple choice questions, and those that required learners to retrieve explicitly stated information, make straightforward inferences and interpret and integrate information from the text. Lastly, the two sets of items contain an even spread of questions based on the fictional and informational texts.

The figure below summarises in visual form the nature of change for the different component areas, question types and text types.

Summary of decline for Language components, question types and text types, Grade 3 Language
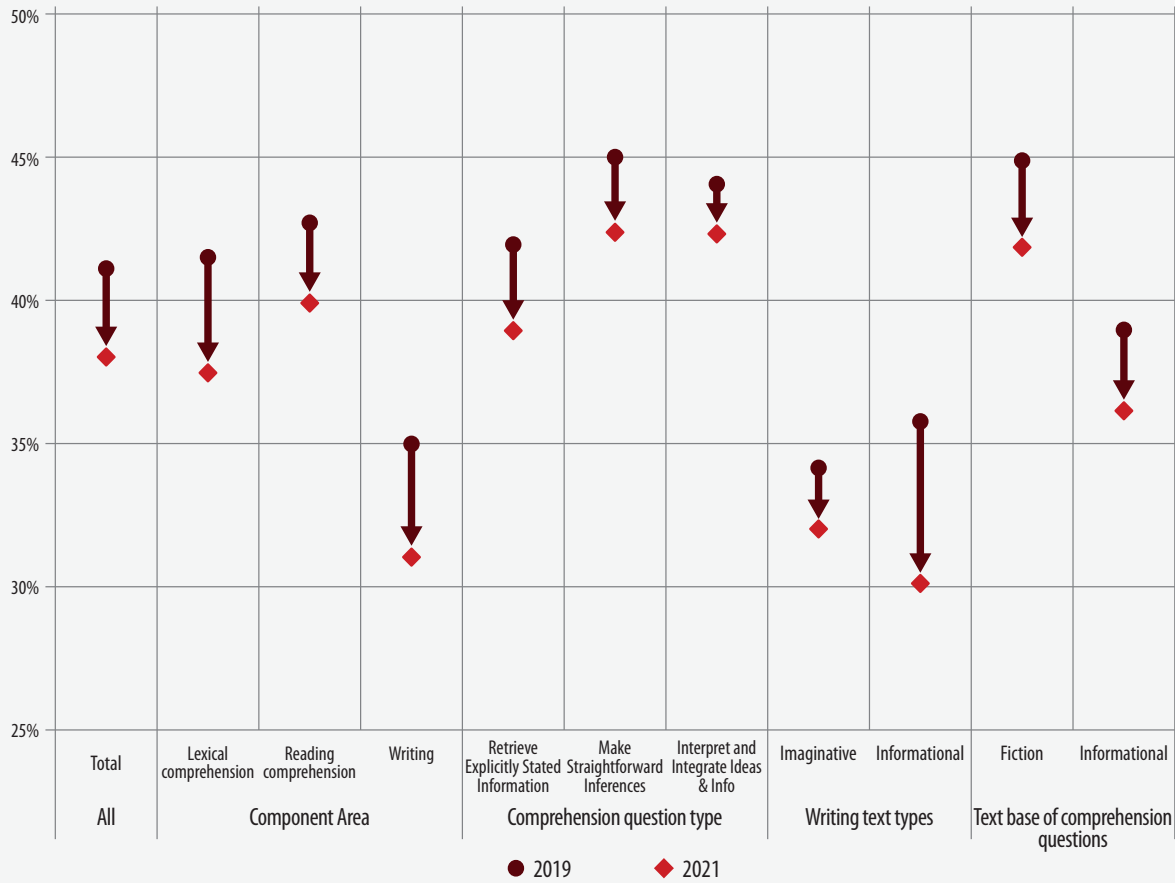
All reported declines in 2021 were off a low base in 2019, across all components. The greatest overall decline in 2021 at Grade 3 were in the components 'Lexical comprehension' and 'Writing' (Informational). Learner performance in 'Writing' was lowest in 2019 and saw the greatest decline in 2021 of all component areas. These two components, Writing and Lexical comprehension, are flagged across a number of reports on the NSC Language examinations in Grade 12 as the most significant problem areas for learners, and it is interesting to note these are in evidence at the Grade 3 level.

In both 2019 and 2021 learners' performance was lower on comprehension questions based on information texts, but the decline over the two years was about the same for fictional and informational texts. In writing, learners' decline on writing tasks based on informational topics was greater than those that required imaginative writing.

3.4　GRADE 6 LANGUAGE: PERFORMANCE AND LEARNING LOSSES

Table 19 below shows the performance levels and declines for each of the component areas 'Lexical Comprehension', 'Reading Comprehension' and 'Writing' in Grade 6.

Table 19　Performance levels and decline in Grade 6 for three Language components 2019 to 2021

		2019	2021	Decline (percentage points)
Component Area	**Lexical Comprehension**	55%	48%	7
	Reading Comprehension	57%	51%	5
	Writing	41%	32%	8

Similar to the Grade 3 level, performance levels were lowest for 'Writing' in both 2019 and 2021 and it was in this component that students demonstrated the greatest losses. Due to the trimming of the Creative Writing project at Intermediate and Senior Phase levels in 2020, many students would have had no formal extended writing instruction in Term 3. The reduction in assessment tasks in 2020 would also have meant less potential writing practice in the year preceding the testing.

There were also substantial losses in the Lexical comprehension component. This could partly be attributed to a lack of exposure to vocabulary instruction, but would be exacerbated for those learners who had changed to a different LOLT in grade 4.

Table 20 below shows the changes in performance for the component 'Reading Comprehension', based on the four comprehension processes derived from the PIRLS framework. Declines were greatest for 'Retrieve Explicitly Stated Information' followed by 'Make Straightforward Inferences'. Learners maintained very low performance on the higher order comprehension processes from 2019 ('Interpret and Integrate Ideas and Information' and 'Evaluate Texts').

Table 20　Performance and learning losses for different comprehension question types in Grade 6 Language

		2019	2021	Decline (percentage points)
Reading comprehension process	**Retrieve Explicitly Stated Information**	62%	55%	7
	Make Straightforward Inferences	55%	50%	5
	Interpret and Integrate Ideas and Info	37%	36%	1
	Evaluate texts	37%	38%	0

Table 21 below shows the difference in decline for comprehension questions based on 'Fictional' and 'Informational texts'. For both text types there were substantial decreases in performance levels.

Table 21   Performance and learning losses across text types in Grade 6 Language

		2019	2021	Decline (percentage points)
Text type	**Fictional**	62%	56%	6
	Informational	55%	50%	5

Finally, Table 22 below shows the decline in performance from 2019 to 2021 within the component Writing, distinguishing between questions that required imaginative writing and those that were based on informational topics. Performance declines were substantial in both the writing of imaginative and Informational texts in 2021, although again these were off a low 2019 base.

Table 22   Learning decline on component Writing: Imaginative and Informational tasks in Grade 6 Language

		2019	2021	Decline (percentage points)
Text type	**Writing: Imaginative**	44%	36%	9
	Writing: Informational	37%	29%	8

The cluster of five items in the bottom left quadrant of the figure shows the greatest decline, and from a low performance level in 2019. Three of these items were writing tasks and the other two were open-response questions that required straightforward inference to derive the answer. The figure shows graphically that writing was a problem for Grade 6 learners. Further, of all items where learners performed below 50% on both the 2019 and 2021 tests (11 items, displayed on the bottom half of the figure) eight were writing or open-response questions, and three were vocabulary questions.

The six items in the top half of the figure, where 70% of learners answered correctly on both the 2019 and 2021 tests were very straightforward multiple-choice questions, three based on a fictional text and three on an informational text.

3.6 GRADE 9 LANGUAGE: PERFORMANCE AND LEARNING LOSSES

Performance and declines at the Grade 9 level showed quite different patterns to the Grade 3 and Grade 6 levels. Firstly, performance on this test was much higher in both 2019 and 2021. Secondly, although there were losses across most language components and question types, these were less severe than at the other grade levels.

Table 23 below shows the performance levels and decline for the component areas 'Lexical Comprehension' and 'Reading comprehension'. There is no reporting for 'Writing' in Grade 9 as all Writing test items were excluded from the analysis. All Writing items had changed between 2019 and 2021 in an attempt to scaffold the Writing process, thus undermining their comparability.

Table 23 Performance levels and decline in Grade 9 for three Language components, 2019 to 2021

		2019	**2021**	**Decline (percentage points)**
Component area	**Lexical comprehension**	58%	59%	−1 (improvement)
	Reading comprehension	61%	57%	3

Performance on test items related to Lexical comprehension improved by 1% over the two tests. Reading comprehension overall declined by 3%. Table 24 below shows 'Reading comprehension' broken down by question types.

Table 24 Performance levels and decline in Grade 9 for different comprehension question types, 2019 to 2021

		2019	**2021**	**Decline (percentage points)**
Comprehension question types	**Retrieve Explicitly Stated Information**	71%	69%	2
	Make Straightforward Inferences	41%	43%	−2 (improvement)
	Interpret & Integrate Ideas & Info	53%	47%	6
	Evaluate texts	56%	54%	2

There was a small improvement in performance on items that required students to 'Make Straightforward Inferences' (2%), and a small decline in those that required students to 'Retrieve Explicitly Stated Information and Evaluate texts'. The greatest decline was found in the more challenging questions where students were required to 'Interpret & Integrate Ideas & Information' (a decrease of 6%). Students showed a similar decline in questions based on informational texts and those based on fictional texts, which was 3% and 2% respectively.

Table 25 Performance and declines across text types in Grade 9

		2019	2021	Decline (percentage points)
Text type	**Fictional**	62%	60%	2
	Informational	60%	57%	3

3.7 SUMMARY ON PERFORMANCE AND LEARNING LOSSES IN LANGUAGE, AND IMPLICATIONS

Figure 16 below shows the performance and declines for the three grades in Language in summary form. The figure shows that the declines were greatest in Grade 6, followed by Grade 3, with the least learning loss shown at the Grade 9 level. The latter results were off a relatively high base. However the fact that the Writing items (which showed the largest decreases in the other grades) were excluded at the Grade 9 level, may have impacted on the extent of losses in Grade 9.

Figure 16 Performance and learning losses in Grades 3, 6 and 9 Language

The international research literature on learning losses tells us that learning losses compound over time if left unaddressed (World Bank, 2020). This is particularly so for children in the early grades and those learning in socially challenging contexts (Iqbal et al, 2020). There is a need for rapid interventions to accelerate learning at all levels in Language, but especially the lower levels.

At the Foundation Phase level, interventions would usefully target Reading and Writing. The use of existing material should be used to this end. In addition, utilising existing school time rather than extending the day (which is systemically difficult and likely to meet with opposition) should be undertaken. The data indicates that particular attention should be paid to writing, which supports and extends learning to read.

At the Grade 6 level, particular attention needs to be paid to writing and vocabulary development, especially for those learners who transitioned to a different LOLT in Grade 4. The development of both these components contribute to better reading outcomes. Attention to vocabulary development in the LOLT is particularly pressing given the lack of exposure many children would have experienced during school closures.

Although the Grade 9 level showed less decline on the test, on-going attention to all Language components would assist learners in catching up lost time engaging with texts and practicing writing. Across the levels, remedial opportunities for learners who have fallen behind should be provided. The results indicate that a large number of learners across the levels have not yet acquired the basics in reading and writing and need opportunities to catch up.

As students move up the grade levels, learning losses of those who have fallen behind will compound. This is likely to lead to more absenteeism and drop out on the one hand, and greater in-class heterogeneity on the other, making teaching difficult and unpredictable. Cuts to the curriculum and the suspension of non-core subjects should be considered to free up time to focus on strengthening reading, writing and lexical skills, which lay the basis for all other learning in school.

While the Systemic Tests provide an overall indicator of the impact of Covid on learning outcomes, the amount of time lost varied considerably across schools depending on closures, rotational timetabling and absenteeism levels. This has resulted in a great deal of between – school and within – school variation. Good baseline assessments that diagnose the learning deficits for learners in individual schools are essential for appropriate and effective planning for catch up at the school level (Olson & Lake, 2020).

LANGUAGE PERFORMANCE IN THE WESTERN CAPE

The data indicates that particular attention should be paid to writing, which supports and extends learning to read

On-going attention to all Language components would assist learners in catching up lost time engaging with texts and practicing writing

Cuts to the curriculum and the suspension of non-core subjects should be considered to free up time to focus on strengthening reading, writing and lexical skills

LEVEL 1 –
MATHEMATICS
CURRICULUM
CONTENT AREAS

Number Operations and
Relationships

Patterns, Functions
and Algebra

Space and Shape (Geometry)

Measurement

Data Handling

4 Performance and learning losses in Mathematics

4.1 DIAGNOSTIC FRAMEWORK FOR MATHEMATICS

4.1.1 Curriculum Content Areas

A diagnostic framework was developed for analysis of the Mathematics tests to assess performance within and across curriculum content areas within Mathematics. At the first level of analysis items were categorised into the five curriculum content areas as identified and defined in CAPS:

◗ Number Operations and Relationships
◗ Patterns, Functions and Algebra
◗ Space and Shape (Geometry)
◗ Measurement
◗ Data Handling

In Grade 3 and Grade 6 CAPS, 'Number Operations and Relationships' is allocated the greatest proportion of teaching time (58% and 50% respectively). In addition, in these grades, proficiency with 'Number Operations and Relationships' is assumed to be further consolidated through work in Patterns, Functions and Algebra (*CAPS for Foundation Phase and CAPS for Intermediate Phase*). In Grade 9 CAPS, 'Number Operations and Relationships' is only weighted at 15%, while 'Patterns, Functions and Algebra' is weighted 35% of teaching time (*CAPS for Senior Phase),* thus these two together constitute 50%.

With reduced teaching time in 2020 and 2021, Revised Curriculum and Assessment Plans were produced by the DBE for all grades. The proposed revisions entailed the removal of some topics and merging some topics to allow for teaching of 'fundamental and core topics' in Terms 2, 3 and 4 in 2020 and in all terms in 2021. However, the weighting of content areas remained as specified in CAPS. In Grades 3 and 6, no topics were removed from 'Number Operations and Relationships', although some topics were merged to allow for 'integrated' teaching and 'catch-up' in some topics (*DBE, Revised Curriculum and Assessment Plans for Mathematics Grade 3 and Grade 6, 2021*). In Grade 9, only Financial Mathematics was removed from 'Number Operations and Relationships' and in 'Patterns, Functions and Algebra' graphs were limited to straight line graphs. In Grade 9, several topics were also merged to allow for 'integrated' teaching (*DBE, Revised Curriculum and Assessment Plans for Mathematics Grade 9, 2021*). Most of the topics that were removed across the grades in the 2020 and 2021 Revised Curriculum Plans were in 'Geometry' (e.g. symmetry and transformations), 'Measurement' (e.g. surface area and volume of 3-D objects) and 'Data Handling' (e.g. probability) content areas. These curriculum trimming revisions in 2020 and 2021 are, however, unlikely to have had a significant impact on the outcomes of the Systemic Tests, given that these tests largely focus on the 'fundamental and core' topics for each content area that were included in the 2020 and 2021 *Revised Curriculum and Assessment Plans for Mathematics*.

4.1.2 Curriculum Topics

Based on the weighting of curriculum areas and for analytic continuity, the diagnostic framework included a second level of analysis, in which items were further grouped in the framework into topics for 'Number Operations and Relationships' Grades 3 and 6) and for 'Patterns, Functions and Algebra' (Grade 9 only). The table below provide descriptions of topics within these content areas for each grade.

… THE PROPOSED REVISIONS ENTAILED REMOVAL OF SOME TOPICS AND MERGING SOME TOPICS TO ALLOW FOR TEACHING OF 'FUNDAMENTAL AND CORE TOPICS' IN TERMS 2, 3 AND 4 IN 2020 AND IN ALL TERMS IN 2021.

Table 26 Topics for Number Operations and Relationships and their relative weight in the different grades

Topics	Description
Grade 3 Topics: 63% of test	
Counting and Number Sense	Involves whole numbers only; Includes ordering numbers; skip counting; identifying symbols and operations; place value;
Routine calculations	Involves all four operations with whole numbers in symbolic form.
Solving problems in context	Word sums involving all four operations with whole numbers.
Identifying/recognising fractions	Identify, recognise and write unitary fractions.
Grade 6 Topics: 54% of test	
Whole number sense and operations	Involves whole numbers only; Includes recognising properties of operations; calculations with all four operations; estimating and rounding off; recognising and identifying multiples and factors and place value.
Solving problems in context with whole numbers	Contextual problems requiring operations with whole numbers to solve problems.
Recognise, compare and order Fractions/Decimals/Percentages	Includes recognising equivalent forms between fractions, decimals and percentages; and ordering and comparing fractions, decimals and percentages
Calculate and Solve problems in context with Fractions/Decimals/Percentages	Includes simple calculations with fractions, decimals and percentages and solving problems in context involving fractions, decimals or percentages.
Grade 9 Topics: 33% of test	
Sequences and Series	Identify a pattern or relationship between consecutive terms in order to extend the pattern or find the rule for relationship
Factorise/Expand Expressions	Factorise, Simplify or Expand algebraic expressions
Solve Equations	Solve algebraic equations, including finding input and output values for given rules
Drawing and Interpreting Algebraic Graphs	Includes finding intercepts; gradients and equations for graphs.

4.1.3 Items excluded from analysis

Since this report is focused on the analysis of learning losses from 2019 to 2021, items that were substantially amended from the 2019 test were excluded from this analysis. Such substantive changes included changes to number values that made calculations easier and scaffolding of questions that made interpreting and answering questions easier. While some of these changes improved the clarity and format of the test, this compromised comparability across the two tests, hence the exclusion of such items in this analysis.

In addition, items that were considered by the WCED to be 'poor performing items' in 2019 (which less than 15% of learners passed in 2019), were also excluded from this analysis. These items were deemed 'too difficult' to use as a comparable measure of performance. This was especially the case with items in the Grade 9 test. These exclusions will be discussed further with the results below. Items that appeared only in the 2019 test or only in the 2021 test were also excluded from this analysis.

4.2 GRADE 3 MATHEMATICS: PERFORMANCE AND LEARNING LOSSES

4.2.1 Distribution of Items – Grade 3 Mathematics

Table 27 and Table 28 show the distribution of included items in the analysis for each curriculum content area as well as the sub-categories for 'Number Operations and Relationships' in Grade 3:

Table 27   Distribution of items in Grade 3 Mathematics Content Areas

Content area	Number of items
Data Handling	4
Measurement	6
Number Operations and Relationships	36
Patterns, Functions & Algebra	5
Geometry	6
TOTAL	**57**

Table 28 Distribution of items Grade 3 Number, Operations and Relationships

Sub-topics: Number Operations and Relationships	Number of items
Counting and Number Sense	11
Identifying and Recognising Fractions	1
Routine Calculations	7
Word Sums	17
TOTAL	**36**

Eleven items were excluded from the analysis, two of which related to 'Identifying and Recognising Fractions'. Only one item was included in the latter category, and performance on this item was very poor, as can be seen in Table 30. Five of the excluded items related to 'Measurement', with some of those also involving calculations.

4.2.2 Performance and learning losses across Gr3 Mathematics content areas

Table 29 shows that Grade 3 performance in 2021 declined in all five Mathematics content areas. The greatest loss was in 'Data Handling', where the average mark dropped from 65% to 53%. This decline in performance was likely in part a consequence of curriculum trimming in 2020 and 2021, where 'Data Handling' was to be integrated into the teaching of 'fundamental and core' topics in the other content areas. Of greater significance is the second highest drop in performance (9%) in 'Number Operations and Relationships'. This area is the most fundamental content area in Foundation Phase Mathematics, yet the average marked dropped from 57% in 2019 to 48% in 2021.

> 66 'Number Operations and Relationships' is the most fundamental content area in Foundation Phase Mathematics, yet the average mark dropped from 57% in 2019 to 48% in 2021. 99

Performance in 'Measurement' was the lowest in both 2019 and 2021, with performance dropping to 26% in 2021. A significant component of work in 'Measurement' in Grade 3 rests on proficiency in understanding and applying 'Number Operations and Relationships'. Hence, poor performance in 'Measurement' is also an indicator of low proficiency in 'Numbers'. Smaller losses occurred in the other two content areas of 'Patterns, Functions and Algebra' and 'Geometry', with performance levels at 67% and 70% respectively in 2021.

| Table 29 | Average performance levels and declines in Grade 3 Mathematics by content areas |

| Content area	2019	2021	Decline (percentage points)
Data Handling	65%	53%	13
Measurement	35%	26%	8
Number Operations and Relationships	57%	48%	9
Pattern, Functions and Algebra	74%	67%	7
Geometry	76%	70%	6

Table 30 shows performance levels and performance on sub-topics for Grade 3 'Numbers'. The largest loss here can be seen for 'Fractions'. Since this measure is based only on one question, it does not represent the full range of knowledge and skills in this sub-topic. However, the measure does serve as a good proxy for performance in recognising and identifying fractions. More significant are the learning losses and low performance levels for 'Word Sums' and 'Routine Calculations'. The lowest performance was for 'Routine Calculations' in both 2019 and 2021, with an average score of only 37% on these items in 2021. Marks were only slightly better for 'Word Sums' at 40% in 2021. This poor performance on 'Word Sums' is no doubt related to poor reading performance levels in Grade 3, specifically, reading for learning, but is also likely a consequence of low proficiency in 'Routine Calculations' in cases where a question has been correctly interpreted. The low performance of 37% for 'Routine Calculations' is likely an indicator of learners struggling to get to grips with the symbolic 'language' of Mathematics and understanding and applying the four basic operations. The highest performance and lowest learning loss was for 'Counting and Number Sense', which is encouraging, as this forms the foundation for learning in all the other sub-topics in 'Numbers'. It is, however, also the easiest sub-topic for Grade 3, as it largely involves ordering numbers, skip counting and recognising place value, which are also starting points in Grade 1 and Grade 2. Grade 3 learners would have had the longest exposure to this sub-topic in 'Numbers', because they would have been exposed to it over three grades, despite the days lost in the previous two years.

| Table 30 | Average performance levels in Grade 3 Sub-Topics of 'Number Operations and Relationships' |

Number Operations and Relationships	2019	2021	Decline (percentage points)
Counting and Number Sense	73%	67%	6
Identifying and Recognising Fractions	64%	46%	17
Routine Calculations	46%	37%	9
Word Sums	51%	40%	11

Figure 17 below summarises in visual form the nature of change for the different content areas in Grade 3 Mathematics, including the sub-topics for 'Numbers'. Of significance here are the average performance levels below 30% for 'Measurement' and below 40% for 'Routine Calculations' in 2021. Performance also declined to 4% for 'Word Sums' in 2021. As mentioned, the large decline for 'Fractions' cannot be considered a robust measure as it is based on performance on only one item. The large decline in 'Data Handling' is likely a consequence of curriculum trimming in 2020 and 2021, with this area integrated into teaching of 'Numbers'.

**Figure 17** Performance and learning losses by content areas, Grade 3 Mathematics
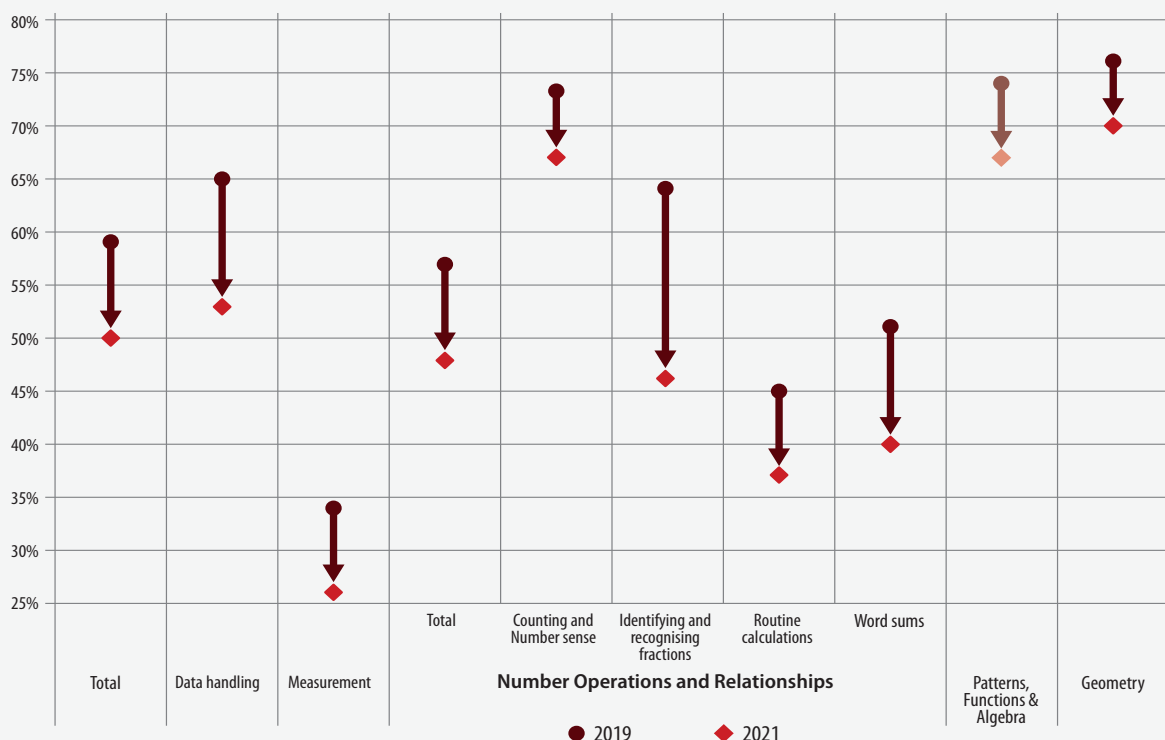
4.2.3 Average performance levels and declines in Mathematics Grade 3 across content areas and LOLT groups

As mentioned earlier in the report, overall Afrikaans LOLT schools, already the weakest in Mathematics in Grade 3 in 2019, showed the highest losses for 2021. The average mark of 44% in Afrikaans LOLT schools in 2021 was a large drop from 53% in 2019. Performance declined in all Mathematics content areas across all three LOLT groups in 2021 (Table 31). Xhosa LOLT learners showed the greatest losses for 'Data Handling' and the one 'Fractions' item, while English LOLT learners showed the greatest losses for 'Measurement'. Afrikaans LOLT learners showed the greatest losses for 'Number Operations and Relationships' overall as well as for 'Patterns, Functions and Algebra' and 'Geometry'.

Table 31 Performance and learning losses by content area and LOLT, Grade 3 Mathematics

		Afrikaans LOLT			English LOLT			Xhosa LOLT		
		2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)
Data Handling		59%	46%	13	69%	57%	12	70%	56%	14
Measurement		30%	22%	8	42%	32%	10	30%	22%	8
Number Operations and Relationships	Total	52%	42%	10	63%	54%	9	54%	45%	9
	Counting and Number Sense	68%	60%	8	79%	74%	6	72%	65%	7
	Identifying and Recognising Fractions	60%	42%	18	62%	48%	14	73%	52%	21
	Routine Calculations	42%	33%	10	51%	41%	9	41%	34%	8
	Word Sums	45%	34%	11	58%	47%	11	47%	37%	10
Patterns, Functions and Algebra		70%	62%	8	79%	73%	6	71%	64%	6
Geometry		71%	64%	7	80%	74%	6	78%	73%	5
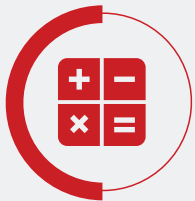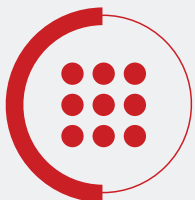
Across all three LOLT groups, performance in 'Measurement', 'Routine Calculations' and 'Word Sums' was below 50%, with the poorest performance in Afrikaans LOLT schools in all three content areas. The losses in these areas were already coming off a low base in 2019. In addition, Afrikaans LOLT learners achieved less than 50% in 'Data Handling'. English LOLT learners outperformed the other LOLT groups in 2021 in all the content areas. In 'Number Operations and Relationships' the gap between Afrikaans LOLT schools and schools with English or isiXhosa as a LOLT widened, with the performance level for English LOLT learners 12% points higher than Afrikaans LOLT learners and 9 points higher than Xhosa LOLT learners in 2021. Afrikaans LOLT and Xhosa LOLT learners achieved less than 50% in 'Number Operations and Relationships' in 2021.

It is likely that individual schools and teachers responded quite differently to the 2021 Revised ATPs which advised that *'Teachers are encouraged to use their professional judgement, and available resources in order to achieve the goals set'.* This 'professional judgement' would have influenced the time spent on the 'fundamental and core content', the form of integration of merged contents and the forms of 'diagnostic' and continuous assessment tasks deployed. Availability of differential resources may be more apparent in the analysis of performance across quintiles below.

4.2.4 Performance and learning losses across Mathematics Content areas and Quintile groups

There is greater variation in Grade 3 Mathematics performance levels across quintiles, with learning losses far less in Quintile 5 schools compared to other quintiles, as mentioned earlier in the report. Table 32 compares performance of Quintiles 1–3 schools ('no fee' schools)[14] with Quintile 4 and Quintile 5 schools.

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14 Note that some poorer Quintile 4 schools in the Western Cape have also been declared 'no fee' schools. For current purposes, they are not included in the category Quintiles 1–3.

Table 32 Performance and learning losses by content area and quintile, Grade 3 Mathematics

	Quintiles 1, 2 and 3			Quintile 4			Quintile 5		
	2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)
Data Handling	64%	49%	15	58%	44%	14	76%	67%	9
Measurement	28%	19%	9	29%	19%	10	49%	43%	7
Number Operations and Relationships — Total	52%	41%	11	52%	41%	12	70%	64%	6
Counting and Number Sense	69%	60%	8	69%	61%	8	84%	81%	3
Identifying and Recognising Fractions	65%	45%	21	57%	36%	21	68%	59%	9
Routine Calculations	40%	30%	10	42%	30%	12	57%	51%	6
Word Sums	45%	33%	12	45%	32%	13	66%	58%	8
Patterns, Functions and Algebra	69%	61%	8	71%	63%	8	83%	80%	4
Geometry	74%	67%	7	72%	64%	9	84%	81%	3

Learning losses were greatest for Quintile 4 schools across most Mathematics content areas. Q1–3 schools had the greatest losses for 'Data Handling' and the sub-topic of 'Counting and Number Sense'. The losses in Quintile 5 schools were significantly less than those in Q1–3 and Q4 schools across all Mathematics content areas. The extremely poor performance of Q4 schools needs further investigation, given that this performance is closer to Q1–3 schools than Q5 schools. Although performance levels dropped for all Mathematics content areas in Q5 schools as well, losses did not exceed 9% percentage points, and only in 'Measurement' did the average scores fall below 50%. Bar the one item for fractions, the highest learning losses across all the quintile groups were for 'Data Handling' and 'Word Sums'.

The 2021 columns show the similarity in performance between Q1–3 and Q4 schools across the Mathematics content areas. In both these groups, average scores in 'Measurement' fell below 20%, off a low base of less than 30% in 2019. Even more significantly, Q1–3 and Q4 schools scored below 50% in 'Number Operations and Relationships', compared to an average of 64% achieved by learners in Q5 schools. In the sub-topic 'Routine Calculations', the average scores were 30% in Q1–3 and Q4 schools, compared with 51% for learners in Q5 schools.

4.3 GRADE 6 MATHEMATICS: PERFORMANCE AND LEARNING LOSSES

4.3.1 Distribution of Items – Grade 6 Mathematics

Table 33 and Table 34 show the distribution of included items in the analysis for each curriculum content area as well as the sub-categories for 'Number Operations and Relationships' in Grade 6:

Table 33   Distribution of items in Grade 6 Mathematics across content areas

Content area	Number of items
Data Handling	7
Measurement	6
Number Operations and Relationships	32
Patterns, Functions & Algebra	7
Geometry	7
TOTAL	**59**

Table 34 Distribution of items in Grade 6 'Number Operations and Relationships' across sub-topics

Content area	Number of items
Whole Number sense	11
Whole Number word sums	3
Recognise, compare, order Fractions, Decimals, Percentage	11
Solve problems with Fractions, Decimals, Percentages	7
TOTAL	**32**

Sixteen items were excluded from the analysis either due to substantive modifications to the question, or because they were deemed low performing in 2019. At least four of these related to solving problems with fractions, decimals and percentages and three related to whole number sense or 'Word Sums'. The rest were 'Measurement' or geometry questions.

4.3.2 Performance and learning losses across Gr6 Mathematics content areas

Table 35 below shows the performance levels and learning losses of learners in each content area for Mathematics in Grade 6:

Table 35 Performance and learning losses in Grade 6 Mathematics by content area

Content area	2019	2021	Decline (percentage points)
Data Handling	57%	45%	12
Measurement	44%	38%	6
Number Operations and Relationships	53%	45%	8
Pattern, Functions and Algebra	56%	47%	9
Geometry	67%	58%	9

Grade 6 performance in 2021 declined in all five Mathematics content areas. Scores were below 50% in 4 out of the 5 content areas, 'Geometry' being the exception. The greatest loss was in 'Data Handling', where scores dropped from 57% to 45%. This decline in performance is likely also a consequence of curriculum trimming in 2020 and 2021, where 'Data Handling' across all grades was integrated into the teaching of 'fundamental and core' topics in the other content areas. The second highest drop (9 percentage points) was for 'Patterns, Functions and Algebra'. Of grave concern is a drop of 8 percentage points for 'Number Operations and Relationships', which constitutes half of allocated learning time for Mathematics in Grade 6.

As with Grade 3, performance in 'Measurement' was the lowest in both 2019 and 2021, at a 37% average mark in 2021. The relatively low loss here is off an already low base. A significant component of work in 'Measurement' in Grade 6 also rests on proficiency in understanding and applying 'Number Operations and Relationships'. Hence poor performance in 'Measurement' is also an indicator of low proficiency in 'Numbers'. Although learning losses for 'Geometry' is quite high (9 percentage points), it is the only content area where the average score exceeds 50%.

Table 36 below shows performance on sub-topics for Grade 6 'Number Operations and Relationships'. Within this topic, the greatest learning losses were for 'Whole Number Sense' and 'Recognising and Comparing Fractions, Decimals and Percentages'. The table suggests that these losses also have an impact on the performance in the other two sub-topics, namely 'Whole Number Word Sums' and 'Solving Problems with Fractions, Decimals and Percentage'. These sub-topics had the lowest performance in 2019 and 2021, and the learning losses here come off a very low base. They also suggest that learners struggle much more with applying 'Number Operations and Relationships' through 'Solving Problems in Context'. This poor performance may also again be related to poor reading proficiency and ability to interpret contexts.

Table 36 Performance Levels and Learning Losses Grade 6 Sub-Topics Number, Operations and Relationships

Number Operations and Relationships	2019	2021	Decline (percentage points)
Whole Number Sense	57%	48%	9
Whole Number Word Sums	47%	43%	4
Recognise, Compare, Fractions, Decimals, Percentages	60%	51%	9
Solve Problems with Fractions, Decimals, Percentages	40%	32%	9

Summary

Figure 18 summarises in visual form the nature of change for the different content areas in Grade 6 Mathematics, including the sub-topics for 'Numbers'. Of significance here are the average performance levels that have dropped to below 50% in 2021 for 'Data Handling', 'Number Operations and Relationships' and 'Patterns, Functions and Algebra'. Performance in 'Measurement' was already below 45% in 2019 and dropped to below 40% in 2021. Similarly, performance in 'Solving Problems with Fractions, Decimals and Percentages' dropped from a low 40% in 2019 to below 35% in 2021. The large decline in 'Data Handling' is again likely a consequence of curriculum trimming in 2020 and 2021, with this area integrated into teaching of 'Numbers'.

Figure 18 Performance and learning losses by content area, Grade 6 Mathematics
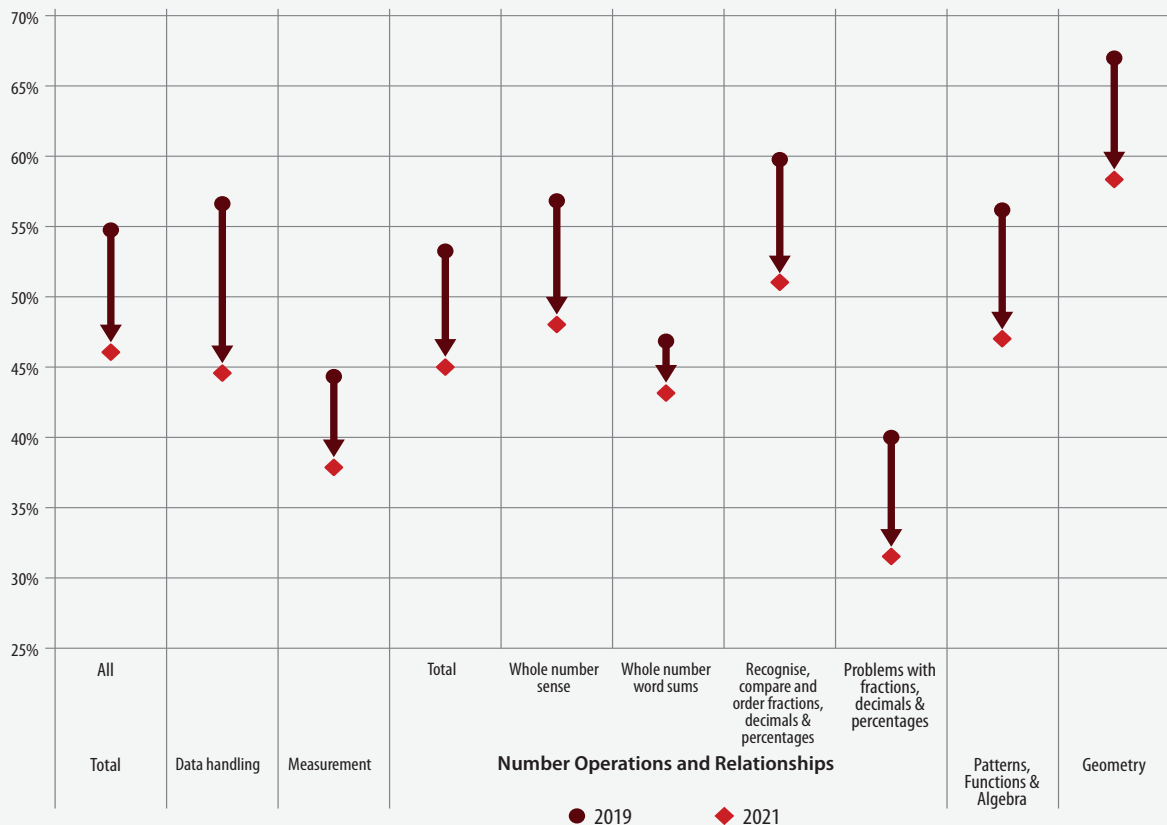
4.3.3 Performance and learning losses across Grade 6 Mathematics Content areas and LOLT groups

As mentioned earlier in the report, in Grade 6, English LOLT schools include schools where most learners had experienced a LOLT change from Xhosa to English between Foundation and Intermediate Phase. This analysis compares only Afrikaans LOLT and English LOLT schools, without distinguishing within the latter.

Overall, learners in English LOLT schools showed the greatest losses in Grade 6 Mathematics, although overall performance in Mathematics is higher than for learners in Afrikaans LOLT schools. Learning losses for learners in English LOLT schools were 9 percentage points compared with 8 points for learners in Afrikaans LOLT schools. However, Grade 6 learners in Afrikaans LOLT schools achieved an average of only 41% in 2021, compared to the 49% of Grade 6 learners in English LOLT schools.

Table 37 shows performance levels and learning losses across Grade 6 Mathematics content areas and LOLT groups. Performance declined in all Mathematics content areas across both LOLT groups in 2021. Afrikaans LOLT learners showed the greatest losses for 'Data Handling' and 'Geometry', while English LOLT learners showed the greatest losses for all the other content areas.

Table 37 Performance and learning losses by content area and LOLT, Grade 6 Mathematics

		Afrikaans LOLT			English LOLT		
		2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)
Data Handling		50%	37%	13	61%	49%	12
Measurement		37%	32%	5	49%	42%	7
Number Operations and Relationships	**Total**	48%	41%	7	56%	47%	9
	Whole Number sense	52%	44%	9	60%	51%	9
	Whole Number word sums	41%	38%	3	51%	46%	4
	Recognise, compare and order fractions, decimals and percentages	56%	48%	8	62%	53%	10
	Problems with fractions, decimals and percentages	33%	27%	7	44%	34%	10
Pattern, Functions and Algebra		49%	40%	8	61%	51%	10
Geometry		64%	55%	9	69%	60%	9

Across both LOLT groups, average scores were below 50% for 'Data Handling', 'Measurement', and 'Number, Operations and Relationships'. Learning losses in these areas for learners in Afrikaans LOLT schools were already coming off a low base in 2019. In addition, Afrikaans LOLT learners scored less than 50% for 'Patterns, Functions and Algebra'. English LOLT learners outperformed Afrikaans LOLT learners in 2019 and 2021 in all the content areas. However, this gap in performance between the two LOLT groups was reduced across most of the content areas in 2021, except in both 'Data Handling' and 'Geometry', where there was a slight widening of the gap.

> **"** In addition, Afrikaans LOLT learners scored less than 50% for 'Patterns, Functions and Algebra'. English LOLT learners outperformed Afrikaans LOLT learners in 2019 and 2021 in all the content areas. However, this gap in performance between the two LOLT groups was reduced across most of the content areas in 2021. **"**

Once again, lack of reading proficiency may account for the very low performances and learning losses across both LOLT groups for 'Measurement', 'Whole Number 'Word Sums' and 'Solving Problems with Fractions, Decimals and Percentages'. Most of these items require some level of reading and interpretation before applying Mathematical knowledge.

4.3.5 Performance and learning losses across Grade 6 Mathematics Content areas and Quintile groups

As with Grade 3, there is greater variation in Grade 6 Mathematics performance levels across quintiles, with learning losses far less in Quintile 5 schools than in the four other quintiles. Table 38 compares performance of Quintiles 1–3 schools with Quintile 4 and Quintile 5 schools. Performance declined in all Mathematics content areas across all quintile groups. Learning losses were greatest for Q1–3 schools across most of the Mathematics content areas, except for Geometry, where learning losses were greatest in Q4 schools. The losses in Q5 schools were significantly less than those in other quintiles across all Mathematics content areas. As with Grade 3, performance of Q4 schools was much closer to Q1–3 schools than Q5 schools. Although performance levels dropped for all Mathematics content areas in Q5 schools as well, losses in that quintile did not exceed 7 percentage points, except for 'Data Handling', which experienced the highest learning losses across all quintile groups.

Table 38 Performance and learning losses by content area and quintile, Grade 6 Mathematics

		QUINTILES 1, 2 AND 3			QUINTILE 4			QUINTILE 5		
		2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)
Data Handling		47%	34%	14	54%	40%	14	74%	65%	9
Measurement		37%	28%	8	39%	32%	7	62%	58%	4
Number Operations and Relationships	Total	49%	39%	10	49%	40%	9	64%	58%	6
	Whole Number sense	53%	42%	11	53%	44%	9	67%	61%	6
	Whole Number word sums	42%	38%	4	41%	38%	4	59%	56%	3
	Recognise, compare and order fractions, decimals and percentages	56%	46%	10	56%	47%	9	69%	62%	7
	Problems with fractions, decimals and percentages	36%	25%	11	33%	25%	8	53%	47%	6
Pattern, Functions and Algebra		50%	39%	11	51%	41%	10	71%	65%	6
Geometry		63%	53%	10	64%	54%	10	75%	70%	6

In both Q1–3 and Q4 schools, average scores were less than 50% in all the content areas except 'Geometry'. For Q4 learners, performance dropped to below 50% from 2019 in four of the content areas. Drops in performance in Q1–3 schools were already coming off a low base in most content areas. In Q5 schools, average scores only fell below 509% in 'Solving Problems with Fractions, Decimals and Percentages'.

The stark differences in performance between Q5 schools and the other quintile groups may well reflect differences in access to online learning and resources during periods of school closure and rotational learning in 2020 and 2021. It is also likely that learners in Q5 schools experienced less disruption to their learning.

4.3   GRADE 9 MATHEMATICS: PERFORMANCE AND LEARNING LOSSES

4.4.1 Distribution of Items – Grade 9 Mathematics

Table 39 and Table 40 below show the distribution of included items in the analysis for each curriculum content area as well as the sub-categories for 'Patterns, Functions and Algebra' in Grade 9:

Table 39   Distribution of items in Grade 9 Mathematics Content Areas

Content area	Number of items
Data handling	9
Measurement	2
Number Operations and Relationships	4
Patterns, Functions & Algebra	15
Geometry	15
TOTAL	45

Table 40   Distribution of items in sub-topics of 'Patterns, Functions and Algebra' in Grade 9 Mathematics

Sub-topics: Patterns, Functions and Algebra	Number of items
Factorise and expand expressions	2
Solve equations	7
Graphs	1
Sequences and series	5
TOTAL	15

Altogether 39 items[15] were excluded from the Grade 9 analysis either because they were not asked in both years, were substantive modifications to the question, or were deemed low performing items in 2019 and thus excluded on request of the WCED. Excluded items included several items relating to 'Factorising Expressions and Solving Equations', graph work and 'Measurement'. Some of the excluded items, for example those related to surface area and probability, were topics that were cut out in the trimmed curriculum for 2020 and 2021. Two items were also excluded for extremely large differences in performance between 2019 and 2021, which could only feasibly have occurred due to differences in the memorandum or the question.[16] Since only four items related to 'Numbers' were included, the analysis does not consider this sub-topic.

In Grade 9, 'Patterns, Functions and Algebra' is allocated 35% of teaching time and is foundational for much of FET Algebra and 'Measurement'. Thus the analysis also looks at performance on sub-topics within this content area.

4.4.2 Performance and learning losses across Grade 9 Mathematics content areas

Table 41 below shows that Grade 9 performance in 2021 declined in all five Mathematics content areas. All learning losses are off a low base in 2019. In 2019, the average score was 50% for 'Data Handling', and this dropped to 44% in 2021. The greatest learning loss (15 points) was for 'Number Operations and Relationships', where average performance dropped below 20% in 2021. This was followed by Patterns, Functions and Algebra (8 point loss), where the average score was below 40%.

Table 41   Performance and learning losses by content areas, Grade 9 Mathematics

Content area	2019	2021	Decline (percentage points)
Data Handling	50%	44%	6
Measurement	9%	8%	0
Number Operations and Relationships	33%	18%	15
Pattern, Functions & Algebra	47%	38%	8
Geometry	31%	28%	3

The extremely low performance in 'Measurement' is again apparent in Grade 9, where the average performance was below 10% in both 2019 and 2021. The relatively low learning loss here, of less than half a percentage point, is almost meaningless, given the poor performance (floor effect) in 2019. Similarly, the lower learning loss in Geometry appears understated when the 2019 score was just 31%.

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15   Note, this count includes 'sub-questions' as separate item numbers.
16   Including these items reduces the overall extent of learning losses but does not affect the overall picture.

If one makes the assumption of cumulative knowledge acquisition in Mathematics, then learning losses together with very low performance across all content areas in Grade 9 suggest a huge deficit in Mathematical confidence and proficiency carried through from the Intermediate Phase and early Senior Phase.

Table 42 below shows performance levels and performance on sub-topics for Grade 9 'Patterns, Functions and Algebra'. Starting off a low base again, the greatest learning loss (12 percentage points) was for solving equations. Average sores were below 50% in all four sub-topics, with the lowest performance for 'Graphs' in both years. The second biggest loss was for 'Sequences and Series', where performance dropped below 50% in 2021. The very poor performance in these sub-topics suggest Grade 9 learners are struggling to grasp basic principles of algebraic language.

> ❝ Starting off a low base again, the greatest learning loss (12 percentage points) was for solving equations. Average sores were below 50% in all four sub-topics, with the lowest performance for 'Graphs' in both years. ❞

Table 42 Performance Levels and Learning Losses in Grade 9 Sub-Topic Patterns, Functions and Algebra

Sub-topics: Patterns, Functions and Algebra	2019	2021	Decline (percentage points)
Factorise and expand expressions	38%	36%	2
Solve equations	47%	35%	12
Graphs	32%	31%	1
Sequences and series	52%	49%	4

Summary

Figure 19 summarises in visual form the learning losses across the Mathematics content areas in Grade 9, including sub-topics for 'Number' and 'Patterns'. The largest learning losses are for items under 'Number Operations and Relationships', followed by 'Solving Equations'. The figure also shows performances below 50% in both 2019 and 2021 across most content areas. The relatively small learning losses in some areas mask the already low base of performance in Mathematics in 2019 – this is most apparent with 'Measurement'.

Figure 19 Performance and learning losses by content areas, Grade 9 Mathematics
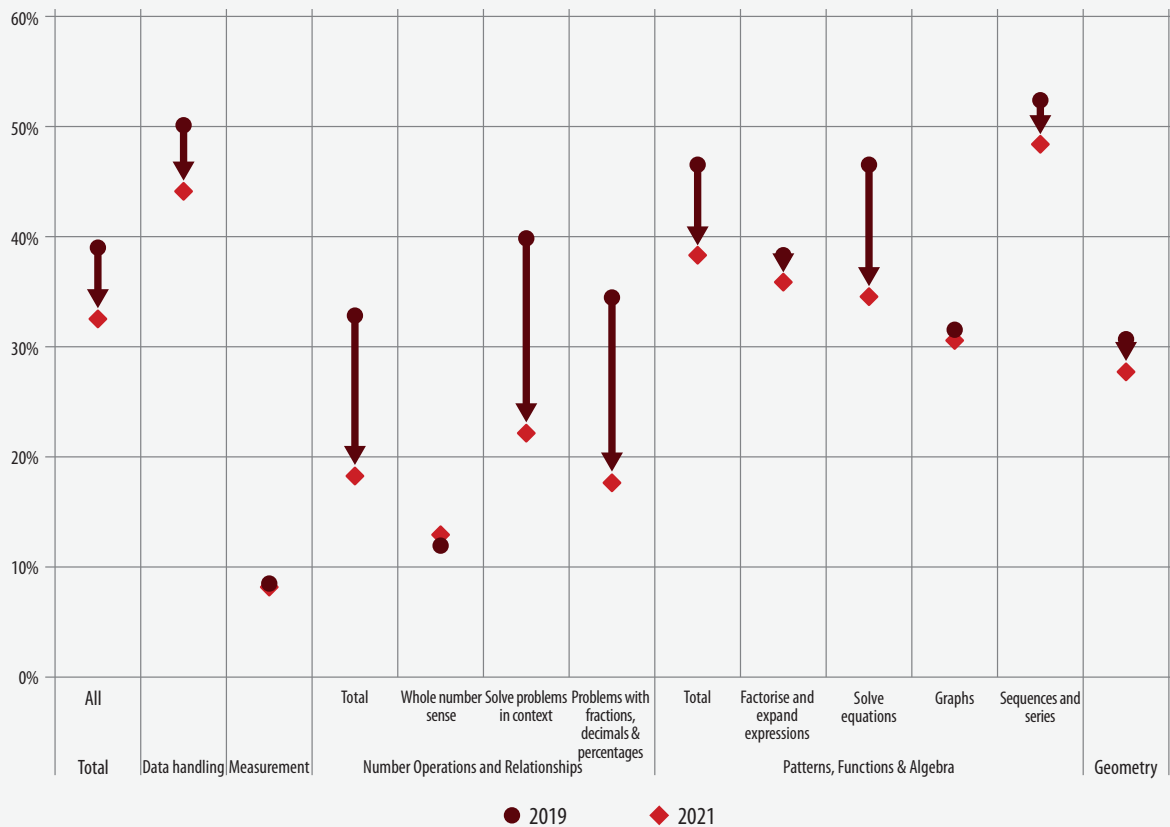
4.4.3 Performance and learning losses across Grade 9 Mathematics content areas and LOLT groups

Overall learning losses for Grade 9 learners in both Afrikaans and English LOLT schools was 6 points. Performance in Afrikaans and English LOLT schools were 31% and 33% respectively in 2021.

Table 43 shows that learning losses were greatest for Afrikaans LOLT schools in 'Numbers' and 'Patterns' (and sub-topics), while learning losses were greater in English LOLT schools for 'Data Handling', 'Measurement' and 'Geometry'. However, these differences were very small, with performances equally low across the two LOLT groups across all content areas. Average scores were below 50% across both LOLT groups and all the content areas and sub-topics. The lowest performance for both LOLT groups was 'Measurement', with scores of 9% for Afrikaans LOLT and 8% for English LOLT learners.

Table 43 Performance and learning losses by content area and LOLT, Grade 9 Mathematics

	Afrikaans LOLT			English LOLT		
	2019	**2021**	**Decline (percentage points)**	**2019**	**2021**	**Decline (percentage points)**
Data Handling	49%	44%	6	51%	44%	6
Measurement	9%	9%	0	8%	8%	1
Number Operations and Relationships	32%	16%	16	33%	20%	14
Pattern, Functions and Algebra Total	45%	36%	9	47%	40%	8
Factorise and expand expressions	37%	33%	3	39%	37%	2
Solve equations	44%	31%	13	48%	37%	11
Graphs	36%	35%	1	29%	28%	1
Sequences and series	51%	47%	4	53%	49%	4
Geometry	30%	27%	2	31%	28%	3

The most significant
differences in learning
losses across the quintile
groups was for 'Numbers'
and 'Patterns'

Decline for 'Number
Operations and Relationships'
in Q1–3 and Q4 schools
was 18ppt; a staggering
60% decrease despite an
already low average score
(<30%) in 2019

Concerning that even
in Q5 schools, average
scores in 'Measurement',
'Numbers' and 'Geometry'
were all below 50%

4.4.4 Performance and learning losses across Grade 9 Mathematics content areas and quintile groups

Table 44 shows performance levels and learning losses across Grade 9 Mathematics content areas and quintile groups. Although there is some variation in Grade 9 Mathematics performance levels across quintiles, learning losses in Quintile 5 schools were similar in 'Data Handling' and 'Measurement' to learning losses in the other quintile groups. The most significant differences in learning losses across the quintile groups was for 'Numbers' and 'Patterns'. While the decline for 'Number Operations and Relationships' in Q1–3 was 18 percentage points and 17 points for Q4 schools, it was only 9 points for Q5 schools. Similarly, learning losses for 'Patterns, Functions and Algebra' in Q1–3 were 9 percentage points and 10 points for Q4 schools, while it was only 5 points in Q5 schools.

> **❝** The most significant differences in learning losses across the quintile groups was for 'Numbers' and 'Patterns'. **❞**

The lowest performance across all quintile groups was in Measurement. The average score in this content area was 3% and 2% respectively in Q1–03 and Q4 schools in 2021, similarly low as in 2019, while in Q5 schools there was a small improvement (under half a percentage point) to 18%. While learners in Q5 schools scored 55% in 'Patterns' in 2021, a decline of 5 points, this was far higher than the 29% and 28% scored in the other quintile groupings. For 'Numbers', too, scores were much lower in the bottom four quintiles than in Quintile 5, and learning losses were generally greater in the bottom four quintiles.

As mentioned before, differences in performance between Q5 schools and the other quintile groups may well reflect differences in access to online learning and resources during periods of school closure and rotational learning in 2020 and 2021. However, at Grade 9 it is concerning that even in Q5 schools, average scores in 'Measurement', 'Numbers' and 'Geometry' were all below 50% in both years.

Table 44　Performance and learning losses by content area and quintile, Grade 9 Mathematics

		Quintiles 1, 2 and 3			Quintile 4			Quintile 5		
		2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)	2019	2021	Decline (percentage points)
Data handling		43%	37%	7	45%	39%	6	60%	55%	5
Measurement		3%	3%	0	3%	2%	1	17%	18%	0
Number Operations and Relationships		29%	11%	18	28%	11%	18	39%	31%	9
Pattern, Functions and Algebra	Total	38%	28%	10	39%	29%	9	59%	55%	5
	Factorise and expand expressions	30%	27%	3	29%	26%	3	53%	52%	1
	Solve equations	38%	24%	15	37%	24%	14	61%	53%	8
	Graphs	27%	26%	1	30%	30%	0	38%	36%	1
	Sequences and series	44%	39%	5	47%	42%	5	64%	63%	1
Geometry		23%	19%	4	23%	20%	3	44%	42%	1

4.5 SUMMARY OF PERFORMANCE AND LEARNING LOSSES IN MATHEMATICS AND IMPLICATIONS

Figure 20 shows the overall performance and learning losses for the three grades in Mathematics. The figure shows that the learning losses were similarly large at Grade 3 and Grade 6 levels, with a smaller learning loss shown at the Grade 9 level. However, the loss at Grade 9 level was coming off the lowest base in 2019.

Figure 20 Performance and learning losses in Grade 3, Grade 6 and Grade 9 Mathematics
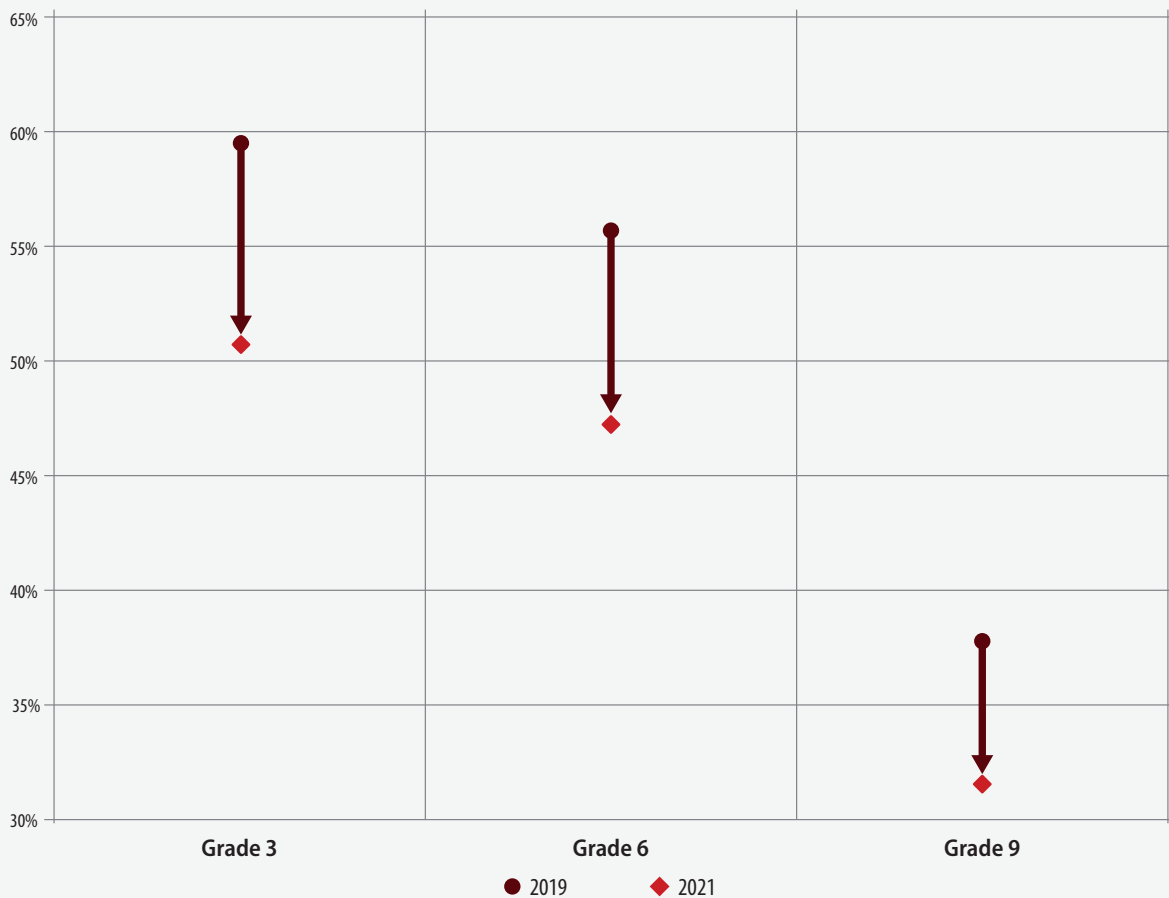
The figure also shows progressive decline in average performance levels from Grade 3 to Grade 9. Given the hierarchical knowledge structure and cumulative learning that characterises Mathematics, the figure is illustrative of how learning losses are compounded as learners move up the grades, resulting in poorer performance. It is possible, though, that the cognitive demand for the different grades in the tests, and most importantly in those questions that were used in the analysis, may differ in ways that could in itself have given varying outcomes in terms of average scores in 2019.

In CAPS, 'Number Operations and Relationships' is given the greatest time allocation in both Foundation and Intermediate Phase and in the Revised Teaching Plans of 2020 and 2021 it states explicitly that *"Numbers, Operations and Relationships is to be dealt with before all other topics since they form part of almost every topic"* (DBE Revised Teaching Plans of 2020 and 2021). This content area is recognised as the most fundamental content area in Foundation and Intermediate Phase Mathematics. Lack of proficiency and confidence in this content area becomes apparent in poor performance in other content areas, most notably in 'Measurement'. 'Measurement' is one of the primary contexts in which learners apply knowledge of 'Number Operations and Relationships'. It is significant therefore that 'Measurement' has the lowest performance levels at all three grade levels.

Interventions in the Foundation Phase must ensure greater proficiency in basic number sense and routine operations with whole numbers and fractions. While reading proficiency may impact on learners' ability to interpret and solve problems in context, learners clearly need much more exposure and practice applying their number knowledge to solving problems in contexts, including measurement contexts. Similarly, in Intermediate and Senior phase, proficiency with basic operations with fractions and decimals must lay the foundation for solving problems in 'Measurement' contexts.

At Foundation and Intermediate Phase, there is a strong case to be made to trim the curriculum even further in the two other content areas (Data Handling and Shape and Space) to take up less than 10% of teaching time, while retaining skip counting and number pattern activities under Patterns, Functions and Algebra. In Foundation Phase, 'Number, Operations and Relationships' and 'Measurement' should constitute 80% of learning time. This can be reduced to 70% in IP. This kind of dedicated time in a trimmed curriculum will likely set a much stronger foundation for learning in the Senior Phase.

PERFORMANCE AND LEARNING LOSSES ACCROSS GRADE 9 MATHEMATICS

Lack of proficiency and confidence in 'Numbers Operations and Relationships' becomes apparent in poor performance in other content areas

'Measurement' has the lowest performance levels at all three grade levels

Increasing the share of learning time dedicated to 'Number, Operations and Relationships' and 'Measurement' in the trimmed curriculum for Foundation- and Intermediate Phase will likely set a much stronger foundation for learning in the Senior Phase

In the Senior Phase, more topics can be added in other content areas that do not require extended periods of learning. While a greater proportion of time in this phase is allocated to 'Patterns Functions and Algebra', without proficiency in 'Number Operations and Relationships', performance in this content area will remain low. In addition, 'Measurement' again commonly serves as the contexts in which learners have to solve equations, or find input and output values. The extremely poor performance in Grade 9 'Measurement' thus also reflects lack of proficiency in basic operations with whole numbers and decimals and identifying and solving equations in context. Learners need much more exposure and practice applying their number and algebraic knowledge in 'Measurement' contexts. The trimmed curriculum for Grade 9 should be retained with a view to possible further trimming in 'Data Handling' and 'Shape and Space'.

> In addition, 'Measurement' again commonly serves as the contexts in which learners have to solve equations, or find input and output values. The extremely poor performance in Grade 9 'Measurement' thus also reflects lack of proficiency in basic operations with whole numbers and decimals and identifying and solving equations in context.

Finally, the impact of Covid-19 disruptions on learning outcomes was unprecedented and also unpredictable, given the various ways schools could respond depending on their capacity and resources. The immediate challenge that lies ahead is the availability of good diagnostic assessments that will allow teachers to assess competency levels at entry of learners and plan appropriate interventions to enable catch-up of learning losses where necessary.

5 Conclusions and Recommendations

1 The very difficult Gr3 Language test that leads to floor effects plus the multiple choice questions, hide the full extent of the **weak performance in Foundation Phase reading** and its consequences for the Intermediate Phase.

2 Time lost due to the pandemic has made **the LOLT transition** even more difficult. It also affects other subjects (as demonstrated in the Grade 6 Maths test). Special attention is required to ensure sufficient reading skills and vocabulary in English in the Intermediate Phase.

3 Mathematics deficits due to lost time amount to at least a year of learning in all grades. **Extra time is required for Mathematics** at all levels to catch up the year lost.

4 The weak performance of Quintile 4 schools needs special attention and is also partly reflected in large learning losses in many Afrikaans LOLT schools.

5 Mathematics and Language are **gateway subjects**, forming the basis for learning in all other subjects. Additional time for catch up in these subjects should be sought. Where feasible, time allocations for other subjects should be reduced or non-core subjects suspended or integrated into other subjects in order to free up time for Language and Mathematics (for example, as was done in 2020 in Foundation Phase with the integration of Life Skills into home language).

AREAS REQUIRING SPECIAL ATTENTION

FOUNDATION PHASE READING PERFORMANCE

READING SKILLS AND VOCABULARY IN ENGLISH FOR LEARNERS IN THE INTERMEDIATE PHASE (ESPECIALLY IF THERE WAS A LOLT TRANSITION)

MATHEMATICS AT ALL LEVELS

QUINTILE 4 SCHOOLS

6 Any catch up programme requires additional time. One way that this can be achieved is to **strengthen the use of existing instructional time**. As schools return from the disruptions of the past two years they need to be supported in maintaining regular school days and normal timetables. Shorter days (for Foundation Phase or on Fridays) should not be permitted. Careful regulation of school days during examination times must be undertaken to ensure that terms run their full course and a maximum number of school days are utilized for instruction. The district and circuit managers have a crucial role to play here.

7 Attention to addressing backlogs in reading and number sense in the **Foundation Phase** is a priority. Teachers must be supported in utilising existing resources and making sure that learners have the opportunity to take reading material home.

8 In subsequent phases, the overfull curriculum and homework tasks in other subjects should be reduced to allow learners to give more attention to catching up in Mathematics and Language. In other words, the **instructional load** of all subjects apart from Mathematics and Language needs to be reduced. This will require discussion and coordination amongst staff in schools across subjects and grades.

9 **Diagnostic assessments** of learners' knowledge to identify gaps should be done by individual teachers. The DBE/provinces/districts could assist teachers by providing quality benchmark assessments and assistance to teachers in interpreting results of these tests.

10 The work of Phase 3 of the Presidential Youth Employment Initiative (PYEI) beginning in April 2022 should focus on assisting individual learners with catching up content in Mathematics and Language. The sole task of the **educator assistants** should be to work through the previous year's DBE Rainbow workbook with individual learners. This will provide (especially struggling) learners with one-on-one instructional and affective support.

11 The DBE needs to attend to the **trimming** of the curriculum as a matter of urgency. Certain learning areas/topics should be omitted or consolidated, and others delayed. The focus should be on mastering those skills and concepts that are necessary for progression in learning in subsequent grades. As an example, in Mathematics, definitions of three-dimensional shapes can be left for later grades while core foundational content is mastered.

6 Annexure

Table 45 Estimates of a year's worth of learning expressed in standard deviations

Country/country grouping/subject	Year of learning in SD	Source
Low income countries	0.20	Azevedo et al. (2020)
Lower-middle income countries	0.30	Azevedo et al. (2020)
Upper-middle income countries	0.40	Azevedo et al. (2020)
High income countries	0.50	Azevedo et al. (2020)
Netherlands (Maths)	0.31–0.41	Engzell et al. (2020)
World, primary schools	0.30–0.60	Engzell et al. (2020)
Tanzania, Uganda and Kenya	0.20–0.30	Azevedo et al. (2020), quoting Jones (2017)
Vietnam	0.45	Azevedo et al. (2020), quoting Singh (2019)
Peru	0.20	Azevedo et al. (2020), quoting Singh (2019)
Brazil – municipal	0.04–0.56	Azevedo et al. (2020), quoting Azevedo & Goldemberg (2020)
Brazil, average	0.30	Azevedo et al. (2020), quoting Azevedo & Goldemberg (2020)
OECD countries	0.25–0.33	Azevedo et al. (2020), quoting Woessmann (2016)
USA Gr2–4, Reading	0.36–0.60	Hill et al. (2008)
USA Gr2–4, Maths	0.56–0.89	Hill et al. (2008)
USA Gr5–7, Reading	0.30–0.32	Hill et al. (2008)
USA Gr5–7, Maths	0.32–0.41	Hill et al. (2008)
USA Gr8–10, Reading	0–19–0.22	Hill et al. (2008)
USA Gr8–10, Maths	0.14–0.25	Hill et al. (2008)
Bolivia, Colombia, Ghana, Kenya and Vietnam	0.15–0.21	Evans & Yuan (2019)
SA Gr3, Maths	0.28	Spaull & Kotze (2015)
SA Gr4, Maths	0.54	Spaull & Kotze (2015)
SA Gr5, Maths	0.20	Spaull & Kotze (2015)
SA Gr3, Maths (non-language items)	0.28	Spaull & Kotze (2015)
SA Gr4, Maths (non-language items)	0.43	Spaull & Kotze (2015)
SA, Maths Gr4	0.49	Gustafsson (2017)
SA, Maths Gr8	0.24	Gustafsson (2017)

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