



TECHNICAL REPORT – JULY 2022

Sepedi Early Grade Reading Benchmarks

JULY 2022



basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA



FundaWande
Reading for Meaning



BENCHMARKS REPORT

Sepedi Early Grade Reading

July 2022

Prof Cally Ardington (SALDRU, University of Cape Town).

Nompumelelo Mohohlwane (Department of Basic Education).

Lesang Sebaeng (Department of Basic Education).

Christine Beggs (Room to Read).

Pinaki Jodar (Room to Read).

Dr Connie Makgabo (University of Pretoria).

Dr Ablonia Maledu (University of Limpopo).

Zamangwe Zwane (Department of Basic Education)

CONTENTS

Abbreviations and Acronyms	i
Contents	ii
List of Figures.....	iv
List of Tables	iv
Executive summary	1
1 Introduction.....	4
1.1 Aims.....	5
1.2 Report structure	5
2 Sepedi language	5
2.1 Linguistic and Orthographic Features of Sepedi.....	5
2.1.1 Vowels	6
2.1.2 Semi-vowels.....	7
2.1.3 Consonants	7
2.1.4 Some consonants distinguishing between Sepedi and Setswana	9
2.1.5 Syllables	9
2.1.6 Tone features in Sepedi	10
2.1.7 Sentence structures in Sesotho-Setswana languages versus Nguni languages	10
2.2 Review of studies of early reading development in Sepedi.....	11
2.2.1 Early Literacy Skills	11
2.2.2 Development of Early Literacy Skills.....	12
3 Benchmarking methodology	14
3.1 Methodological Approach.....	14
3.1.1 Conceptual underpinnings	14
3.1.2 Empirical approach	15
3.1.3 Exploratory non-parametric methods versus traditional benchmarking approaches	16
3.2 Instrument development	17
3.2.1 Tasks.....	18
3.2.2 Piloting and Results.....	20
4 Sepedi data	23
4.1 Background.....	23
4.2 Sample characteristics	24
4.3 Assessments.....	26
4.4 Reading norms	27

5	Benchmarking results	31
5.1	Establishing an oral reading fluency thresholds	31
5.1.1	Reading speed and accuracy	31
5.1.2	Fluency and comprehension.....	33
5.1.3	Thresholds and learner profiles.....	36
5.1.4	Concurrent validity: written comprehension	38
5.2	Examining Attainability and Setting Grade-Specific Minimum Benchmarks.....	39
5.3	Letter-sounds benchmark.....	40
6	Summary.....	42
7	References	44
8	Appendix.....	47

LIST OF FIGURES

Figure 1: Diagram of vowels in Sepedi.....	6
Figure 2: Percent of Grade 6 learners answering each comprehension question correctly across three passages.	21
Figure 3: Sepedi written comprehension for Grade 3 learners.....	22
Figure 4: Sepedi written comprehension – second passage for pilot two	23
Figure 5: Percentage of learners scoring zero for oral reading fluency.....	28
Figure 6: Percent correct on each comprehension question for learners attempting all questions	30
Figure 7: Speed and accuracy	31
Figure 8: Speed distribution for accurate readers (95% plus correct)	32
Figure 9: Speed distribution for inaccurate readers (less than 95% correct)	33
Figure 10: Fluency and comprehension	34
Figure 11: Oral reading fluency and individual comprehension questions – Grade 1 Term III.....	35
Figure 12: Oral reading fluency and individual comprehension questions – Grade 2 Term V Passage 1 ..	35
Figure 13: Oral reading fluency and individual comprehension questions – Grade 3 Term III Passage 1.	36
Figure 14: Oral reading fluency distribution by written comprehension score – Grade 3	38
Figure 15: Oral reading fluency distribution by written comprehension score – Grade 6	39
Figure 16: Percentage of learners reaching threshold and benchmark.....	40
Figure 17: Letter-sound knowledge speed and accuracy	41
Figure 18: Percentage of learners reaching letter-sound benchmark.....	42

LIST OF TABLES

Table 1: Standard vowels in Sepedi.....	6
Table 2: Semi-vowels in Sepedi	7
Table 3: Simple Consonants in Sepedi	7
Table 4: Complex Consonants in Sepedi.....	8
Table 5: Distinctive consonants for Sepedi and Setswana orthography	9
Table 6: Types of syllables in Sepedi	10
Table 7: Sepedi benchmarks reference group members	17
Table 8: Sepedi reading assessment by skill/task, source and grade.....	18
Table 9: Words attempted in 3 minutes by Grade 6 learners – pilot 1	21
Table 10: Oral reading fluency (ORF) for Grade 6 learners – pilot 2.....	22
Table 11: Sample size	24
Table 12: School characteristics.....	25
Table 13: Learner characteristics	26
Table 14: Oral reading fluency and written comprehension passages.....	27
Table 15: Mean letter-sound fluency, oral reading fluency, oral reading comprehension and written comprehension	28
Table 16: Data sub-samples used to assess fluency-comprehension relationships	29
Table 17: Learner profiles by benchmark level	37

EXECUTIVE SUMMARY

BACKGROUND

Despite comparatively high expenditure on education, almost universal primary enrolment and access to mother tongue instruction for the first three years, learning outcomes in South Africa are persistently poor. Although the country has shown large gains in the last three cycles of Progress in International Reading and Literacy Study (PIRLS) assessments, performance remains weak. Almost 80 percent of grade 4 learners did not reach the lowest PIRLS benchmark (understand literal information in texts), which means that they cannot read for meaning (Howie et al. 2017). Amongst participants who wrote the assessment in Sepedi, 93% did not reach this low international benchmark. These very poor outcomes for reading comprehension at the end of grade 4 point to problems with foundational aspects of reading such as decoding texts (the technical aspects of reading that relate to knowledge of the written code). This suggests that large gaps in early literacy development already occur in the Foundation Phase (Grades R-3). Several localised early grade reading studies confirm that the majority of foundation phase learners lag behind in the fundamental skills essential for learning to read (Cilliers et al. 2020, 2022; Spaul and Pretorius, 2019; Ardington, Hoadley and Menendez 2019; Ardington and Meiring 2020; Ardington and Henry 2021, 2022; Ardington et al. 2021). Children cannot read to learn when they have not yet learnt to read.

In response to this reading crisis, there are a range of ongoing initiatives and strategies to support early grade reading. These include provision of reading materials, campaigns to promote a culture of reading at school and at home, improvements in initial teacher training and ongoing teacher professional development and the establish of language specific benchmarks for foundational skills. The Department of Basic Education (DBE) has been leading efforts in the establishment of empirical benchmarks for all African languages. Through close partnerships between government, donors, NGOs and academics early grade reading benchmarks have already been established using large scale reading data for the Nguni languages (Ardington et al. 2022), Setswana and English as a first additional language (Wills et al. 2022). The DBE identified Room to Read and Funda Wandé as the two organisations who had existing data or would be collecting data respectively in Sepedi. With funding from Zenex Foundation and Funda Wandé, these organisations have collaborated with DBE and specialists from three South African universities to establish grade specific minimum benchmarks for foundational reading skills for Sepedi learners throughout the Foundation Phase.

WHY DO WE NEED BENCHMARKS?

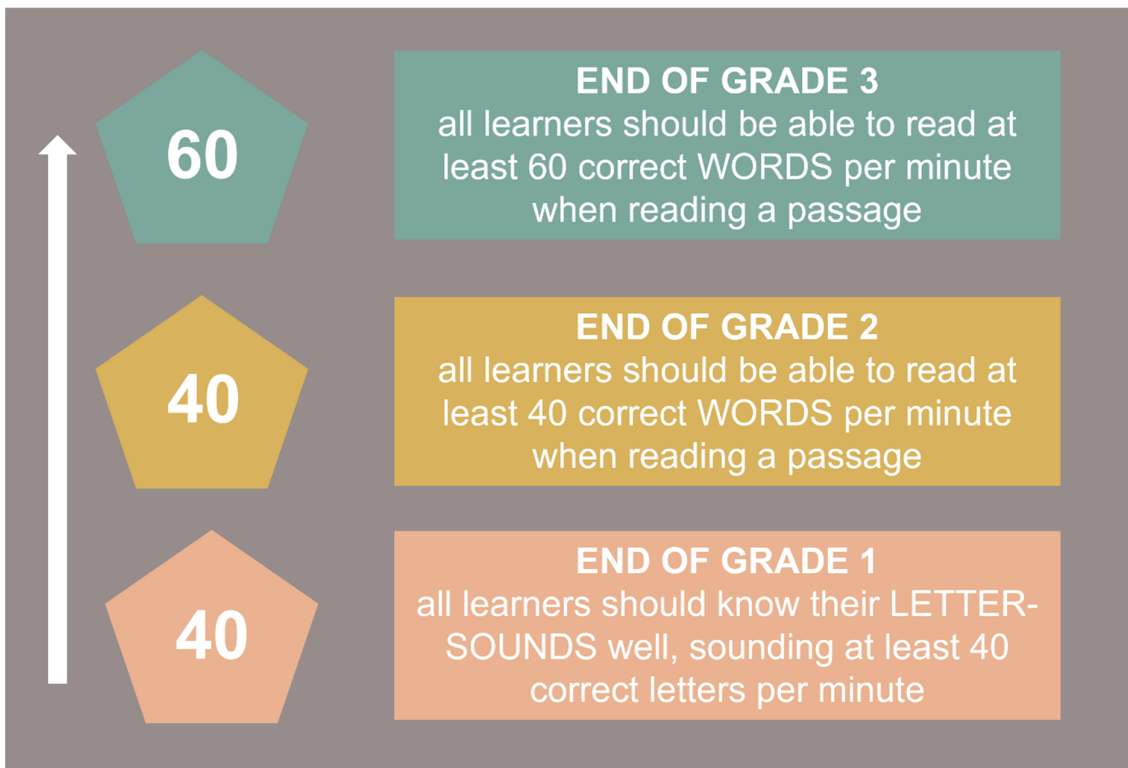
Reading benchmarks provide standards against which to measure learners' reading trajectories and assess whether they are on track to be able to read with meaning by the end of Foundation Phase. By articulating what successful reading looks like at the end of each grade, benchmarks allow for the early identification of learners who are at risk and hence supports remediation before large gaps develop. Benchmarks also potentially assist teachers in adapting their instructional focus to meet learners' needs at their reading level. Beyond the classroom, benchmarks facilitate the monitoring of reading outcomes and the measurement of progress towards the goal of having all learners are on track for a successful reading trajectory.

HOW DO WE ESTABLISH THE BENCHMARKS?

Following the Nguni and Setswana benchmarking reports (Ardington et al. 2020, Wills et al. 2022), our approach is guided by a combination of insights from the data, reading development theory, expert

linguistic knowledge of Sepedi and an understanding of curriculum demands and system realities. We use existing Room to Read data and newly collected data from the Funda Wande impact evaluation in Limpopo to identify critical thresholds along a successful trajectory to reading for meaning in Sepedi. We then assess whether these thresholds could serve as contextually appropriate benchmarks by examining attainability at various grade levels. Overall, we have Sepedi reading assessment data on 8,179 unique learners across 187 no-fee schools.

WHAT ARE THE SEPEDI EARLY GRADE BENCHMARKS?



The following grade-specific minimum benchmarks are proposed:

- By the end of grade 1, all learners should know their letter-sounds well, sounding at least 40 correct letters per minute.
 - Letters are a good early predictor of oral reading fluency (ORF) later in Foundation Phase. Improvements in letter-sound speed stagnate at 40 letters. Pre-pandemic 32 percent of learners in this sample had reached this benchmark at the end of grade 1.
- By the end of grade 2, all learners should be able to read at least 40 correct words per minute when reading a passage
 - Below this threshold, accuracy is poor and we find little evidence that learners can comprehend what they have read. This is therefore a minimum benchmark, if learners do not reach this level of fluency, higher-order reading skills are very unlikely to develop. Pre-pandemic 32 percent of learners in this sample had reached this benchmark at the end of grade 2.

- By the end of grade 3, all learners should be able to read at least 60 correct words per minute when reading a passage
 - At this level of fluency reading comprehension becomes increasingly possible when learners read on their own. Once learners reach this level of fluency, it appears that poor comprehension skills become the limiting factor to further literacy development. In 2021, only 7 percent of learners in this sample had reached this benchmark at the end of grade 3. However, 62 percent of grade 6 learners in the same schools had reached the benchmark.

1 INTRODUCTION

Although South Africa has shown large gains in the last three cycles of Progress in International Reading and Literacy Study (PIRLS) assessments, the performance of the country remains poor (Howie et al. 2017). While PIRLS only assesses reading comprehension at the end of grade 4, the high number of learners who cannot reach the lowest PIRLS benchmark (understanding literal information in texts) suggests that they have problems with foundational aspects of reading such as decoding texts (the technical aspects of reading that relate to knowledge of the written code). This suggests that large gaps in early literacy development already occur in the Foundation Phase (Grades R-3). Nationally less than a quarter (22%) of learners reach the low international benchmark. This shrinks to only 7% for participants who wrote the assessment in Sepedi (Howie et al. 2017).

Despite comparatively high expenditure on education, almost universal primary enrolment and access to mother tongue instruction for the first three years, learning outcomes in South Africa are persistently poor. Although the country has shown large gains in the last three cycles of Progress in International Reading and Literacy Study (PIRLS) assessments, performance remains weak. Almost 80 percent of grade 4 learners did not reach the lowest PIRLS benchmark (understand literal information in texts), which means that they cannot read for meaning (Howie et al. 2017). Amongst participants who wrote the assessment in Sepedi, 93% did not reach this low international benchmark. These very poor outcomes for reading comprehension at the end of grade 4 point to problems with foundational aspects of reading such as decoding texts (the technical aspects of reading that relate to knowledge of the written code). This suggests that large gaps in early literacy development already occur in the Foundation Phase (Grades R-3). Several localised early grade reading studies confirm that the majority of foundation phase learners lag behind in the fundamental skills essential for learning to read. Children cannot read to learn when they have not yet learnt to read.

In response to this reading crisis, there are a range of ongoing initiatives and strategies to support early grade reading. These include provision of reading materials, campaigns to promote a culture of reading at school and at home, improvements in initial teacher training and ongoing teacher professional development and the establish of language specific benchmarks for foundational skills. The Department of Basic Education (DBE) has been leading and efforts in the establishment of empirical benchmarks for all African languages. In 2019, the DBE convened a consultative design process including South African academics and reading practitioners, funders and international benchmarking experts that culminated in the *Setting Reading Benchmarks* report (Khulisa Management Services, 2020) that identified three data approaches. First, reanalysis of existing data; second identifying and “topping up” upcoming planned data collections from other reading studies and third, collecting data specifically for benchmarking.

Using large scale reading assessment data from over 30,000 learners across 5 provinces, collaborative research and funder activities have, to date, led to the establishment of benchmarks for the Nguni language family (Ardington et al. 2020) and a Setswana and English First Additional Language benchmarking report (Wills et al. 2022). Analysis of recently collected Afrikaans data and instrument piloting in preparation for Xitsonga data collection are both under way.

Following a search through the Literacy Association of South Africa (LITASA), the public launch of the Setting Reading Benchmarks and Nguni benchmarks and following up with individual NGO’s directly and through the National Reading Coalition, the DBE found that Room to Read and Funda Wandé were the two organisations who had existing data or would be collecting data respectively in Sepedi. The DBE approached both organisations requesting collaboration on reading benchmarks for Sepedi.

Room to Read had existing early grade reading assessment data for grade 1 and 2 learners collected between 2016 and 2019. Data collection for the impact evaluation of Funda Wande programme in 120 Sepedi schools was planned for the third term of 2021. With funding from Zenex Foundation and Funda Wande, the scope of the fieldwork for the impact evaluation was revised to include Sepedi benchmarking. Provision was also made for a rigorous instrument development process in collaboration with Sepedi language experts and utilising multiple rounds of small scale piloting. In addition to expanded data collection, funding included analysis, report writing and dissemination of both the Room to Read and Funda Wande data.

1.1 AIMS

The purpose of this report is to establish grade-specific minimum Sepedi reading benchmarks for the Foundation Phase. Following the Nguni and Setswana benchmarking reports (Ardington et al. 2020, Wills et al. 2022), our approach is guided by a combination of insights from the data, reading development theory, expert linguistic knowledge of Sepedi and an understanding of curriculum demands and system realities. We use existing Room to Read data and newly collected data from the Funda Wande impact evaluation in Limpopo to identify critical points along a successful trajectory to reading for meaning in Sepedi.

The results from this study, together with the Setswana report and an analysis of existing Sesotho data from Save the Children, will inform the establishment of early grade reading benchmarks for the Sesotho-Setswana language family.

1.2 REPORT STRUCTURE

The next section outlines the orthography, phonology and morphology of the Sepedi language, highlighting features that might prove challenging for developing readers (Section 2.1). This is followed by a brief summary of the limited research into early reading in Sepedi (Section 2.2). Thereafter we describe our empirical approach (Section 3.1) and instrument development process (Section 3.2). The data used to establish Sepedi benchmarks are described in Section 4 and the benchmarking results are presented in Section 5 and summarised in the concluding section (Section 6).

2 SEPEDI LANGUAGE

2.1 LINGUISTIC AND ORTHOGRAPHIC FEATURES OF SEPEDI

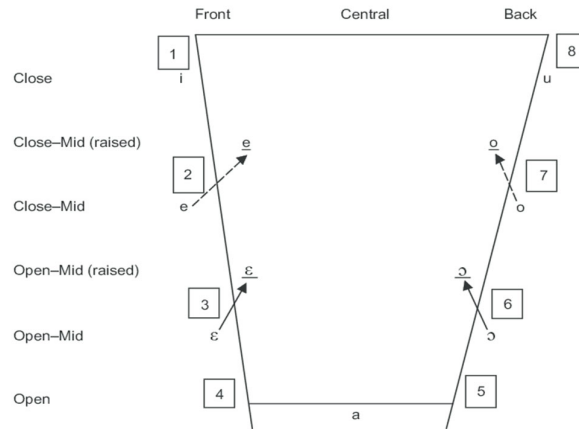
Sepedi language, also known as Northern Sotho (Sesotho sa Leboa), is one of the 11 official languages spoken in South Africa, as stated in the South African Constitution (1996), and Chapter 11 on Language in Schools (Stein, 2011). Sepedi consists of 30 dialects of the North-Eastern Provinces of South Africa and the Southern part of Botswana (Faaß et al., 2009). This language is spoken mainly in Limpopo province and parts of the Mpumalanga and Gauteng provinces. According to the 2011 National Census, Sepedi is spoken by 4,6 million people as a first language and 9,1 million as a second language in South Africa. First language speakers form around 9 percent of the South African population (Statistics South Africa, 2012).

Sepedi belongs to the family of Sesotho-Setswana languages, together with Setswana (mainly spoken in the North-Western parts of South Africa) and Sesotho/South Sotho (mainly spoken in Free State province, parts of Eastern Cape and Gauteng provinces, and Lesotho).

Sepedi's language structure is based on three types of sounds; vowels, semi-vowels, and consonants. Similar to Setswana and Sesotho, Sepedi has seven vowels that differ according to the position of the tongue within the oral cavity during their articulation. The diagrammatic representation of Sepedi vowels is as follows:

2.1.1 Vowels

Figure 1: Diagram of vowels in Sepedi



The diagram above shows Sepedi's 7 standard vowels, of which 4 are raised vowels. Raised vowels are those naturally low vowels that increase their pitch when followed by high vowels, sounding the same as the ones following them. During writing, the raised vowels are not represented differently from their counterparts. It is only during reading and speaking where the pitch of vowels occurs in relation to the context of the speech to distinguish lexical meaning between or among words of the same structure.

Table 1 shows the representation of 7 standard vowels common for Sepedi and other Sotho languages (Setswana and Sesotho):

Table 1: Standard vowels in Sepedi

Vowels in Sepedi	Example	
	Sepedi	English
a	bala	read
e	sepela	walk
ê	bolela	speak
i	rita	brew
o	motho	human being/person
ô	kobo	blanket
u	bula	open

The circumflex diacritic mark (ˆ) for (ê) and (ô) differentiates (ê) from (e) and (ô) from (o). While the differences in these sounds are expressed in spoken language and in official orthography, the diacritic markings are not typically used nor taught in the classroom. The difference in sounds is generally derived from context. The following are the Sepedi words that distinguish between the circumflex diacritic vowels and their counterparts.

- (ê) & (e) > beka (cut meat into strips for biltong); bêka (to marry)

>lefela (maize); lefêla (pay for)

- (ô) & (o) > bola (initiate/reveal); bôla (rot)
>noka (river); nôka (body waist)

2.1.2 Semi-vowels

Two semi-vowels are part of Sepedi language, being; (w) and (y). Table 2 shows the semi-vowels and their examples in words.

Table 2: Semi-vowels in Sepedi

Semi-vowel	Sepedi	English
w	wela wena	fall into you
y	boya myemyela	fur smile

2.1.3 Consonants

Sepedi language depends on consonants for word structure. Consonants together with vowels and semi-vowels combine to form words. It is easy to write words in Sepedi due to its simple and transparent orthography, like in any other African language, but the challenge comes with the complex consonants that make it difficult for learners to learn orthography with ease, especially at the Foundation Phase. There is a larger code set of simple and complex consonants, represented as diagraphs, and trigraphs as reflected in the Tables 3 and 4 below.

Simple consonants consist of single sounds that are not complicated to read and write since they are represented by only one letter.

Table 3: Simple Consonants in Sepedi

Simple Consonant	Sounds like			Example	
				Sepedi	English translation
b	B	in	battle	beke	week
d	D	in	die	dula	sit
f	F	in	phone	fofa	fly
g	G	in	gorrel (in Afrikaans)	goga	pull
h	H	in	head	hema	breathe
h̥	does not exist in English ¹			hwetša	find
j	J	in	June	Ja	eat
k	K	in	keep	kolobe	pig
l	L	in	lay	loma	bite
m	M	in	Man	motho	person
n	N	in	Norm	nama	meat
p	P	in	Pink	padi	novel
r	R	in	Rope	rata	love
s	S	in	Sale	sekolo	school
š	Sh	in	Shine	lešela	cloth

¹ This voiceless pharyngeal fricative [h̥] does not occur in English but sounds like steaming up your glasses to clean them. <http://web.mnstate.edu/houtsli/tesl551/Phonetics/page3.htm>

t	T	in	Time	tau	lion
w	W	in	Wet	wa	fall
y	Y	in	Yell	yela	that one
x	-	-	click sound	nxa	disapproval
c	-	-	click sound	cecece	sympathy

The 'x' and 'c' are click sounds that form part of the Sepedi consonants, and are minimally used in the language. Each of them is used once as in the two cases mentioned above. Complex Consonants are types of consonants that are represented by two or three letter-sounds, that when combined with vowels and other sounds create words that give a specific sound and meaning.

Table 4: Complex Consonants in Sepedi

Complex consonant	Sounds like			Example	
				Sepedi	English translation
Bj				bjang	grass
Gw				gwerana	befriend/make friends
Hl				hlaba	stab
Hlw				hlweka	clean
Hw				hwa	die
Kg				kgaka	guinea fowl
Kgw				kgwele	ball
Kh	K	In	King	khora	become full
Kw				kwa	hear
Lw				lwala	be sick
Mm				mmele	body
Mph				mpho	gift
Mp				mpa	stomach
Mps				mpsha	new/young
Mpš				mpša	dog
Ng	Ng	In	Wrong	ngaka	doctor
Ngw				ngwala	write
Nk				nko	nose
Nkw				nkwe	leopard
Nn				nne	four
Nng				nngele	left side
Nny				nnyane	small
Nt				nta	louse
Nth				ntho	wound
Ntl				ntlō	house
Ntlw				ntlwana	small house
Nts				ntsebe	know me
Ntsh				ntsho	black
Ntš				ntši	many
Ntšh				ntšhi	fly
Ntw				ntwa	fight
Nw				nwa	drink
Ny	Ny	In	canyon	nyaka	want

Nkg				nkg	smell
Nyw				nywanywa	smile
Ph	P	In	Plough	phadima	shine
Rw				rwala	carry
Sw				swa	burn
Th	T	In	Tin	thapa	wet
Tl				tlala	hunger
Tlh				tlhago	nature
Ts				tsoga	wake up
Tš				tšea	take
Tsh				tshela	Six/jump
Tšh	Ch	In	church	tšhela	pour
Tshw				tshwanelo	appropriate
Tšhw				tšhweu	white
Tšw				tšwafa	be lazy
Tsw				tswalela	close

2.1.4 Some consonants distinguishing between Sepedi and Setswana

Sepedi and Setswana languages have the same consonants that they use interchangeably when articulating words, especially with the use of diacritic (š). Words pronounced with (š) in Sepedi are using (s) in Setswana and vice versa. The sound (tlh) in Sepedi is used for nouns and (hl) for verbs, but is the opposite in Setswana because the sound (tlh) is used to create verbs and the sound (hl) is for nouns.

Table 5: Distinctive consonants for Sepedi and Setswana orthography

CONSONANT	SEPEDİ	SETSWANA
b - b'	b (<i>Bilabial Fricative</i>) – bana (kids)	b' (<i>Bilabial Plosive</i>) > b'ana (kids)
bj - jw	bj > bjala (plough)	jw > jwala (plough)
ng - kw	ng > ngwala (write)	kw > kwala (write)
tš - ts	tš > pitša (pot)	ts > pitsa (pot)
hl - tlh	hl > hlapa (bath)	tlh > tlhapa (bath)
pš - psw	pš > bopa (built)	psw > bopswa (built)
ts - b	ts > matsogo (arms)	b > mabogo (arms)
ts - tš	ts > tsoma (hunt)	tš > tšoma (hunt)
š - s	š > šala (remain)	s > sala (remain)
tšh - tš	tšh > tšhuma (set alight)	tš > tšuba (set alight)
sw - š	sw > swa (burn)	š > ša (burn)

2.1.5 Syllables

A syllable is a unit of spoken language that is no bigger than a speech sound and consists of one or more vowel sounds alone or of a syllabic consonant alone or of either one or more consonant sounds preceding or following. The four syllables structures in Sepedi, as stated in (Madigoe, 2003), are presented in Table 6.

Table 6: Types of syllables in Sepedi

Type of syllable	Word	Analysis	Results
CV (Consonant + Vowel)	loma	lo > CV ma > CV	CV + CV
C (Consonant only)	monna	mo > CV n > C na > CV	CV + C + CV
	kerekeng	ke > CV re > CV ke > CV ng > C	CV + CV + CV + C
V (Vowel only)	leoto	le > CV o > V to > CV	CV + V + CV
CwV (Consonant + semi-vowel 'w' + Vowel)	rwala	rwa > CwV la > CV	CwV + CV

Sepedi words differ according to the number of syllables they have. Some words are monosyllabic while others are multisyllabic. Multisyllabic words make it difficult for learners to read with understanding since it is difficult to break them up to get meaning from their parts because collectively they create meaning. Examples are words like 'semphetekegofete' (8 syllables) and 'leebarope' (5 syllables).

2.1.6 Tone features in Sepedi

Sepedi is a tonal language spoken using two contrasting tones: low and high. The most important property of tonal languages which distinguishes them from languages that merely use the pitch as part of intonation is the existence of numerous tonal minimal pairs. Often, a few words may be composed of exactly the same syllables/phonemes yet have different characteristic tones. The example will be based on the Sepedi homonyms, being words that have the same structure but different meanings, with the meaning being influenced by the tone. Tone can alter the meaning of a word or expression completely.

Example 1: mōhlwà (termites) and mōhlwá (grass).

Example 2: nòkà (body waist), nókà (put spice), and nóká (river) appear similar but differ in the use of tones which change the meaning of the word.

It is difficult for learners at the foundation phase level to differentiate homonyms according to their tonal differences. Tonal differences may make it difficult for learners to pronounce and comprehend the words effectively.

2.1.7 Sentence structures in Sesotho-Setswana languages versus Nguni languages

All the Sesotho-Setswana languages are written disjunctively as compared to Nguni languages which are conjunctive. Examples of Sesotho-Setswana languages: 'Ke se sebotse' in Sepedi; 'Ke se settle' in Sesotho, and 'Ke se se pila' in Setswana (*English: It is beautiful*). The three words are used to form a sentence in Sotho languages but are represented by one word in Nguni languages, 'yinhle'. For this reason, Spaull, Pretorius,

and Mohohlwane (2020) suggest the tentative benchmarks in Sepedi (a Sesotho-Setswana language) that are higher by more than double the number of correct words per minute compared to isiZulu benchmarks.²

Learners should be assisted from a young age to deal with complex sounds and syllables so that they acquire the reading skills and vocabulary at their early stages of education. They should be given reading activities regularly so that they get used to reading and learning simple and difficult words.

2.2 REVIEW OF STUDIES OF EARLY READING DEVELOPMENT IN SEPEDI

2.2.1 Early Literacy Skills

Early literacy instruction in African languages usually happens in the context of high poverty schools (Pretorius and Mokhwesana, 2009). Early literacy refers to the reading and writing behaviours and notions that are acquired by children during the pre-school years and the first few grades of school (Schutte, 2005). In approximately 70% of South African primary schools, children complete grades 1-3 in their African home language, with English taught as an additional language (Spaull *et al.*, 2020). Things however change in grade 4 where 90% of all learners are taught with English as the medium of instruction and African languages are taught as a home language subject. Even though the majority of learners learn to read and write in an African language, there are currently not many studies on reading in African languages (Spaull *et al.*, 2020).

Large scale literacy assessments that have been conducted in South Africa indicate that learners are struggling to read (Mokhwesana, 2009). A reading project called “*Reading is FUNdamental*” was implemented in Gauteng in 2005 in a non-fee paying primary school, the purpose of the project was to help the school optimize conditions that promote the development of sound reading in order for the school to develop a culture of reading which would, in turn, improve the overall language and academic development of learners (Pretorius and Mokhwesana, 2009). Pretorius and Mokhwesana (2009) outlined the intervention programme at the school and examined the effects that the intervention had on grade 1 learners in the home language Northern Sesotho (Sepedi), over a period of 4 years. The questions addressed in the study by Pretorius and Mokhwesana (2009) were as follows:

- Has performance in Northern Sotho literacy development in grade 1 changed since the inception of the reading intervention?
- In what way have the Northern Sotho classrooms changed during the four years?
- In what way have the teachers practised Northern Sotho literacy instruction during this period?

The intervention being evaluated in this study was made up of two approaches to reading, these were resource building and capacity building. The resource building component was focused on the school library and classrooms. The component on capacity building focussed on developing the instructional capacity of the teachers and the supportive capacity of the parents (Pretorius and Mokhwesana, 2009). For this study, a quasi-experimental, pre and post-test design was used to assess the reading skills of grade 1 (Northern Sotho) and grade 6 & 7 (Northern Sotho and English) learners every year to monitor the literacy accomplishments of the learners over time. The article, however, focused on the grade 1 results. At the start of the project, the reading results of the grade 1 learners were very poor. However, the results of the study showed a steady increase in various aspects of reading competence during the four years (Pretorius and Mokhwesana, 2009). Pretorius and Mokhwesana (2009) argued that improvements in reading in the

² In Spaull, Pretorius and Mohohlwane (2020) the isiZulu learners reading at 21 CWPM or faster, read with an accuracy of 95 percent or higher. In contrast, a 95 percent accuracy is associated with reading at 51 CWPM or faster in Sepedi (Northern Sotho).

African languages depend on changes in instructional practices in the classroom and that these changes will only happen if attention is paid to both resource building and capacity building in formal schooling contexts.

2.2.2 Development of Early Literacy Skills

Research that has been conducted on the development of cognitive-linguistic skills like phonological processing (among others) which is important for reading development does not adequately address the development of, as well as the relationship between, a large range of phonological processing and reading skills in South Africa to (Makaure, 2016). This is largely due to the differences between English and African languages, including Sepedi which underpin reading acquisition namely, orthographic depth, phonological and morphological differences (Schroeder, L. 2013). Makaure (2016) Investigated the relationship between phonological processing skills and reading development in Northern Sotho-English bilingual children. The systems of language are different in terms of phonological and orthographical rules. Northern Sotho and English are different in both their phonological and orthographic systems. The phonological differences between Northern Sotho and English can be seen in rhythmic properties, syllable shape and the quantity of consonant clusters and phonemes (Makaure, 2016). A learner who is bilingual in Northern Sotho and English is expected to learn the phonological and orthographic rules for both these languages which can prove to be very challenging for the learner. Northern Sotho and English also differ in rhythmical properties. Northern Sotho is regarded as a syllable-timed language, this means that the syllables are approximately equal in duration (Makaure, 2016). English however is a stress-timed language; this means that it is a language with a rhythm in which syllables tend to show regular inter-stress intervals. In Northern Sotho, there are approximately 38 consonantal phonemes whereas English has approximately 25 consonantal phonemes. According to Makaure (2016), a phoneme can be described as a basic unit of human speech. Phonemes make distinctions between words possible, they are smaller than words or syllables. Makaure (2016) and Schroeder (2013) both point to the need to understand the relationship distinctly for each language and for this to shape both the reading methodologies adopted and the literacy components emphasized and taught explicitly.

In terms of the orthographic structure of these languages, although they are both alphabetic languages, they have different orthographies. Northern Sotho has a transparent/shallow orthography meaning that words can be pronounced exactly as they are spelt. English however has an opaque/deep orthography; words are not always pronounced as they are spelt. In order to go about investigating this relationship between phonological processing skills and reading development in Northern Sotho-English bilingual children, Makaure (2016) divided 98 participants into group 1 (n=48) and group 2 (n=50) based on their Language of Learning and Teaching (LOLT). Group 1 received literacy instructions in Northern Sotho and Group 2 received literacy instructions in English. The grouped learners were assessed using a battery of phonological processing tests and reading abilities in English and Northern Sotho. The results from the correlations, multiple regressions and multivariate analyses of variance that were conducted indicated that phonological processing skills are essential in reading development in both the first and second language of participants (Makaure, 2016).

Schutte (2005) conducted a study that examined the typical development of early literacy in a group of developing preschool Sepedi first language children from Atteridgeville. The basis for the subsequent achievement of higher linguistic skills that include reading and writing is early literacy. Early literacy skills are important because they make way for the transition to conventional literacy levels that will eventually play an important role in the routine aspects of education (Schutte, 2005). Early intervention with children that are at risk for literacy problems is important because reading performance can be influenced by a child's insight into their own reading capabilities from as early as their second school year.

Oral language fluency (with emphasis on the phonological awareness component) is said to be interrelated with children's early literacy skills. This means that an increased skill or understanding in either phonological awareness or early literacy skills will promote skill and understanding in the other (Schutte, 2005). For this study by Schutte (2005), 20 Sepedi speaking children from Atteridgeville attending grade R were selected using a non-probability convenience sampling method which used readily available participants. The main purpose of this study was to gather data on the development of early literacy in a group of typically developing pre-school Sepedi first language children, by determining their performance in several early literacy tasks. These tasks included: written language awareness, narrative abilities, phonological awareness, letter name knowledge, grapheme-phoneme correspondence and literacy motivation. The performance of the selected children on these tasks was used to describe the early literacy development of the target population. The results were also used to identify risk criteria that could indicate delayed early literacy development in the targeted population. The performance of the children from Atteridgeville on these tasks differed from those of other children in local and international studies. This highlights the necessity of assessments and interventions that consider the unique influence of factors such as socioeconomic status, family literacy and specific learning environment (Schutte, 2005). The results of the study also indicated that instruction has a major influence on the development of early literacy skills. It was also found that the mother's level of education was not related to a child's early literacy skills, this could however be related to the unique social circumstances of the population used (Schutte, 2005).

Wilsenach (2019) conducted a study that assessed different levels of phonological awareness in Sepedi learners to determine the relationship between phoneme awareness, syllable awareness and reading. Phonological Awareness is a sensitivity to sounds and sound structure of a certain language, it plays an important role in the development of reading across different languages. Although there has been an interest in the role of phonological awareness in successful reading attainment in Sepedi, there has been no establishment of the importance of developing awareness of the different phonological grain sizes that underlie decoding in the language (Wilsenach, 2019).

The study by Wilsenach (2019) was conducted in Atteridgeville on grade 3 learners who spoke Sepedi as a home language and who received their literacy instruction in Sepedi. In this study, 60 grade 3 learners were randomly selected and assessed on a range of phonological processing and reading skills. The study was cross-sectional and included a correlation component. All data for this study were collected in the 3rd term of the school year. The tests used in the study were custom made to meet the aims of the study, this is because no standardised tests to assess phonological awareness skills or reading in Northern Sotho existed. The results of the study indicated that Sepedi learners are significantly better at identifying syllables than they are at identifying phonemes, however, the results also showed that phoneme awareness predicts reading outcomes more accurately (Wilsenach, 2019). The main takeaway from the study is that phoneme awareness does not really develop early or automatically in languages that have a simple syllable structure and a transparent orthography, the study highlights the importance of teaching phoneme-grapheme correspondences to Sepedi learners with the use of a systematic phonics approach in Sepedi, the importance of this is highlighted because sensitivity to phonemes will help improve a child's ability to properly recode symbols to sounds (Wilsenach, 2019).

While these studies are instructive, they are part of a small select number of studies focusing on understanding cognitive-linguistic processes in reading in African languages, far more research has been done on English and Afrikaans. Evidence of this includes (De Vos, van der Merwe, and van der Mescht, 2014; Pretorius; 2018).

3 BENCHMARKING METHODOLOGY

3.1 METHODOLOGICAL APPROACH

Our approach to establishing early grade reading benchmarks in Sepedi follows the same process as that for the Nguni languages (Ardington et al. 2020, Ardington et al. 2021) and Setswana (Wills et al. 2022). We follow a data driven approach that is grounded in the reading development theory and guided by expert linguistic knowledge of Sepedi and an understanding of curriculum demands and system realities. Ardington et al. (2020) and Wills et al. (2022) provide a detailed exposition of the theory of reading development informing our empirical analyses. Here we briefly summarize the main points that motivate our approach and then set out our empirical strategy.

3.1.1 Conceptual underpinnings

While the ultimate goal of reading is to construct meaning from the text, reading comprehension is a complex phenomenon requiring the development and coordination of multiple foundational skills and processes. Within each process decoding accuracy tends to develop first, followed by increased speed as decoding becomes more automatic, rapid and effortless. This in turn frees up working memory and attention for meaning construction.

Oral reading fluency (ORF) is the ability to read with accuracy, speed and proper expression (prosody) and is necessary (albeit not sufficient) for learners to fully comprehend what they are reading. While fluency builds a bridge between decoding and reading comprehension (Chard, Pikulski and McDonagh, 2006), there may be non-linearities in the relationship between fluency and comprehension. The decoding threshold hypothesis put forward by Wang et al. (2019) suggests that reading comprehension is unlikely to develop until decoding exceeds a lower bound threshold level. They also suggest that there may be an upper threshold, beyond which there are no additional gains (in comprehension) for increasing decoding skills.

Language differences have a critical impact on the development of these processes. Accuracy tends to develop more rapidly in languages with transparent orthography (e.g. Sesotho-Setswana and Nguni languages) than in those with opaque orthography (e.g. English). Automaticity (i.e. processing without effort or conscious attention) develops at various unit levels - grapheme-phoneme correspondence, syllables, morphemes and words. The rate at which this happens depends crucially on language morphology. Within agglutinating languages, automaticity at the word level will develop faster in languages with a disjunctive orthography (e.g. Sesotho-Setswana languages) than those with a conjunctive orthography (e.g. Nguni languages).

This understanding of reading development informs our approach to benchmarking in several ways. First, ORF is an important skill in its own right and a reasonable proxy for comprehension. Reading comprehension is not a simple construct and is challenging to assess in an equivalent or reliable manner while ORF is easily understood and measured making it an appropriate skill for benchmarking. In this report, we use the term fluency to describe the combination of speed (number of words attempted in a time period) and accuracy (percentage of attempted words read correctly) as the assessment of prosody is subjective and difficult to measure in field studies.

Second, following Wang et al. (2019), our exploratory data analysis aims to identify critical decoding thresholds in learners' reading development. We specifically look for fluency points below which comprehension is unlikely to develop and whether there is evidence of an upper threshold where limited comprehension skills become a constraint and there are no further gains to increasing fluency.

Third, we explicitly acknowledge the importance of accuracy by focussing on the relationship between accuracy and speed before turning our attention to the comprehension-fluency relationship.

Fourth, differences between languages necessitate language-specific benchmarks. African languages, including Sepedi, are under-studied and we are careful not to impose any *a priori* assumptions on the accuracy-speed and fluency-comprehension relationships. Our empirical approach relies heavily on exploratory data analysis to uncover these relationships for Sepedi early grade readers. In this sense, our approach is data driven. That said, benchmarks need to be contextually appropriate and cognisant of curriculum requirements. Setting benchmarks at a level that is out of reach for most learners limits their usefulness in tracking incremental improvements or guiding remediation or instruction. On the other hand, benchmarks need to be set high enough to encourage system improvements toward levels that are appropriate for the demands of the curriculum. To this end, we examine the attainability of proposed benchmarks and engage in expert opinion on the appropriate grade level at which to set each benchmark.

Fifth, reading is hierarchical with the development of lower-level skills necessary for the development and application of higher order skills. This supports establishing benchmarks for lower order skills to ensure that learners are on a successful trajectory for learning to read for meaning. Letter-sound knowledge fluency has been shown to be predictive of later oral reading fluency. Benchmarking this foundational skill provides a means of identifying at-risk learners early on at the lower end of the hierarchy.

3.1.2 Empirical approach

The aim of this report is to establish appropriate letter-sound knowledge and oral reading fluency benchmarks to map out a successful reading trajectory through the Foundation Phase. The focus of the empirical work is to identify the level where decoding skills are sufficiently established to support reading comprehension (upper threshold) and to investigate whether there are critical points in learners' decoding development below which comprehension stagnates (lower threshold). To avoid imposing *a priori* assumptions about reading development in Sepedi, we use non-parametric techniques to explore the accuracy-speed and fluency-comprehension relationships.

Once these thresholds are identified, we use concurrent data on related reading skills to establish whether these potential benchmarks align with meaningful distinctions between learners and the stages of reading development. We also investigate whether the potential benchmarks are contextually appropriate by examining the proportion of current learners reading at these levels. The benchmarks need to be ambitious enough to support improvements in reading proficiency while at the same time being set at a level such that they can be used to measure incremental progress and inform instructional focus in the classroom. Our process of setting benchmarks involves both backwards and forwards analyses of the data.

3.1.2.1 Establishing ORF benchmarks

3.1.2.1.1 Examining the relationship between speed and accuracy

Betts (1946) classified learners as reading at the independent, instructional or frustration level based on a combination of their word reading accuracy and comprehension. In terms of accuracy, learners reading at the independent level read with at least 99 percent accuracy, those at the instructional level read with at least 95 percent accuracy and readers at the frustration level are reading with less than 90 percent accuracy. A review of recent evidence supports the continued use of these levels (Allington et al. 2015). The levels developed by Betts should be easily attainable for Sepedi readers as accuracy tends to develop more readily in transparent languages than in English which has an opaque orthography.

Using locally weighted polynomial regressions, we investigate the relationship between speed and accuracy paying particular attention to the speed associated with the instructional level of accuracy identified by Betts. Below those speeds, decoding is likely to be laboured hindering the ability of the learner to make meaning from the text. This point is the lower threshold.

3.1.2.1.2 Examining the relationship between fluency and comprehension

We then use the same non-parametric approach to explore the relationship between fluency (a measure of both speed and accuracy) and comprehension. We consider whether learners struggle to comprehend what they read when their fluency levels are below the lower threshold suggested by the accuracy-speed relationship. We also seek to establish the fluency level necessary to support comprehension, paying particular attention to whether there is evidence of an upper threshold below which there are limited improvements in comprehension with increased fluency.

3.1.2.1.3 Concurrent validity and contextual alignment

Next we establish the concurrent validity of the fluency thresholds by examining how they align against the performance of the same learners on written comprehension assessments. We also investigate whether they distinguish learners into meaningful reading profiles. Finally, we assess whether these thresholds are contextually appropriate by investigating their achievability at various grade levels.

3.1.2.2 Establishing letter-sound benchmarks

Using longitudinal data and drawing on expert opinion, the Nguni benchmarking report identified 40 correct letter-sounds per minute as an appropriate minimum benchmark for the end of grade 1 (Ardington et al. 2020). Reaching this level was predictive of reaching later oral reading fluency benchmarks and data indicated that there were diminishing improvements in letter-sound knowledge once learners had reached 40 correct letter-sounds per minute. Despite differences in pronunciation, one wouldn't expect significant differences in the process of letter-sound acquisition across the Nguni and Sesotho-Setswana language groups. The Setswana benchmarking report determined that this benchmark was appropriate in terms of reachability and predictive validity (Wills et al. 2022). Sepedi longitudinal data have not yet been collected, and we, therefore, focus on the extent to which the benchmark of 40 correct letter-sounds per minute is contextually appropriate.

3.1.3 Exploratory non-parametric methods versus traditional benchmarking approaches

Typical approaches to benchmarking focus on identifying the fluency levels associated with achieving a fixed comprehension threshold, for example at least 80 percent of questions correct (Room to Read, 2018; Abadzi, 2012). Our approach has a number of advantages over the traditional approach.

First, reading benchmarks are language and context specific and need to be set in way that is responsive to patterns emerging from the data. Non-parametric methods make no assumptions about the speed-accuracy or fluency-comprehension relationships which can be affected by both pedagogical and linguistic differences.

Second, our approach to identifying critical thresholds in the accuracy-speed and fluency-comprehension examines the full distribution of these relationships whereas traditional methods only focus on these relationships around the specific comprehension cut-off.

Third, traditional methods assume that comprehension is an easily defined and comparable construct across passages and languages. There is plenty of evidence to the contrary and in this and other reports (Ardington

et al. 2020, Wills et al. 2022) we highlight the serious challenges of establishing the appropriate level of comprehension questions. Our approach is much less sensitive to these challenges than traditional approaches that focus on a particular comprehension cut off.

A disadvantage of our approach is that it requires some degree of expert subjective judgement. However, a prescriptive, formulaic approach to benchmarking runs the risk of setting benchmarks that are neither contextually appropriate nor informative for tracking incremental improvements or guiding remediation or instruction. For example, RTI International (2017) report that across African countries only around 5 percent of learners were reaching the established benchmarks. We instead are guided by both the patterns that emerge from the data and the current realities of South African classrooms. This developmental approach enables the measurement of incremental improvements over time in a low-literacy context.

For comparability purposes, we provide the results for the traditional mean, median and logistic regression benchmarking approaches outlined by Room to Read (2018) in the appendix. An initial examination of the data revealed that across grade samples, very few learners were reaching the 80 percent comprehension level. We therefore focussed on the 60 percent comprehension level. This again highlights the need to be responsive to the data. Even at the 60 percent comprehension level, we found that for four of the six samples, the confidence intervals around the logistic regression benchmarks were too wide to be considered informative (Joddar and Beggs 2022).

3.2 INSTRUMENT DEVELOPMENT

The Sepedi benchmarking project used existing data from *Room to Read* and primary data collected for the dual purpose of evaluating the impact of the Funda Wandé and Bala Wandé programmes and for Sepedi benchmarking. This section of the report will detail the development process of the instruments that were used to gather data for the latter.

The instruments were sourced, reviewed and developed by a language team comprised of two Sepedi language experts from the University of Limpopo and the University of Pretoria, and DBE officials from the Research Coordination, Monitoring and Evaluation directorate. The DBE has also established a Reference Group to ensure broader stakeholder buy-in, comments to the language team during the instrument development and piloting process as well as support in adoption and dissemination. The reference group included officials and curriculum experts from the Limpopo Department of Education (LPDoE), Sepedi language experts, including those from *Room to Read* and *Funda Wandé*, and an academic linguist (Table 7).

Table 7: Sepedi benchmarks reference group members

Name and Surname	Role	Organisation
Ms Thandi M Dlodlo	Director of Early Childhood Development	Limpopo Department of Education
Dr Rachel K Mashaba	Chief Education Specialist of Foundation Phase	Limpopo Department of Education
Ms Edna Phasha	Sepedi Subject Advisor	Capricorn South District
Ms Valery Ramashala	Sepedi Subject Advisor	Capricorn North District
Ms Julia Maphutha	Head of Sepedi	Funda Wandé
Ms Catherine Ngwane	Senior Manager: Sepedi	Room to Read
Prof Lilli Pretorius	Independent Linguist	Formally with the University of South Africa (UNISA)

The development process began with sourcing assessment tasks that were readily available in Sepedi and those that could be appropriately versioned into Sepedi. The instruments were sourced from the Early Grade Reading Study in North West led by the DBE³; the Reading Support Project in North West⁴; the Room to Read interventions; the Leadership for Literacy study lead by ReSEP and the DBE⁵ Ulwazi Lwethu materials development project led by SAIDE⁶; and released items from the South African Progress in Reading Literacy Studies led by the Centre for Education Assessments in South Africa. Of those that were versioned, priority was given to instruments that were previously used in other credible studies. The complete bank of instruments was piloted at least once in the two pilot exercises.

3.2.1 Tasks

Table 8 shows the battery of Sepedi reading assessments that were utilised in the main data collection. Details of each task are provided below.

Table 8: *Sepedi reading assessment by skill/task, source and grade*

Skill/Task	Source	Grade 1	Grade 3	Grade 6
Rapid Object Naming	EGRS I Wave 4	X	X	
Letter-sound Knowledge	EGRS 1 Wave 4	X	X	
Complex Consonants/Diacritic	EGRS 1/RSP Leadership for Literacy		X	
Syllable	Room to Read	X	X	
Listening Comprehension	Transcreated from EGRS EFAL <i>Running in the rain</i> passage	X		
Word Reading	Leadership for Literacy	X	X	
Oral Reading Fluency + Comprehension Questions	Room to Read 2017 (Grade 1 and 3) EGRS 1/RSP (Grade 3) Ulwazi Lwethu: <i>Letšatši la ditokelo tša batho</i> (Grade 6) SAIDE African Storybooks <i>Bopeloglale jwa ga Bonolo</i>	X	X	X
Written Comprehension	EGRS I Grade 3 Wave 4 (Grade 3) PIRLS <i>Perele</i> (Grade 6)		X	X

3.2.1.1 Rapid Object Naming and Phonemic Awareness

A learner's literacy journey does not begin when they are formally taught foundational skills like letter-sound knowledge, however, these taught skills build on the crucial oral language that includes vocabulary, grammar, phonology and morphology (Dale and Crain-Thoreson, 1999). The knowledge and development of oral language greatly impacts learners' ability to learn how to read. The Rapid Object Naming and Phonemic Awareness tasks are the two tasks that were chosen to assess learners' oral language. These are foundational skills of which phonemic awareness, the most challenging of the three, for example, is expected to be mastered by the end of grade R (Department of Basic Education, 2011, p.40). These were administered to Grade 1 and 3 learners

³ The EGRS I study was funded by the DBE, the Department of Planning, Monitoring and Evaluation, the North West Provincial Department of Education, the Initiative for Impact Evaluation, Zenex Foundation, UNICEF, USAID, Anglo American Chairman's Fund.

⁴ The Reading Support Project was funded by the Department of Basic Education, the North West Provincial Department of Education; USAID, Anglo American Chairman's Fund

⁵ Leadership for Literacy funded by Department for International Development in the United Kingdom and the DBE

⁶ Ulwazi Lwethu is funded by Zenex Foundation

Unfortunately, a phonemic awareness task that was used in pilot one for grade 3s did not test well and had to be discontinued for the second pilot as well as the main study. The Rapid Object Naming task selected was one where learners were given 20 seconds (not communicated to learners) to name the six common objects presented on a chart in random order as fast as they could.

3.2.1.2 Letter-sound Knowledge and Complex Consonants/Diacritics

In a language that subscribes to an alphabetic writing system, it is imperative that learners are taught the visual representation of letters maps on to the sounds that are present in the language. The most foundational of these that enable decoding is the knowledge of individual letter-sounds (RTI International, 2016, p43).

A letter chart of 110 items consisting of all the letters of the alphabet appearing in random order in both upper and lower case was presented to learners in grades 1 and 3 and they were asked to sound as many as they could in 60 seconds. This chart was then revised after the second pilot to be 60 items. Each letter appeared at least once. For letters where the uppercase and lowercase forms were dissimilar, both versions were included. After consultation with the reference group, it was further advised that vowels be prioritised for repetition and sequencing as these were the most common of the sounds. Letters that were not very common- others might argue absent- like v, c, x and z in the Sepedi language were included but deprioritised by being included only once and being placed later in the chart.

A 30-item chart of complex consonants and the diacritic s (š) common in Sepedi was given to learners in grade 1 and 3 in the first pilot. The complex consonants represented on the chart were either phonologically complex- that is a cluster of two to four consonants where the produced sound was not completely blended- or visually complex where a cluster represented the single phoneme (sound). The complex consonant sequences that were prone to involuntary vowel insertion- mostly those ending w- were excluded after the second pilot. Although present in the language, diphthongs were not represented. Due to floor effects for grade 1 learners in the pilot, the complex consonants task was only administered at the grade 3 level in the final data collection.

3.2.1.3 Syllable Reading

Because of the highly syllabic nature of African languages, decoding happens on two levels- on a phonemic level and on a syllabic level. We know that when instructing on this skill, many teachers defer to the latter, sometimes to the detriment of the learners' understanding of how each syllable is comprised of phonemes (Department of Basic Education, 2020, p.22). Because of this emphasis on instruction, learners are found to be more likely to recognise syllables than complex consonants which resulted in the former being assessed for both grades 1 and 3 in the main data collection and the latter dropped for the grade 1 cohort. The syllables used in the grade 3 chart were made of a combination of CV (consonant + vowel) and CCV (Consonant, consonant, vowel) structures; the CCV mirroring some of the complex consonants and diacritics in the Complex Consonants/Diacritics task.

3.2.1.4 Word Reading

Isolated word reading was assessed with grades 1 and 3. The grade 3 chart included all 40 words from the grade 1 chart plus an additional 20 to make 60. The word list was sourced from the Leadership for Literacy study although a few were swapped out at the discretion of the language experts. Learners were asked to read as many as they could in one minute. The words were generally arranged in order of difficulty determined by the number of syllables. Although there are single syllable words in Sepedi, these were not included in this task as the Syllable Reading task did to some extent assess this. Instead, the words ranged from two to four syllables for the grade 1s and two to seven syllables for the grade 3s.

3.2.1.5 Oral Reading Fluency and Comprehension

When learning to read, ultimately decoding happens at a passage level. The grade 1, 3 and 6s each had at least one grade appropriate Sepedi text (two for grades 3 and 6) and related comprehension questions. In typical Early Grade Reading Assessments (EGRA), the learner is allowed one minute to read the passage and then asked five comprehension questions (RTI International 2016). These passages tend to be very short and simple texts which lend themselves mostly to literal questions. Longer passages allow more scope for assessing a range of comprehension processes but require more time to read as learners are only asked questions related to the parts of the passage that they were able to read within the time limit. Therefore, after the words correct in a minute were captured, learners were given an additional two minutes to attempt to complete reading the passage for the purpose of answering a wider range of questions.

The development of the comprehension passages followed the PIRLS conceptual framework that includes four types of questions to assess whether learners can 1) retrieve explicitly stated information (literal); 2) make straightforward inferences; 3) interpret and integrate ideas and information; and 4) evaluate and examine the content, language and textual elements. For all ORF passages, a combination of all four of these question types was used, but always beginning with a literal question.

3.2.1.6 Listening Comprehension

The listening comprehension was administered to the grade 1 learners as this also forms part of the early oral literacy skills. In this task, the enumerator read a short narrative text to the learner twice before asking questions related to the story. The same PIRLS matrix was used for the comprehension questions.

3.2.1.7 Written Comprehension

By the end of grade 3, learners are expected to have acquired the skill of reading independently at grade level so that when they transition to grade 4, they are able to read in order to learn (Howie et al., 2017). In terms of literacy, written comprehension is the ultimate skill that is assessed beyond the Foundation Phase. The PIRLS written assessments are used to measure reading achievement in learners in grade 4 (Howie et al., 2017). Learners are given a narrative and informational text that they read independently and answer the accompanying comprehension questions in written form. In the final instruments, both the grade 3 and grade 6 written assessments utilised the pre-PIRLS structure where the text was broken up into sections by questions as a way of scaffolding.

3.2.2 Piloting and Results

The purpose of the two pilots ahead of the main data collection was threefold: first to ensure that the instruments were at the correct level with no floor or ceiling effects; second to verify that the language was appropriate for the context and the questions were not ambiguous; and lastly to test that the overall assessments and the subtasks were of the appropriate length. After each pilot iteration, a review meeting was convened with the language team to present the findings from the pilot data analysis and recommendations for the revision of the instruments. The recommendations varied from shortening passage lengths, rephrasing questions, revising the order of chart items amongst others. Below are some of the key insights drawn from the data collected during the two rounds of piloting as examples of this instrument design process. We consider one example for each grade.

- Example from Grade 6

Table 9 below summarises the number of words that Grade 6 learners in the first pilot attempted in the first three minutes. The number of words in each passage is also shown for reference. Starting with the Sepedi passages, we see that the median learner was attempting between 155 and 181 words in the three-minute time period. This is substantially less than the length of the passages and even at the 75th percentile,

we see that learners have not managed to finish the passages. In contrast, the median learner did manage to complete the English First Additional Language (EFAL) passage. Based on the results from the first pilot it was clear that the Sepedi passages needed to be shortened.

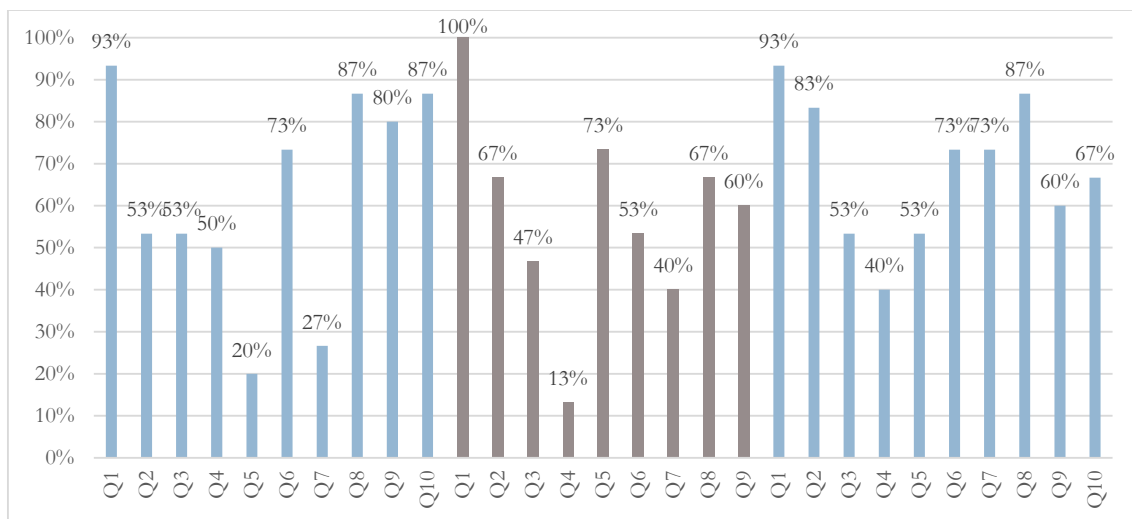
Table 9: Words attempted in 3 minutes by Grade 6 learners – pilot 1

Passage	Words in passage	Words attempted in 3 minutes		
		25th percentile	Median	75th percentile
ORF 1	308	82	176	244
ORF 2	380	79	155	235
ORF 3	269	99	180.5	257
EFAL	203	120	203	203

For the second pilot, we decided there was no further need to pilot the EFAL passage as 1) the length seemed reasonable in this pilot, 2) it had been extensively piloted among Setswana learners in preparation for the next round of EGRS I and 3) because it made sense to keep the instrument the same across the Sepedi and Setswana samples for comparability purposes.

In the second round of piloting, although the passages were substantially shortened the median learner was still not completing the passage within the three minutes. However, they were reading far enough in each of the passages to attempt at least the first seven comprehension questions. The language team then focused on the first seven comprehension questions to ensure that they covered the range of comprehension processes and that there was sufficient variation in question difficulty. This process was guided by the results shown in Figure 2, which presents the percentage of learners answering each comprehension question correctly for the three passages.

Figure 2: Percent of Grade 6 learners answering each comprehension question correctly across three passages.



The analysis of ORF across the three passages produced some interesting results (Table 10). The first and third passages were fiction texts while the middle passage was non-fiction. Learners at all points in the distribution clearly found the non-fiction text hardest to read with an average ORF of 52 words per minute in comparison to 60 and 83 words per minute for the fiction texts.

Table 10: Oral reading fluency (ORF) for Grade 6 learners – pilot 2

	25th percentile	Median	75th percentile
ORF 1	45	60	74
ORF 2	42	52	59
ORF 3	62	83	93

For the final instrument, the second and third passages were selected to include both fiction and non-fiction and to provide a range of difficulty.

- Example from Grade 3

Figure 3 summarises the performance of grade 3 learners on the Sepedi written comprehension in pilot 1 (left panel) and pilot 2 (right panel). Starting with the grey line for pilot 1, we see that the percentage of learners attempting each question drops off sharply and in a linear pattern suggesting that the instrument was either too long or too difficult and learners gave up after the first few questions. For the first pilot, the written comprehension was presented as the full text followed by a series of questions. For the second pilot, the same task was broken up into paragraphs of text followed by relevant questions. Focusing on the grey line for pilot 2, we see a much higher percentage of learners attempting the first couple of questions indicating that the new format appeared less challenging to learners. However, the percentage of learners attempting the later questions is still very low.

Figure 3: Sepedi written comprehension for Grade 3 learners

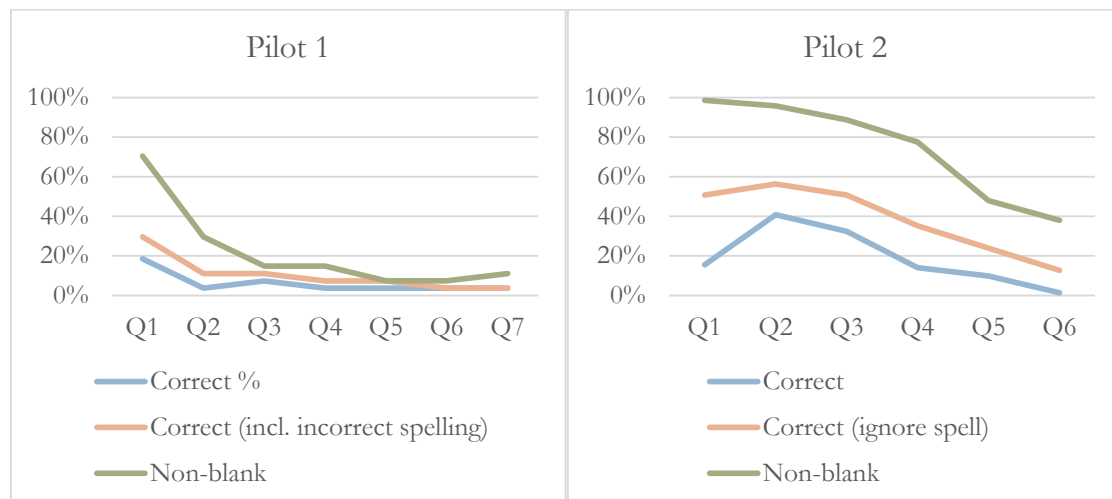
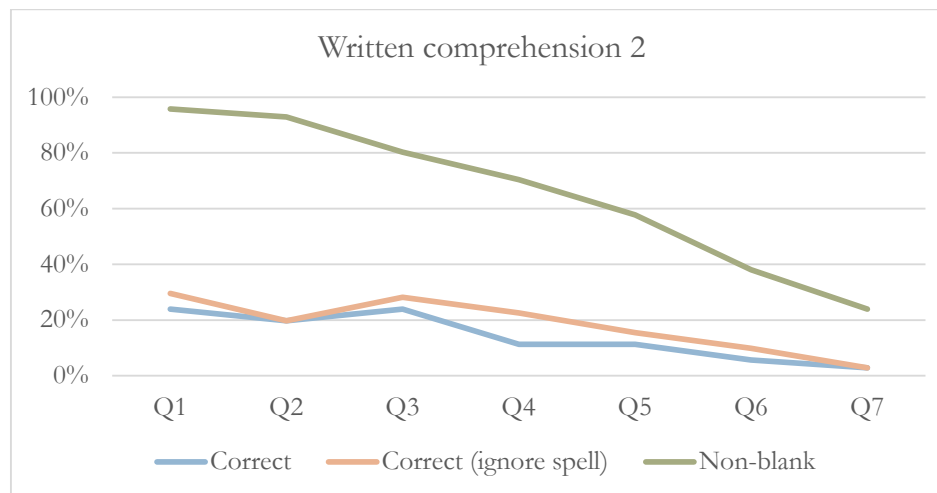


Figure 4 summarises the performance on the second written comprehension that was included in the second pilot. Again, we see very poor results suggesting that the difficulties were not specifically around the first passage but indicative of weak proficiency in this area. This is perhaps unsurprising given the impact of COVID-19 related school closures and ongoing rotational timetabling.

Figure 4: *Sepedi written comprehension – second passage for pilot two*



- Example from Grade 1

In pilot 1, 69 percent of grade 1 learners were unable to identify any complex consonants. We were concerned about floor effects on this task but decided to continue piloting as we had only conducted assessments at two schools. Results from the next four schools in pilot 2 revealed a similar pattern with 64 percent of learners scoring zero on this task. Given our concerns about floor effects after pilot 1, we also included a new syllables task in the grade 1 assessment for pilot 2. Here learners performed better with only 24 percent of learners unable to complete the task at all. Based on the two rounds of piloting, we removed complex consonants and included syllable reading in the final grade 1 instrument.

4 SEPEDI DATA

4.1 BACKGROUND

The establishment of Sepedi early grade reading benchmarks draws on two key data sources. *Room to Read* conducted Sepedi reading assessments at the grade 1 and 2 level as part of their monitoring and evaluation efforts over the period 2016 to 2019. In 2021, the external impact evaluation of the *Funda Wande* programme in Limpopo included reading assessments with grade 1 learners. In collaboration with DBE, data collection was extended to include reading assessments with grade 3 and 6 learners in the same schools for benchmarking purposes. Table 11 presents the key features of the *Room to Read* and *Funda Wande* samples. Overall, we have Sepedi reading assessment data on 8,179 unique learners across 187 no-fee schools.

Table 11: Sample size

Study	Grade	Term	Year	Schools	Learners
Room to Read	1	IV	2016	50	1338
	2	IV	2017	50	1336
	2	IV	2018	20	387
	2	IV	2019	20	389
Funda Wande	1	III	2021	120	2394
	3	III	2021	120	1175
	6	III	2021	120	1160

4.2 SAMPLE CHARACTERISTICS

Room to Read worked in collaboration with the LPDoE on the selection of schools to participate in the literacy program. Sekhukhune District officials shared a list of all quintile 1 and 2 schools from the area. Using the list provided by the district, *Room to Read* personnel surveyed and selected qualifying schools as per the *Room to Read* school selection criteria. The main selection criteria that were used are: schools should be easily accessible all year round, school infrastructure should not pose an imminent threat to learners; there should be a functioning administration and leadership committee to support project decisions in the school with an School Management Team (SMT) and School Governing Body (SGB) that are supportive of core programme objectives and activities. Also, the school should not have an active library already and their access to appropriate books and other reading materials should be limited. Furthermore, there should be appropriate space available to establish a separate library and the school should be willing to appoint volunteer personnel to manage the library and to integrate a compulsory library period per class into the time-table.

The list of qualifying schools was shared with the department for their approval. All 70 selected schools comprised of schools with Sepedi as their LOLT. We did not experience challenges of multi-graded classes nor of multi-lingual classes as the area consists of the majority of people speaking Sepedi.

Room to Read used simple random sampling, with no matching/stratification on an indicator of school quality for both project and control schools. We did not have access to 2014 or earlier Annual National Assessments records (ANAs) and relied solely on enrolment to sample schools to include in the evaluation.

Learners were selected based on availability on the day of the assessment. All learners who were present were included for random sampling. All absent learners were excluded from the class list to avoid selecting learners who were absent. For example: If on the day of the assessment 40 learners were available, we used the class list to assign each learner with a number. A random number generator was used to randomly select the participants. If all learners were available, we used the pre-existing class list numbering since no changes needed to be made.

Recruitment of schools for the *Funda Wande* evaluation was done in collaboration with the LPDoE. Officials from the Capricorn North and Capricorn South districts identified no-fee (quintile 1 to 3) schools with Sepedi as the LOLT in the Foundation Phase with no chronic management issues or existing literacy programmes. Multi-grade schools and those with severe overcrowding (more than 60 learners per class) were also excluded. Schools were invited to apply for the programme and a final list of 120 schools was randomized into a control group and two treatment arms. or severe overcrowding (class size between 20 and 60 learners) issues. Within each school, two classes were randomly selected from each grade. In each

of the two selected grade 1 classes, 10 learners were randomly selected for assessment. In each selected grade 3 and 6 class, five learners were randomly selected.

The *Room to Read* and *Funda Wande* samples were not designed to be representative of all Sepedi home language learners but together provide an informative picture of early grade reading skills in typical no-fee schools in Limpopo province. The *Room to Read* schools are all in rural areas and 79 percent are classified as the poorest quintile (see Table 12). *Funda Wande* schools are predominately in rural areas (85 percent) with 12 percent classified as quintile 1, 50 percent as quintile 2 and 37 percent as quintile 3.

For both samples, around two-thirds of schools are intervention schools. The benchmarking analysis pools the intervention and controls schools in order to maximize the analytical sample and to produce as wide a distribution of reading skills as possible. Pooling is appropriate as the main focus of the benchmarking exercise is on understanding the speed-accuracy and fluency-comprehension relationships rather than on producing reading proficiency norms.

In the *Funda Wande* schools, the number of learners in grades R to 7 ranges from 165 to 1496 with an average size of around 500. All but one school had working electricity and the vast majority had water when the field teams visited. However, only 18 percent of schools had flush toilets for learners and 79 percent of schools had a ratio of learners to toilets above the 30 recommended by the World Health Organisation (Adams et al., 2009). Indeed, 29 percent of schools had ratios in excess of 1 toilet to 60 learners. Only 28 percent of schools have a library (mobile or on-site).

The *Room to Read* schools have an average learner educator ratio of around 38 learners to one teacher in grades 1 and 2.

Table 12: School characteristics

	Room to Read	Funda Wande
Rural	100%	85%
School quintile:		
1	79%	12%
2	21%	50%
3	0%	37%
Intervention school	64%	67%
Number of learners in grade R to 7		497
Working electricity		93%
Working water		99%
Flush toilets for learners		18%
Ratio of learners to toilets:		
<31		21%
31-60		50%
>60		29%
Library		28%
Enrolment in target grade	58	
Teachers in target grade	1.7	
Learner Educator ratio in target grade	38.1	
Observations	67	120

Notes: Room to Read statistics are from first round that school was included

Table 13 presents learner characteristics for the two samples by grade. The gender split of the samples is approximately equal. Comparing the two grade 1 samples, learners in *Funda Wandé* schools are on average 3 months older than learners in *Room to Read* schools despite data collection occurring a term earlier in the school year. Looking within samples across the grades, the impact of grade repetition is evident with the increase in average age slightly higher than the increase in grades. The vast majority of learners in *Room to Read* schools speak Sepedi at home and attended pre-school. Almost a quarter of grade 2 learners in *Room to Read* schools have an illiterate mother and 44 percent do not have a collection of books to read at home.

In *Funda Wandé* schools, less than a quarter of learners report having more than five non-schoolbooks to read at home. While almost all learners have electricity at home, only between 13 and 28 percent have hot running water inside their house. The vast majority of learners have access to mobile phones (98 percent) and television (92 to 93 percent) at home. Less than half of grade 1 learners have a computer in their home (41 percent). Interestingly, older learners are less likely to report a computer in their home possibly indicating a fair degree of measurement error with responses from younger learners. Around one in four grade 6 learners have a computer at home.

Table 13: Learner characteristics

Learner characteristics	Room to Read		Funda Wandé		
	Grade 1	Grade 2	Grade 1	Grade 3	Grade 6
Female	50%	50%	52%	53%	51%
Average age in years	6 years 6 months	7 years 8 months	6 years 9 months	8 years 11 months	12 years 3 months
Speaks Sepedi at home	96%	95%			
Attended pre-school	98%	96%			
Mother is literate	83%	77%			
Has collection of books at home	64%	56%			
Learner has more than five non-schoolbooks to read at home			26%	24%	19%
Electricity			96%	95%	97%
Hot running water inside home			28%	20%	13%
Mobile phone in household			98%	98%	98%
Television			93%	92%	93%
Computer			41%	34%	26%

4.3 ASSESSMENTS

The early grade reading assessments were designed to assess a range of foundational reading skills. This benchmarking exercise focuses predominately on the assessment of letter-sound knowledge, oral reading fluency and oral reading comprehension. In addition, we examine the concurrent validity of the established benchmarks using the performance on written comprehension tasks.

Across both samples, the letter-sound knowledge task included both lower case and capital letters. In the *Funda Wandé* assessments, the diacritic š was also included in the letter-sound knowledge task and an additional assessment of knowledge of complex consonants (with two up to four complex consonant sounds) was administered at the grade 3 level.

The various oral reading fluency passages together with text length and the number of related comprehension questions are summarized in Table 14. All passages were narrative texts except the second grade 6 passage which was an informational text about Sharpeville. For *Room to Read* schools, at each round of data collection, learners were randomly assigned to one of three or four passages. In *Funda Wandé*

schools, at the grade 3 and 6 level, the same learners were assessed on two different passages. All oral assessments were administered individually in a one-to-one assessment, with three minutes given for completion of reading the passage followed by an untimed opportunity to respond.

At the grade 3 and 6 level in *Funda Wande* schools, learners completed a written comprehension. The grade 6 written comprehension was a shortened version of one of the PIRLS 2016 released passages.

Table 14: Oral reading fluency and written comprehension passages

Grade	Year	Term	Oral reading fluency				Written comprehension		
			Passage description	Max possible words	Time allowed	N comprehension questions	Time allowed	Passage description	N comprehension questions
1	2016	IV	Tumi	65	3 mins	5			
1 & 2	2016-2019	IV	Koko	69-71	3 mins	5			
1 & 2	2016-2019	IV	Thabo	66-71	3 mins	5			
1 & 2	2016-2019	IV	Lerato	69-71	3 mins	5			
1	2021	III	Koko	48	3 mins	5			
3	2021	III	Thabo	70	3 mins	7	15 mins	Nkane Kubu a se na boya	6
			Pule le Mosidi	59	3 mins	7			
6	2021	III	Bogale bia Bonolo	269	3 mins	10	25 mins	Perela	10
			Letšatši la Ditokelo tša Botho	220	3 mins	9			

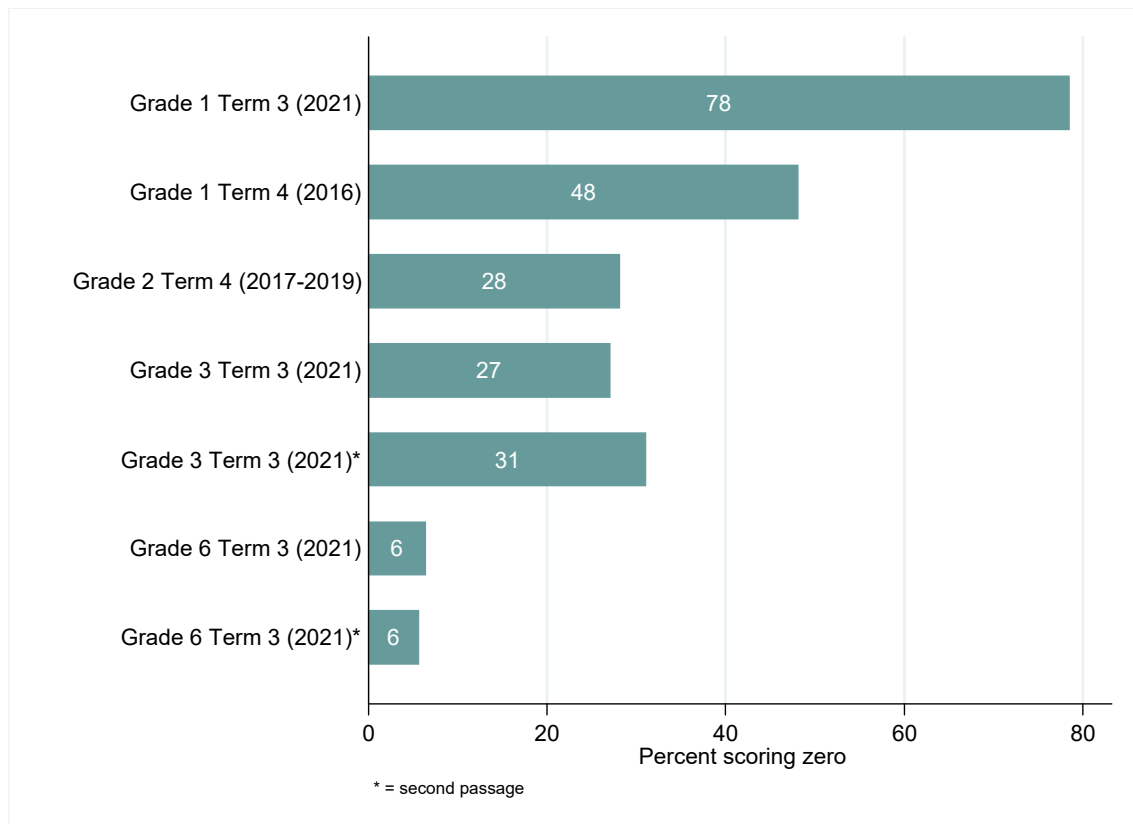
4.4 READING NORMS

Average performance on the four key sub-tasks is summarised in Table 15 while Figure 6 shows the percentage of learners scoring zero for the oral reading fluency task. Starting with letter-sound knowledge, there are striking differences in the performance of the two grade 1 samples with learners in *Funda Wande* schools producing around 16 correct letter-sounds per minute (CLSPM) on average in contrast to 30 CLSPM in *Room to Read* schools. While some of this divergence in performance may be attributable to differences between the samples, this is likely a reflection of the impact of Covid-19 school closures and rotational timetabling on learning. Pre-pandemic grade 2 learners had an average of 42 CLSPM while grade 3 learners in 2021 had an average of 38 CLSPM.

Table 15: Mean letter-sound fluency, oral reading fluency, oral reading comprehension and written comprehension

Grade	Term	Year	Letter-sounds (CLSPM)	Oral reading fluency (CWPM)	Comprehension (% correct)	Written comprehension (% correct)
1	III	2021	15.8	3.5	6%	
1	IV	2016	30.1	10.8	12%	
2	IV	2016-2019	41.9	26.3	34%	
3	III	2021	38.3	Passage 1: 22.6 Passage 2: 23.7	Passage 1: 35.2% Passage 2: 38.1%	21.1%
6	III	2021		Passage 1: 66.0 Passage 2: 46.2	Passage 1: 33.9% Passage 2: 26.3%	41.6%

Figure 5: Percentage of learners scoring zero for oral reading fluency



Comparisons across the samples also suggest that Covid-19 had a detrimental effect on oral reading fluency (ORF). At the grade 1 level, *Funda Wande* learners were reading 4 correct words per minute (CWPM) in contrast to 11 CWPM in *Room to Read* schools. Grade 2 learners in *Room to Read* schools were reading slightly faster (26 CWPM) than grade 3 learners in *Funda Wande* schools (23 to 24 CWPM). Figure 5 highlights the alarming proportion of learners who reach the end of grade 1 unable to read one word. Even pre-pandemic, almost half of grade 1 learners were non-readers. In 2021, 78 percent of grade 1 learners could not read one word in term 3. By grade 2 and 3, around three in ten learners were still non-readers.

The average grade 6 learner in *Funda Wande* schools is reading 66 CWPM for the narrative passage. These learners are substantially slower on the informational text with an average ORF of only 46 CWPM. Interestingly, even though the fluency is so much lower on passage 2, the correlation between the ORF on both passages is very high (0.92).

Learners tend to perform very poorly on the comprehension questions with scores ranging from 6 to 38 percent. Learners are only asked comprehension questions related to the parts of the passage that they read within the three-minute time limit. Learners who cannot read at all and those who read very slowly will therefore not attempt all the questions. For samples with a high proportion of non-readers, average comprehension scores are not very informative. For slow readers, we implicitly make the assumption that they would not have been able to correctly answer the comprehension questions that they did not read far enough to attempt. In the analysis of individual comprehension questions in section 6 below, we will see that this assumption is often unlikely to be true with later questions sometimes being less challenging than earlier ones. Furthermore, the relationship between words read and questions attempted induces a mechanical relationship between fluency and comprehension for these slow readers. In our analysis of the fluency-comprehension relationship, we, therefore, focus on the sub-samples of learners who complete reading the passage and attempt all the questions.

The columns shaded in pink in Table 16 summarise the performance of the sub-sample of learners who attempted all questions for each passage. For grade 2, these learners form the vast majority (88 to 90 percent) of those who can read at least one word. For other grades, learners who attempted all questions are a more select sub-sample of those able to read at least one word. For example, with the longer passages in grade 6, only 35 and 38 percent of learners were able to complete reading the two passages. For the benchmarking analysis, our preference would be to focus on a less select sample and we would also like to ensure that we have reasonable sample sizes. We therefore decided to trim the number of questions so that learners attempting the trimmed set of questions represented at least 70 percent of learners who could read at least one word. For example, 70 percent of grade 6 learners who could read at least one word attempted the first seven out of 10 questions for the first passage. The columns shaded in green in Table 16 summarise the final sub-samples used in the analysis of fluency-comprehension relationships.

Table 16: Data sub-samples used to assess fluency-comprehension relationships

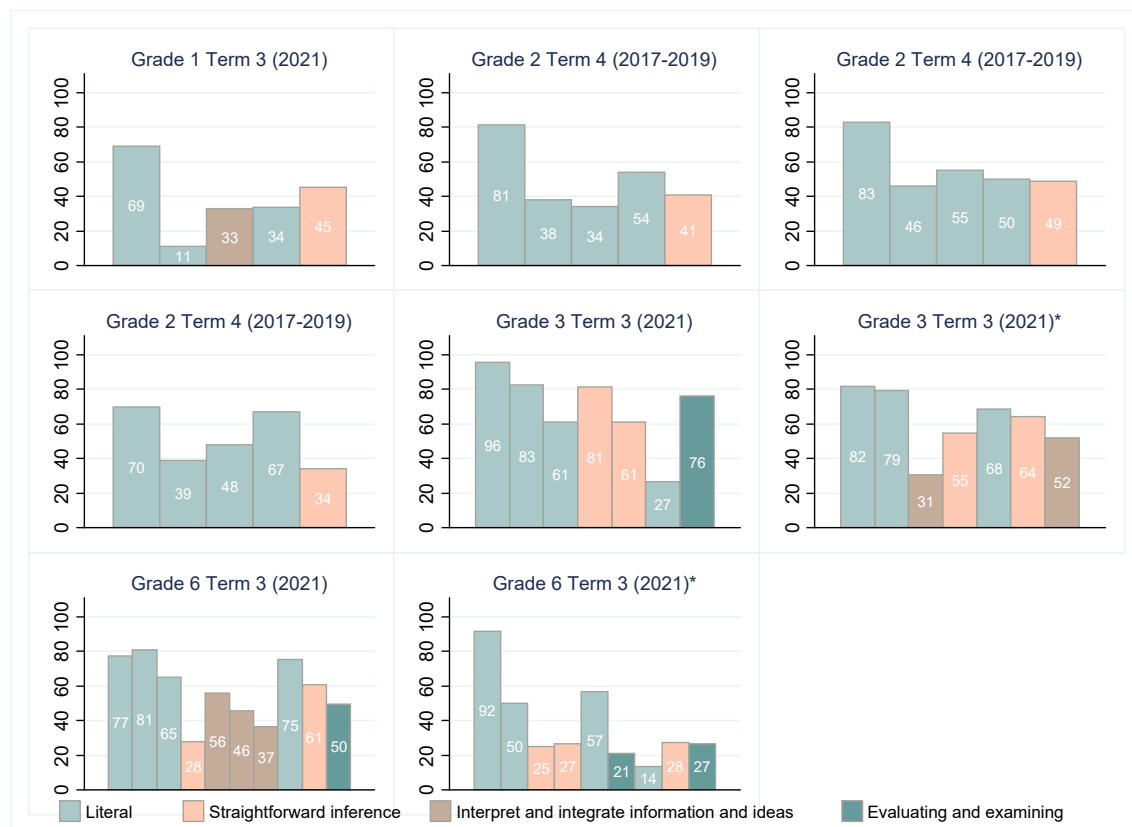
Grade	Term	Passage	ORF > 0	Learners attempting all questions				Learners attempting subset of questions			
				% of ORF>0 sample	Mean comprehension score (%)	% scoring 80%+ for comprehension	% scoring 60%+ for comprehension	% of ORF>0 sample	Mean comprehension score (%)	% scoring 80%+ for comprehension	% scoring 60%+ for comprehension
1	III	1	510	55%	27%	6%	19%	73%	31%	1%	11%
2	IV	1	515	88%	45%	26%	46%	88%	45%	26%	46%
2	IV	2	507	90%	51%	36%	54%	90%	51%	36%	54%
2	IV	3	496	88%	47%	28%	50%	88%	47%	28%	50%
3	III	1	850	66%	52%	25%	44%	86%	59%	47%	65%
3	III	2	802	77%	51%	22%	39%	77%	51%	22%	39%
6	III	1	1,073	38%	36%	12%	26%	70%	40%	10%	23%
6	III	2	1,082	35%	28%	1%	6%	79%	38%	4%	14%

Interestingly, even for learners attempting all the trimmed questions, average comprehension scores are low ranging from 31 to 59 percent. Very few learners reach the 80 percent comprehension cut-off associated with typical benchmarking processes. The range of average scores across the passages highlight the

challenges with establishing an appropriate or comparable level of comprehension assessment. This is particularly striking where the same learners were administered two different passages and sets of questions. For example, amongst grade 3 learners attempting all the trimmed questions, 47 percent score at least 80 percent for comprehension for passage 1 in contrast to only 22 percent for passage 2.

We further illustrate the challenge with assuming that a fixed comprehension level (e.g. 80 percent correct) is a defined construct with equivalent meaning across passages through an examination of the individual comprehension questions. Comprehension questions are classified following the PIRLS conceptual framework into four different comprehension processes: i) retrieving explicitly stated information; ii) making straightforward inferences; iii) interpreting and integrating ideas and information; and iv) evaluating and examining content, language and textual elements. Figure 6 shows how learners perform on each individual comprehension question with the colours indicating the different comprehension processes. To facilitate comparisons between questions the sample for each passage is kept constant by restricting the analysis to learners attempting all questions. Examining each passage in turn, there is considerable variation in question difficulty within each comprehension process and no clear hierarchy of processes in terms of difficulty.

Figure 6: Percent correct on each comprehension question for learners attempting all questions



5 BENCHMARKING RESULTS

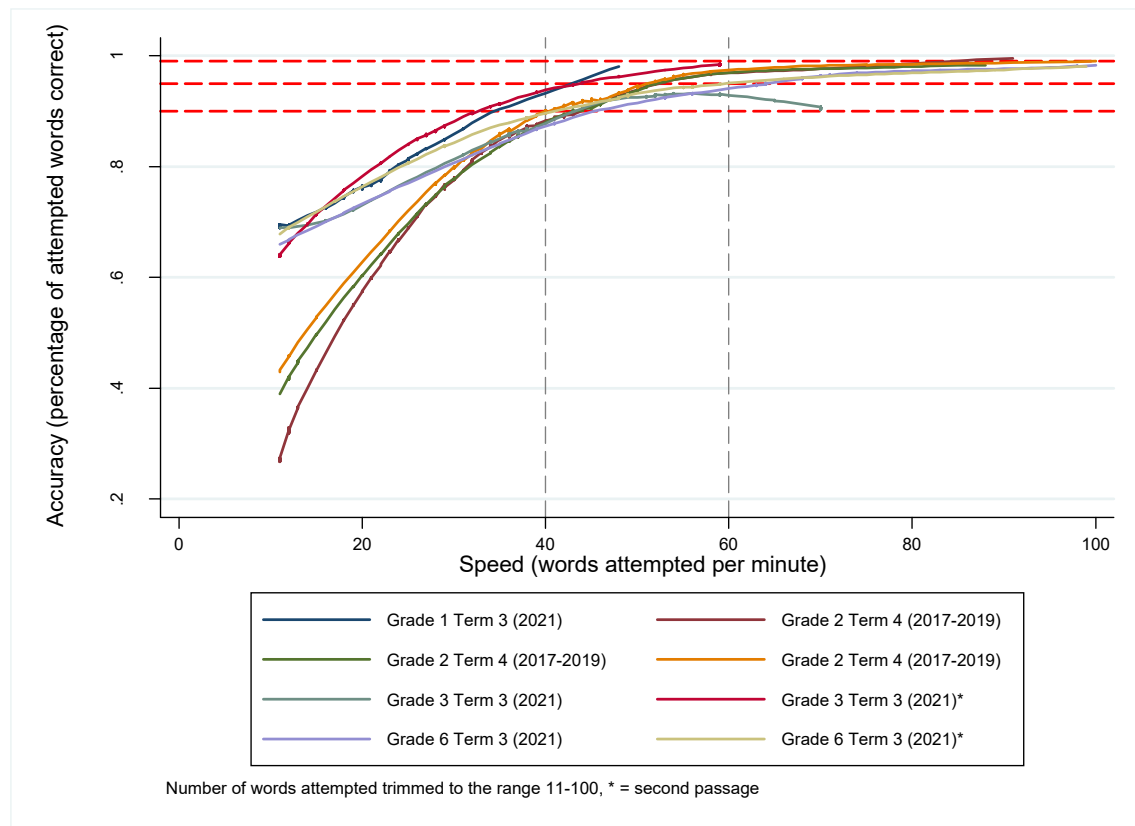
In this section we seek to establish appropriate grade-level minimum benchmarks for early grade reading in Sepedi.

5.1 ESTABLISHING AN ORAL READING FLUENCY THRESHOLDS

5.1.1 Reading speed and accuracy

We investigate the relationship between speed and accuracy in Sepedi oral reading in Figure 7. Speed is measured as the number of words attempted in a minute while accuracy refers to the percentage of attempted words that are read correctly⁷. The dashed red horizontal lines represent the 90, 95 and 99 percent accuracy levels.

Figure 7: *Speed and accuracy*



⁷ EGRA timed tasks typically have an automatic stopping rule that ends the task if the learner gets everything incorrect in the first line. If a learner has at least one correct item in the first line, they will continue the task until the time is up. In these timed tasks, the enumerator instructs the learner to move onto the next item (letter or word) after three or five seconds if there is no response from the learner. A learner with one item correct in the first line and nothing thereafter, will be moved by the enumerator from word to word every three seconds. This learner would have a score of one, but would be marked as having attempted many more words, particularly in cases where the learner is allowed a full three minutes for the oral read fluency task. This can seriously distort the relationship between speed and accuracy. We therefore follow Piper and Zuilkowski (2016) in implementing a post-fieldwork early stopping rule as soon as ten consecutive words are marked as incorrect.

While there are differences in the speed associated with different levels of accuracy, we observe a similar pattern in the speed-accuracy relationship across all texts. Initially speed and accuracy develop together steeply then accuracy flattens out while speed continues to develop. Accuracy tends to reach a ceiling in the instructional zone above 95 percent. The speed associated with 95 accuracy ranges from 43 to 64 words per minute across the various passages. At 40 words per minute, the average accuracy is below 95 percent for all of the passages and most passages are sitting with an average accuracy of around 90 percent, indicating that learners reading at this speed are at the frustration level.

Figure 8 shows the distribution of speed for the sub-sample of learners who are reading with at least 95 percent accuracy separately by passage. The box represents the middle 50 percent of the data (from the 25th to the 75th percentile) with the median indicated by the horizontal line inside the box. In grade 1, a substantial portion of learners are decoding accurately but in a very slow and laboured manner. However, from grade 2 onwards, the majority of accurate readers are attempting at least 40 words per minute (represented by the lower dashed grey line).

Figure 8: Speed distribution for accurate readers (95% plus correct)

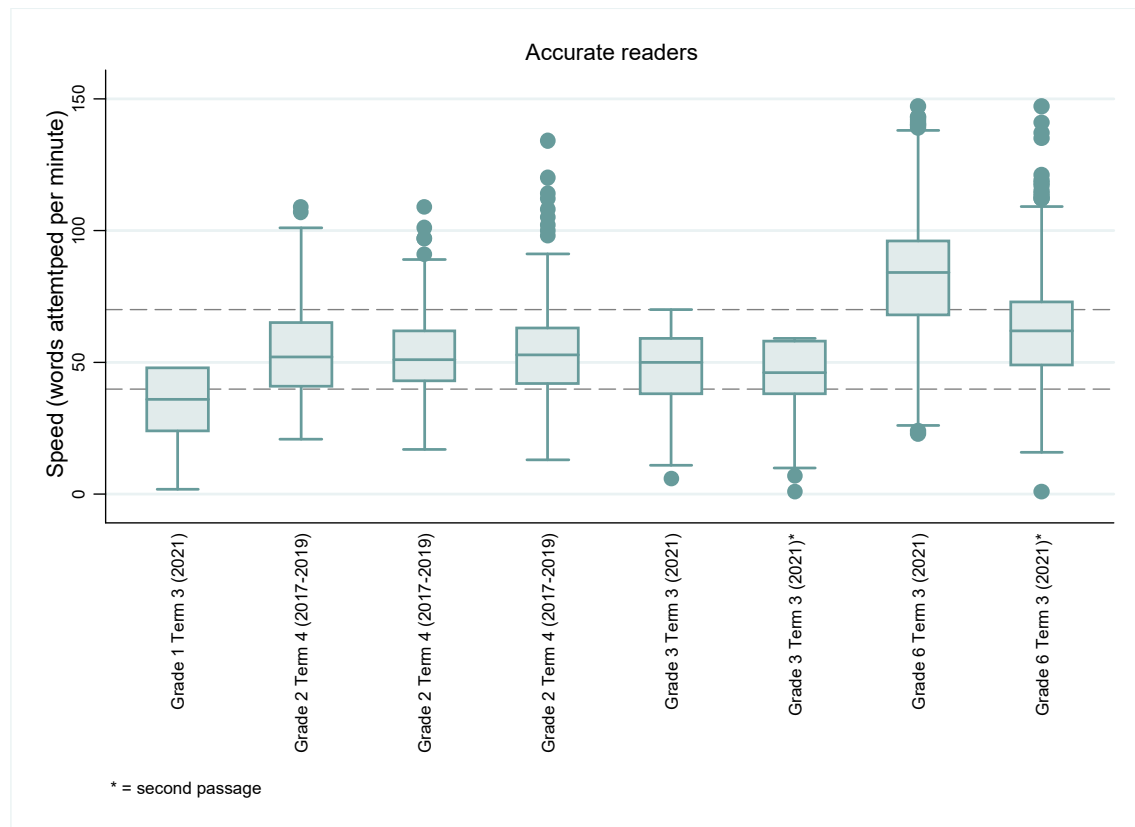
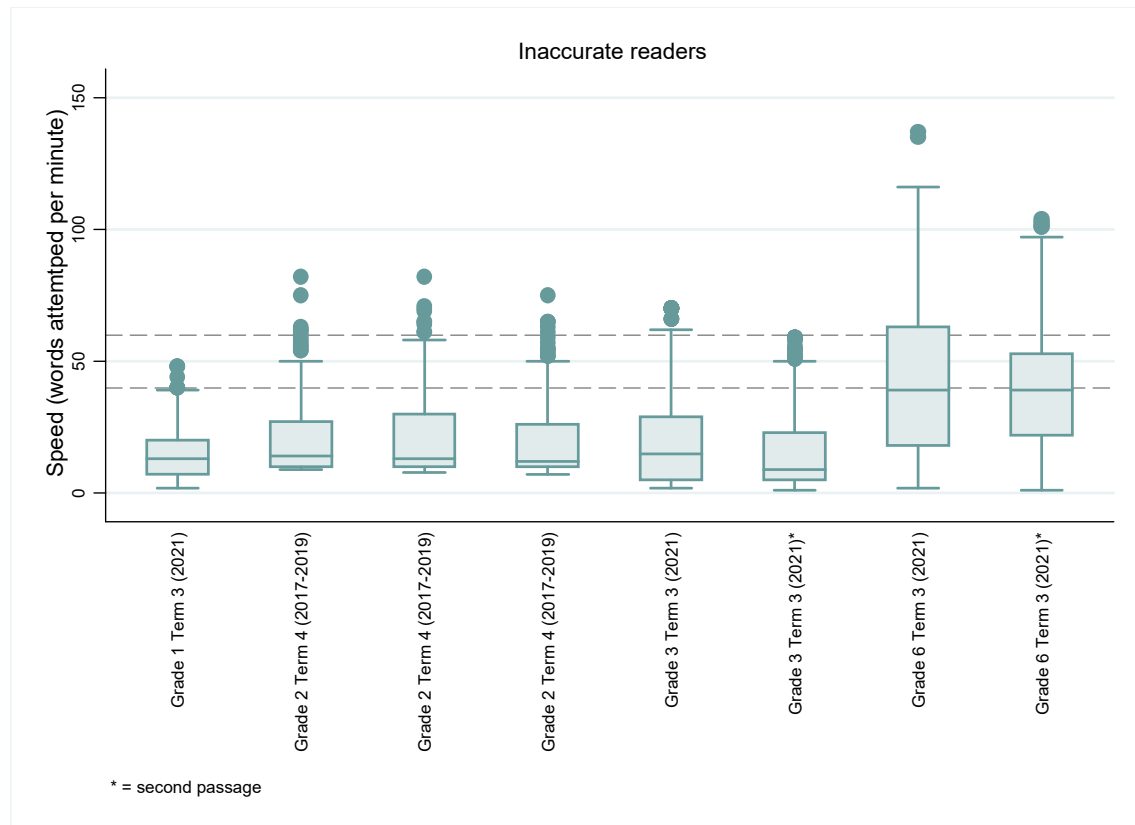


Figure 9 shows the speed distribution for inaccurate readers. Across all the grades, we see that readers who are making decoding errors tend to read very slowly with the bulk of the distributions lying well below the 40 words per minute line.

Figure 9: Speed distribution for inaccurate readers (less than 95% correct)



Other than in the first grade, if learners are reading slower than 40 words per minute, they are not reading with sufficient accuracy to have reached the instructional level and are therefore unlikely to be able to comprehend what they are reading. Indeed for most passages, average accuracy at 40 words per minute is below 90 percent, placing learners at the frustration level.

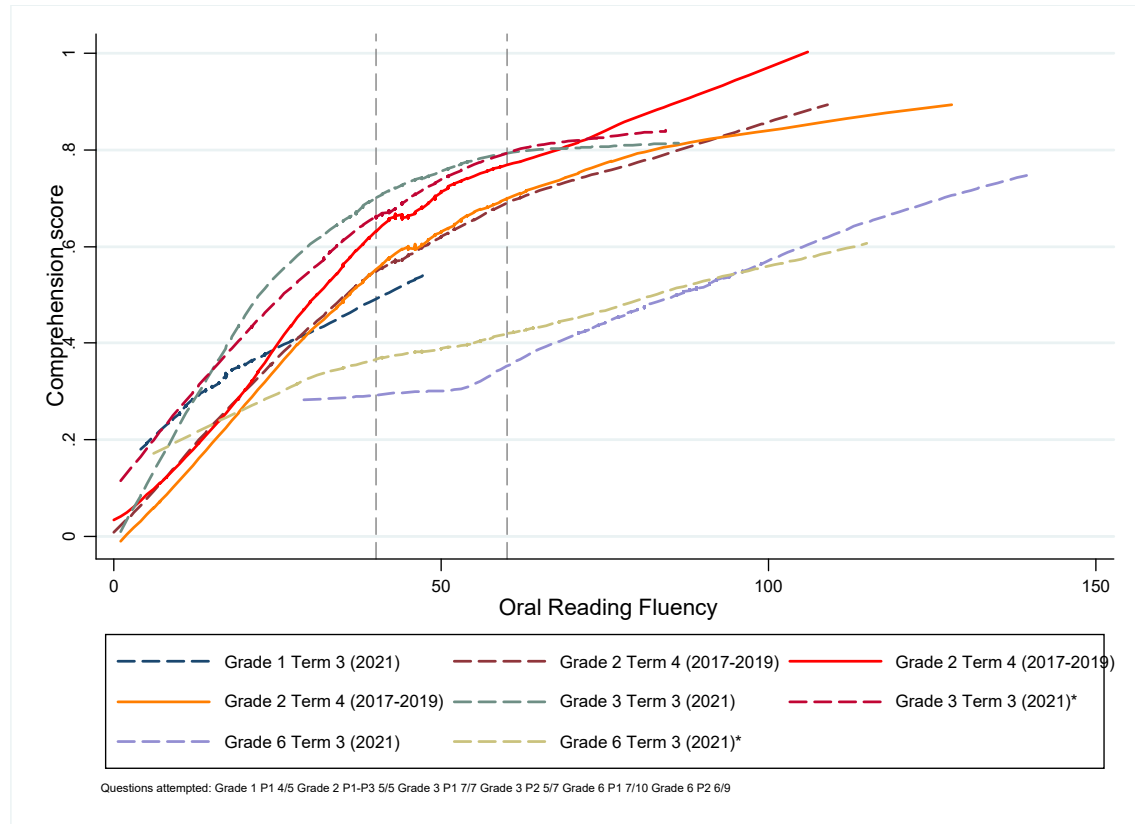
5.1.2 Fluency and comprehension

The next step in our analysis is to examine the relationship between fluency and comprehension. The average comprehension score at each level of fluency is displayed using local polynomial regressions in Figure 10. Focussing on the Foundation Phase samples, we observe very poor comprehension outcomes when learners are reading below 40 CWPM. In this zone, accuracy has not yet reached instructional level and effortful decoding does not allow learners to engage with the meaning of the text. Above 40 CWPM, comprehension skills develop steeply and learners are beginning to answer 6 to 7 out of 10 comprehension questions correctly. At around 60 CWPM the comprehension-fluency gradient begins to flatten out with diminishing comprehension gains to increasing fluency.

The comprehension-fluency relationship is much flatter and more linear for the two grade 6 passages with very low average comprehension scores at each level of fluency. Even at fluency levels associated with an instructional level of accuracy for the text, average comprehension scores are below 50 percent. Despite a 20 word difference in average ORF between the informational and narrative texts, the two passages' comprehension-fluency relationship is very similar. This highlights the point that many learners who are

reading narrative passages with fluency and comprehension, may not be able to read more technical or unfamiliar materials with sufficient fluency to support comprehension.

Figure 10: Fluency and comprehension



Figures 11 to 13 display the comprehension-fluency relationship for each individual comprehension question. The lines show the locally weighted polynomial regressions for the proportion of learners answering the question correctly at each level of fluency. The histogram shows the distribution of ORF for learners attempting the question. There are substantial differences in question difficulty indicated by variability in the height of the lines. However, the fluency-comprehension gradient is fairly similar across questions and aligns with the notion of non-linearities in the development of reading comprehension with fluency.

Figure 11: Oral reading fluency and individual comprehension questions – Grade 1 Term III

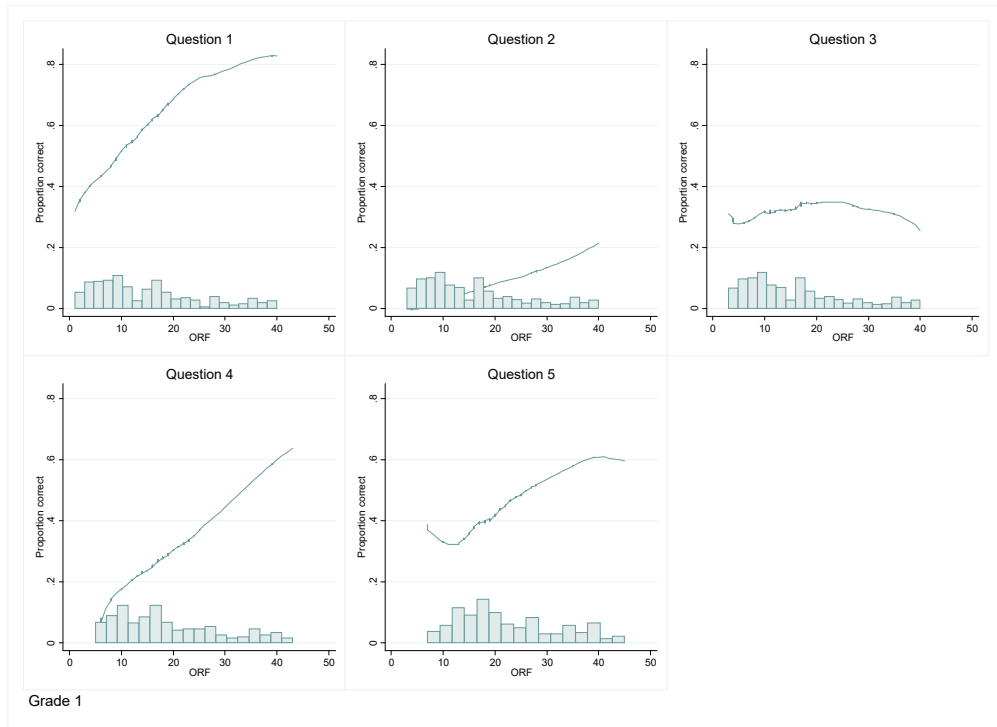


Figure 12: Oral reading fluency and individual comprehension questions – Grade 2 Term V Passage 1

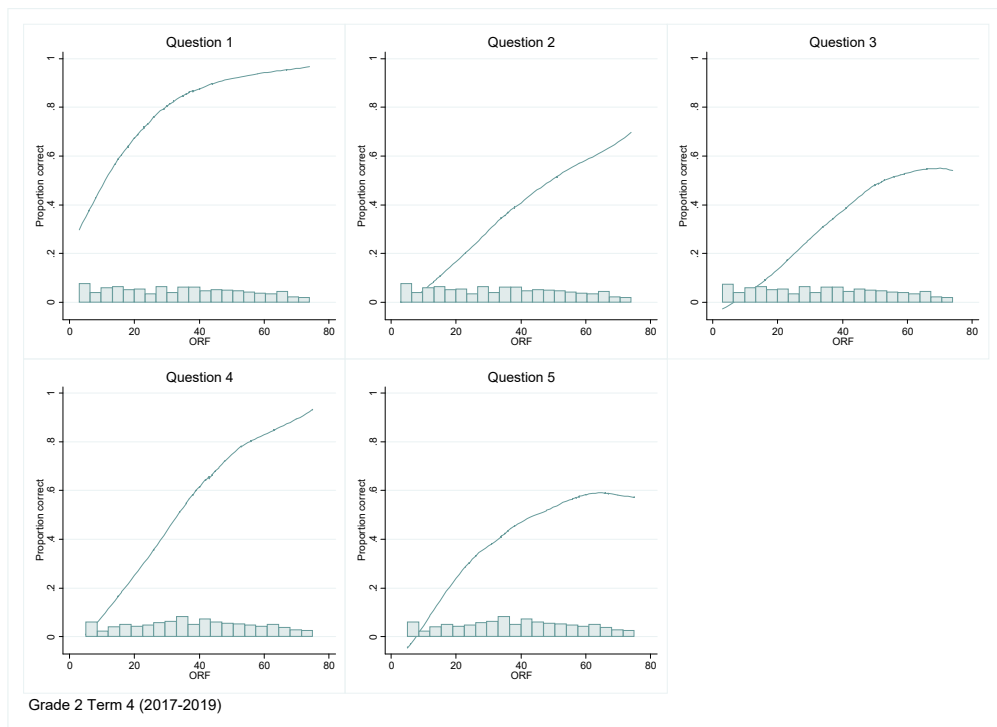
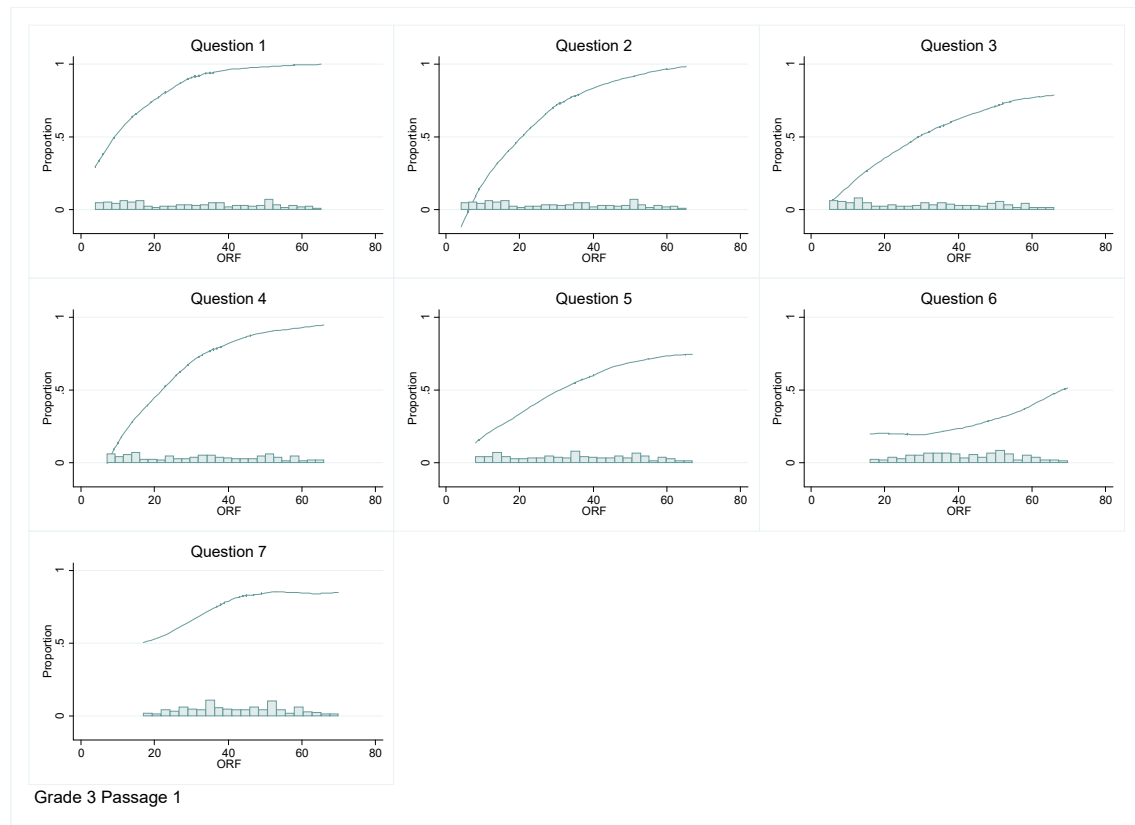


Figure 13: Oral reading fluency and individual comprehension questions – Grade 3 Term III Passage 1



5.1.3 Thresholds and learner profiles

Next we consider whether classifying learners against the upper and lower thresholds distinguishes learners into meaningful reading profiles.

Learners were classified into four groups: i) unable to read, ii) reading below the lower threshold, iii) reaching the lower threshold and iv) reaching the upper threshold. Table 8 presents summary learner profiles for each of the four reading levels by grade⁸. For the grade 3 and 6 samples, results are presented for the first passage. Between 22 and 27 percent of grade 1 learners who cannot read a word are also unable to correctly sound one letter and the average correct letter-sounds per minute ranges from 10 to 14 letters. Grade 3 learners who are unable to read can mostly sound at least one letter but struggle with identifying complex consonants (65 percent score zero on this subtask). Learners who are reading below the lower threshold are correctly sounding between 34 and 43 letters per minute. They are reading at the frustration level with only between 14 to 21 percent reaching 95 percent accuracy in word reading. They comprehend very little of what they read correctly answering between 17 and 42 percent of the questions that they attempt. Grade 6 learners who have not met the lower threshold have very poor vocabulary, scoring 30 percent on average.

⁸ Given the similarity across passages for the Room to Read samples, learners have been grouped by grade.

Table 17: Learner profiles by benchmark level

	Room to Read		Funda Wande		
	Grade 1	Grade 2	Grade 1	Grade 3	Grade 6
Cannot read: 0 CWPM					
Mean correct letter-sounds per minute	14.2	18.5	10.4	18.3	
Letter-sounds scoring zero (%)	27%	16%	22%	8%	
Complex consonant sounds per minute				1.2	
Complex consonants scoring zero (%)				65%	
Vocabulary (%)					13%
Observations	644	594	1855	315	74
READING BELOW LOWER THRESHOLD: 1-39 CWPM					
Mean correct letter-sounds per minute	40.6	43.4	33.6	42.5	
Complex consonant sounds per minute				13.3	
Complex consonants scoring zero (%)				10%	
% with at least 95% accuracy in word reading	15%	20%	15%	21%	14%
Comprehension (% of total correct)	17%	29%	26%	38%	7%
Comprehension (% of attempted correct)	17%	30%	32%	42%	21%
Comprehension scoring zero (%)	53%	34%	32%	20%	53%
Vocabulary (%)					30%
Observations	595	836	483	537	183
MEETS LOWER THRESHOLD BUT NOT UPPER THRESHOLD: 40-59 CWPM					
Mean correct letter-sounds per minute	68.3	58.3		53.0	
Complex consonant sounds per minute				32.2	
Complex consonants scoring zero (%)				0%	
% with at least 95% accuracy in word reading	83%	80%		77%	57%
Comprehension (% of total correct)	55%	68%		76%	18%
Comprehension (% of attempted correct)	55%	68%		76%	33%
Comprehension scoring zero (%)	9%	2%		0%	13%
Vocabulary (%)					59%
Observations	82	441		234	160
MEETS UPPER THRESHOLD: 60+ CWPM					
Mean correct letter-sounds per minute		64.9		57.0	
Complex consonant sounds per minute				40.0	
Complex consonants scoring zero (%)				0%	
% with at least 95% accuracy in word reading		95%		84%	88%
Comprehension (% of total correct)		76%		80%	48%
Comprehension (% of attempted correct)		76%		80%	51%
Comprehension scoring zero (%)		0%		0%	2%
Vocabulary (%)					83%
Observations		241		79	730

Note: Cells with less than 30 observations are not shown

Foundation Phase learners meeting the lower threshold but not yet the upper threshold have well established letter-sound fluency and accuracy has improved with 77 to 83 percent of these learners reaching at least 95 percent accuracy. Comprehension scores are in the range of 55 to 76 percent. The performance of grade 6 learners in this category is very poor indicating that learners who are still reading below 60 CWPM by grade 6 are an increasingly select sample of weaker learners.

Foundation Phase learner who have reached the upper threshold tend to be accurate readers scoring in the 76 to 80 percent range for comprehension. Grade 6 learners in this category still tend to perform poorly on comprehension but it should be noted that i) this category includes the majority of grade 6 learners and ii) the grade 6 comprehension questions appear considerably more challenging than those for earlier grades.

In general, classifying Foundation Phase learners against the upper and lower thresholds produces distinct reading profiles.

5.1.4 Concurrent validity: written comprehension

We investigate the validity of the fluency thresholds in predicting learners' concurrent written comprehension skills. Figures 14 and 15 present the oral reading fluency distribution for each comprehension score for grade 3 and grade 6 learners respectively. The dashed grey lines indicate 40 and 60 CWPM. Learners who perform well on the written comprehension in grade 3, tend to be mostly be reading above the lower threshold of 40 CWPM. In grade 6, the bulk of learners who pass the written comprehension are reading aloud at a fluency above the upper threshold of 60 CWPM.

Figure 14: Oral reading fluency distribution by written comprehension score – Grade 3

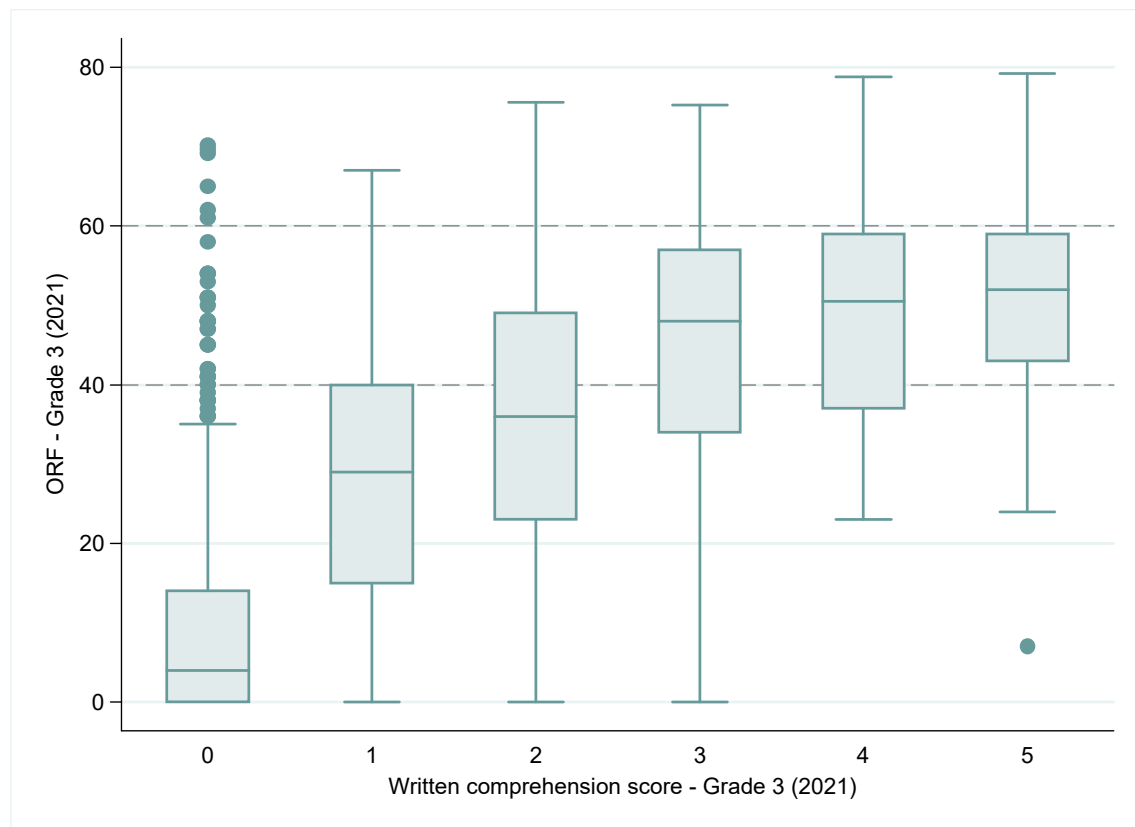
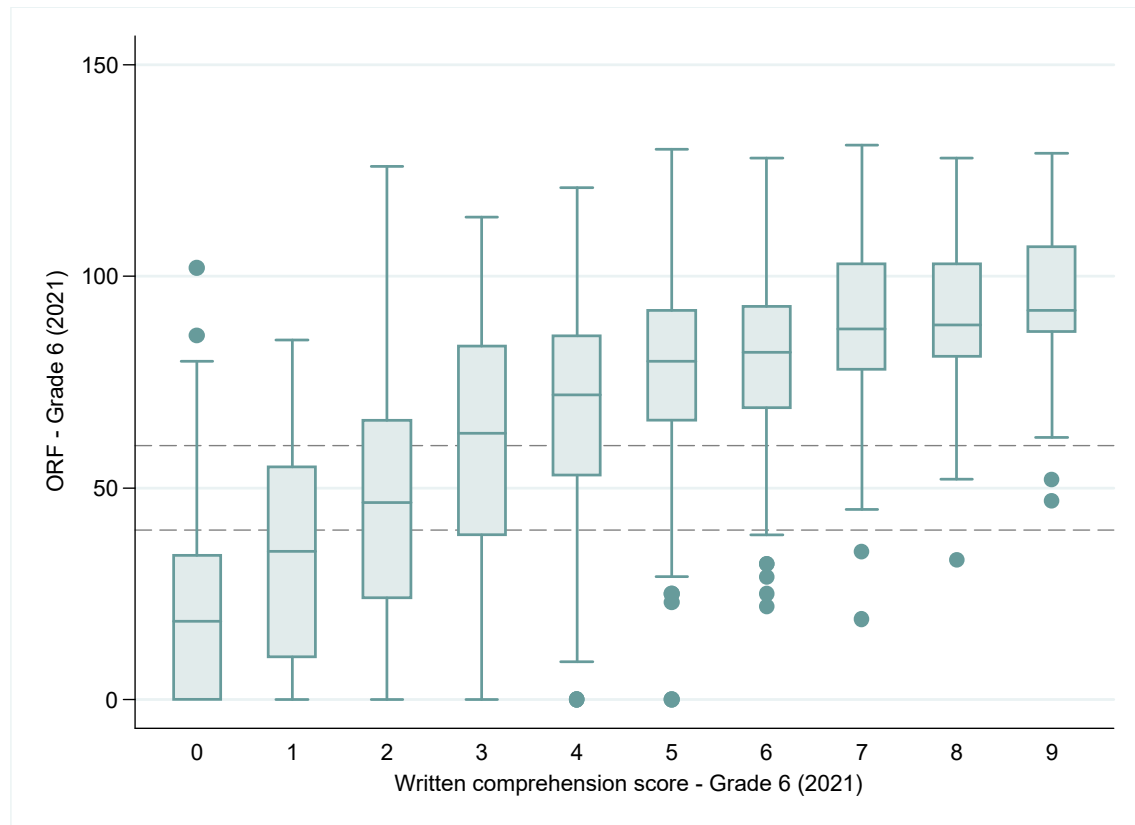


Figure 15: Oral reading fluency distribution by written comprehension score – Grade 6



5.2 EXAMINING ATTAINABILITY AND SETTING GRADE-SPECIFIC MINIMUM BENCHMARKS

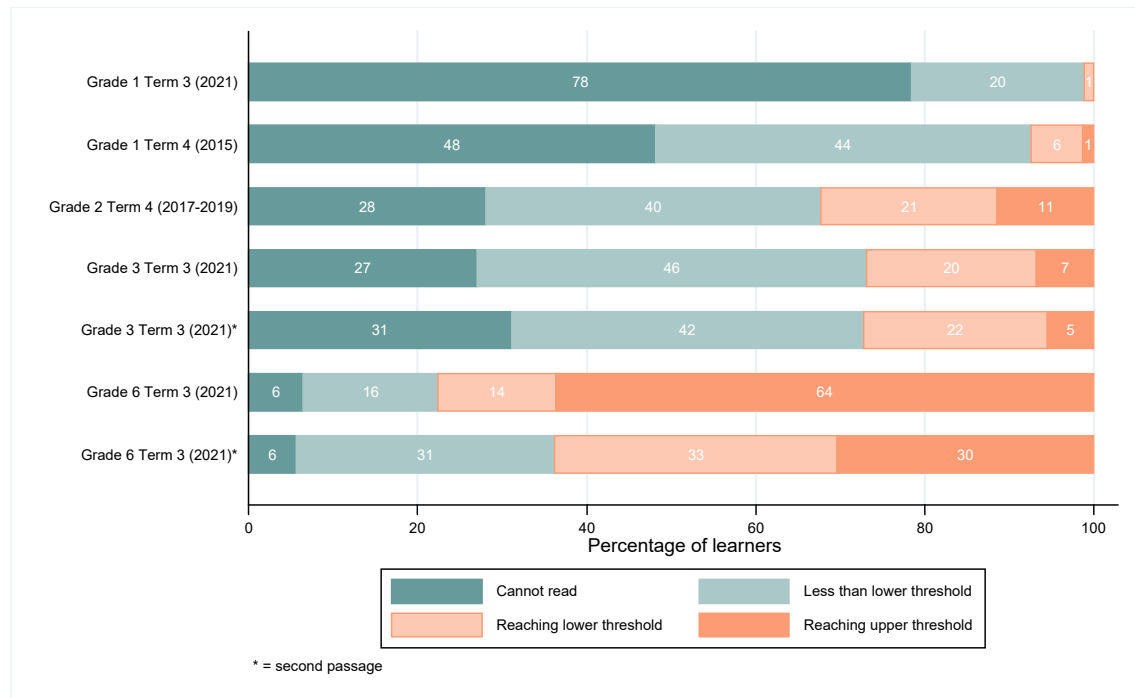
In this section we consider the attainability of the lower and upper thresholds for learners in typical no-fee schools in Limpopo province.

Figure 16 shows the percentage of learners reaching the thresholds by grade. Pre-pandemic, 48 percent of learners at the end of grade 1 were unable to read one word, 44 percent had not reached the lower threshold, 6 percent reached the lower threshold but not the upper threshold and only 1 percent reached the upper threshold. Outcomes in 2021 were considerably worse with only 78 percent of learners unable to read and only 1 percent meeting the lower threshold.

In line with research on Covid-19 learning losses (Ardington et al. 2021), grade 3 learners in 2021 perform at a similar level to grade 2 learners pre-pandemic. Between 27 and 31 percent of these learners are unable to read a word, 40 to 46 percent have not reached the lower threshold, 20 to 22 percent have reached the lower threshold but not the upper threshold and 5 to 11 percent have reached the upper threshold.

At the grade 6 level, six percent of learners can still not read one word. Focussing on the narrative text, the majority of learners (64 percent) have reached the upper threshold. This falls to 30 percent for the informational text.

Figure 16: Percentage of learners reaching threshold and benchmark



The results highlight the dire state of reading in no-fee schools in Limpopo but show that lower and upper thresholds are set at level that is not out of reach of all learners.

The following grade-specific minimum benchmarks are proposed:

- By the end of grade 2, all learners should be able to read at least 40 correct words per minute when reading a passage. Below this threshold, accuracy is poor and we find little evidence that learners can comprehend what they have read. This is therefore a minimum benchmark, if learners do not reach this level of fluency, higher-order reading skills are very unlikely to develop. Pre-pandemic 32 percent of learners in this sample had reached this benchmark at the end of grade 2.
- By the end of grade 3, all learners should be able to read at least 60 correct words per minute when reading a passage. At this level of fluency reading comprehension becomes increasingly possible when learners read on their own. Once learners reach this level of fluency, it appears that poor comprehension skills become the limiting factor to further literacy development. In 2021, only 7 percent of learners in this sample had reached this benchmark at the end of grade 3. However, 62 percent of grade 6 learners in the same schools had reached the benchmark.

5.3 LETTER-SOUNDS BENCHMARK

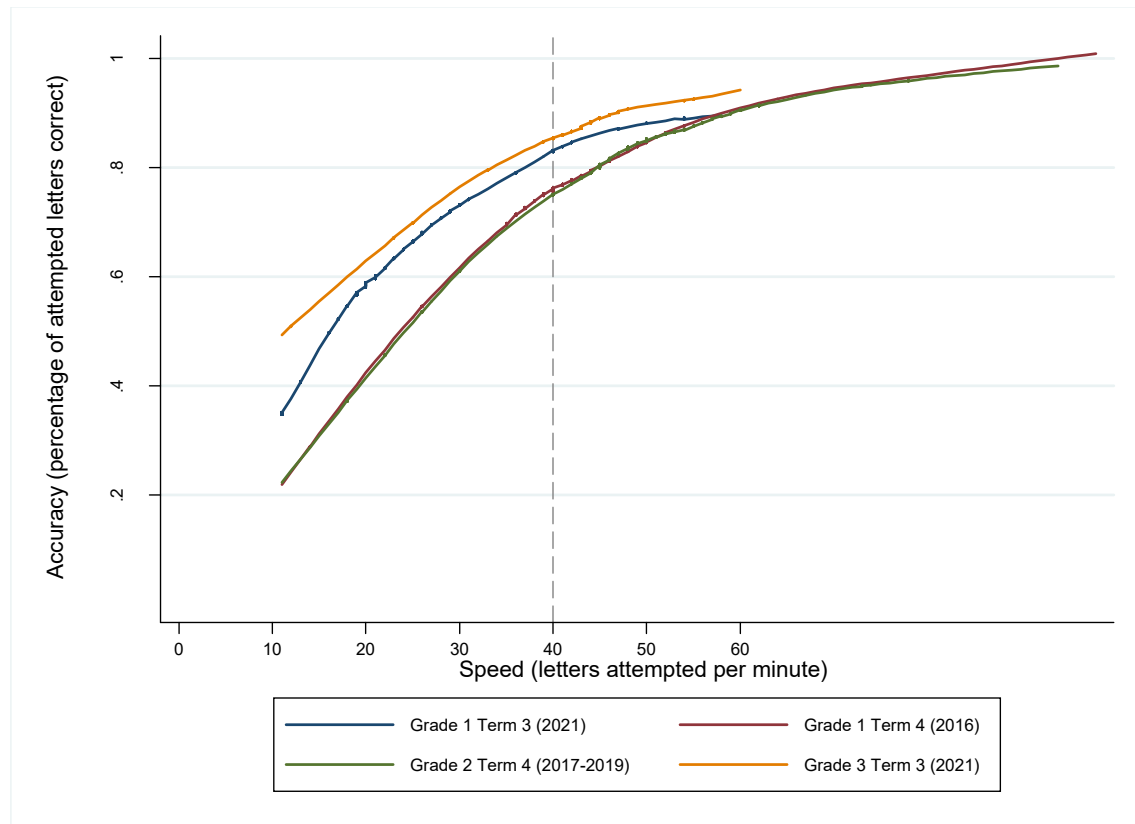
Reading development is hierarchical with different processes and skills coming into play as reading proficiency increases. This understanding supports benchmarking foundational skills as an early indicator of whether learners are on track. Letter-sound knowledge fluency has been shown to be predictive of future oral reading fluency in Setswana (Wills et al. 2022) and Nguni languages (Ardington et al. 2020) making it an appropriate foundational skill for benchmarking. Using learner-level longitudinal data and taking into

account expert opinion on curriculum demands, the Setswana and Nguni benchmarking reports identified 40 correct letter-sounds per minute as an appropriate minimum benchmark for the end of grade 1. Reaching this level was predictive of reaching later oral reading fluency benchmarks and data indicated that there were diminishing improvements in letter-sound knowledge once learners had reached 40 correct letter-sounds per minute.

Sepedi longitudinal data is not yet available and we cannot examine the predictive validity of a letter-sound benchmark for a successful Sepedi early grade reading trajectory nor can we investigate how letter-sound knowledge develops over time. However, all Sotho and Nguni languages are alphabetic and it is reasonable that they should share a common letter-sound benchmark. We consider whether the letter-sound benchmark of 40 correct letter-sounds per minute is appropriate for Sepedi by examining both the fluency-speed relationship and the attainability of the benchmark in the Sepedi samples.

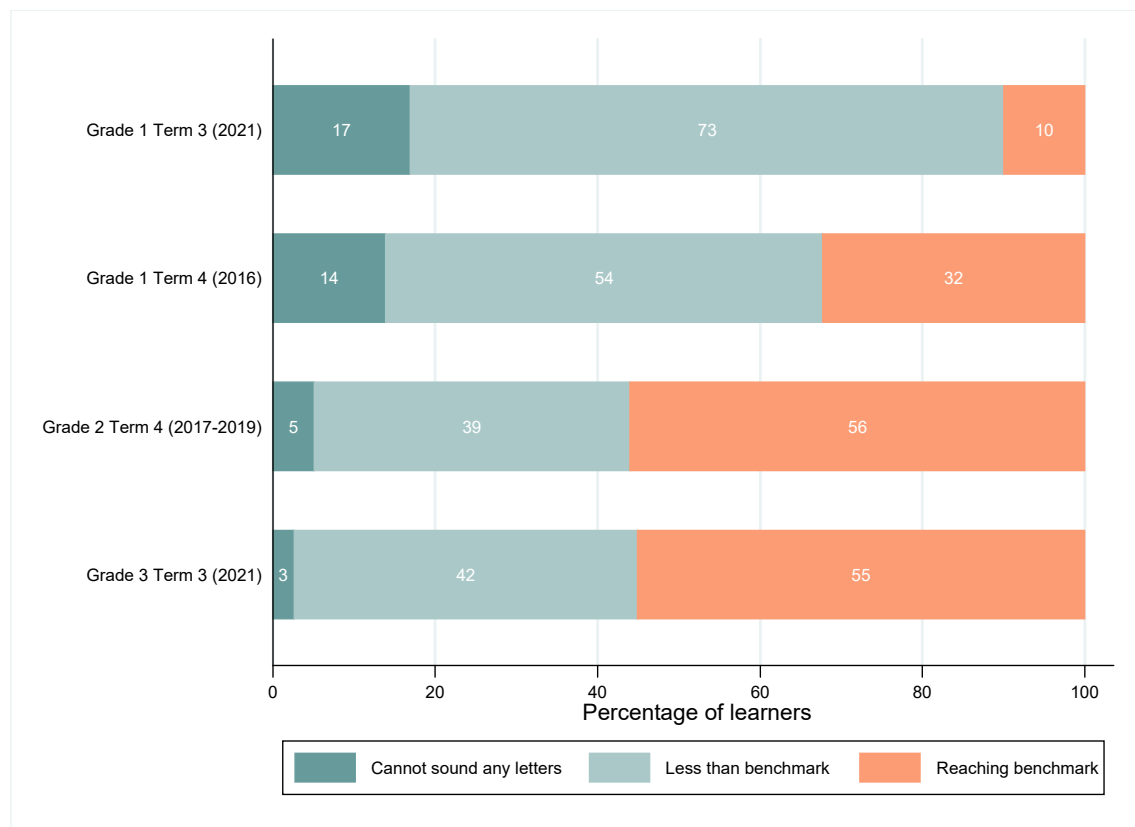
The relationship between speed and accuracy in letter-sound knowledge is summarised in Figure 17. Similar to word reading, speed and accuracy increase together steeply before accuracy tends to flatten off. Interestingly, at every level of speed, learners' accuracy in the *Room to Read* samples is substantially lower than that of the *Funda Wande* samples. On investigation, it appears that learners consistently struggled with the third letter (d) on the *Room to Read* assessment. The letter d also appears on the *Funda Wande* sheet of letters but is further down and therefore only attempted by the stronger learners in the sample.

Figure 17: Letter-sound knowledge speed and accuracy



The attainability of the letter-sound benchmark is summarised in Figure 18 below. Learners are classified as i) not being able to correctly sound one letter, ii) not reaching the benchmark or iii) reaching the benchmark of 40 correct letter-sounds per minute. Similar to oral reading fluency, the deterioration in learner performance over the pandemic is evident. Pre-pandemic, just under a third of grade 1 learners were meeting the letter-sound benchmark. This decreased to 10 percent for the 2021 sample. The performance of grade 2 learners pre-pandemic is very similar to that of the grade 3 sample in 2021. These results are in line with estimated Covid-19 learning losses in the range of 1 to 1.4 years of normal learning (Ardington et al 2021). Over half of the grade 2 and 3 learners meet the letter-sound benchmark. A letter-sound benchmark of 40 correct letter-sounds per minute for the end of grade 1 seems appropriate in that it is aspirational and supportive of improvements while at the same time being attainable by a reasonable portion of learners pre-pandemic.

Figure 18: Percentage of learners reaching letter-sound benchmark



6 SUMMARY

The following grade-specific minimum benchmarks are proposed:

- By the end of grade 1, all learners should know their letter-sounds well, sounding at least 40 correct letters per minute.

- Letters are a good early predictor of oral reading fluency (ORF) later in Foundation Phase. Improvements in letter-sound speed stagnate at 40 letters. Pre-pandemic 32 percent of learners in this sample had reached this benchmark at the end of grade 1.
- By the end of grade 2, all learners should be able to read at least 40 correct words per minute when reading a passage
 - Below this threshold, accuracy is poor and we find little evidence that learners can comprehend what they have read. This is therefore a minimum benchmark, if learners do not reach this level of fluency, higher-order reading skills are very unlikely to develop. Pre-pandemic 32 percent of learners in this sample had reached this benchmark at the end of grade 2.
- By the end of grade 3, all learners should be able to read at least 60 correct words per minute when reading a passage
 - At this level of fluency reading comprehension becomes increasingly possible when learners read on their own. Once learners reach this level of fluency, it appears that poor comprehension skills become the limiting factor to further literacy development. In 2021, only 7 percent of learners in this sample had reached this benchmark at the end of grade 3. However, 62 percent of grade 6 learners in the same schools had reached the benchmark.

7 REFERENCES

- Abadzi, H., 2012. Developing Cross-Language Metrics for Reading Fluency Measurement, Developing Cross-Language Metrics for Reading Fluency Measurement. <https://doi.org/10.1596/26819>
- Adams, J., Bartram, J., Chartier, Y., Sims, J., 2009. Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings. World Health Organisation. Available at: https://apps.who.int/iris/bitstream/handle/10665/44159/9789241547796_eng.pdf?sequence=1&isAllowed=y
- Allington, R.L., McCuiston, K., Billen, M., 2015. What Research Says About Text Complexity and Learning to Read. *The Reading Teacher* Vol. 68 Issue 7 pp. 491–501 DOI: 10.1002/trtr.1280
- Ardington, C., Hoadley, U., & Menendez, A. 2019. Impact Evaluation of USAID/South Africa Story Powered School Program Endline Report. Chicago: NORC at the University of Chicago, USAID.
- Ardington, C. & Henry, J. 2021. Funda Wande Limpopo Evaluation. Baseline Report. Cape Town: SALDRU, University of Cape Town
- Ardington, C. & Meiring, T. 2020. Impact Evaluation of Funda Wande Coaching Intervention Midline Findings. Cape Town: SALDRU, University of Cape Town.
- Ardington, C., Wills, G., Pretorius, E., Deghaye, N., Menendez, A., Mohohlwane, N., Mtsatse, N. and Van der Berg, S. 2020. Technical Report: Benchmarking early grade reading skills in Nguni languages. Stellenbosch: ReSEP, Stellenbosch University.
- Ardington, C., Wills, G., Pretorius, E., Mohohlwane, N., and Menendez, A. 2021. Benchmarking oral reading fluency in the early grades in Nguni languages. *International Journal of Educational Development*, 84, 102433.
- Betts, E. A. 1946. Foundations of reading instruction with emphasis on differentiated guidance. New York, NY: American Book Company.
- Chard, D.J., Pikulski, J.J., & McDonagh, S.H. 2006. Fluency: The link between decoding and comprehension for struggling readers.
- Cilliers, J., Fleisch, B., Prinsloo, C., & Taylor, S. 2020. How to Improve Teaching Practice? An Experimental Comparison of Centralized Training and In-Classroom Coaching. *Journal of Human Resources* 55(3): 926-962
- Cilliers, J., Fleisch, B., Kotze, J., Mohohlwane, N., Taylor, S., & Thulare, T. 2022. Can virtual replace in-person coaching? Experimental evidence on teacher professional development and student learning. *Journal of Development Economics* 155: 102815
- Constitution of the Republic of South Africa [South Africa], 10 December 1996, available at: <https://www.refworld.org/docid/3ae6b5de4.html> [accessed 6 May 2022]
- Dale, P.S., Crain-Thoreson, C., 1999. Language and Literacy in a Developmental Perspective. *Journal of Behavioral Education* 9, 23–33 <https://doi.org/10.1023/A:1022135831472>

- Department of Basic Education (DBE). 2011. Curriculum Assessment and Policy Statement. Grades R-3. English Home Language. Pretoria.
- Department of Basic Education (DBE). 2020. National Framework for the Teaching of Reading in African Languages: Foundation Phase. Pretoria: Department of Basic Education
- De Vos, M., van der Merwe, K. and van der Mescht, C. 2014. A linguistic research programme for reading in African languages to underpin CAPS. *Journal for Language Teaching*, Vol. 48, No. 2, pp. 149-177. <http://dx.doi.org/10.4314/jlt.v48i2.7>
- Faaß, G., & Ulrich, H., Elsabe, T., and Prinsloo, D. 2009. Part-of-Speech tagging of Northern Sotho: Disambiguating polysemous function words. 38-45.
- Howie, S., Combrinck, C., Roux, K., Tshele, M., Mokoena, G., & McLeod Palane, N. 2017. Progress in International Reading Literacy Study 2016 - South African Childrens' Reading Literacy Achievement. Pretoria: Centre for Evaluation and Assessment
- Joddar, P. and Beggs, C. 2022. Sepedi Benchmarking Working Paper. Room to Read.
- Khulisa Management Services. 2020. Setting reading benchmarks in South Africa. USAID Publication. Johannesburg: Department of Basic Education.
- Madigoe, M.W. 2003. Syllable structure processes in northern Sotho. A linear and nonlinear phonological analysis. Stellenbosch University.
- Makaure, Z.P. 2016. Phonological processing and reading development in Northern Sotho-English bilingual children. Unpublished Thesis. Pretoria: Department of Linguistics and Modern Languages, university of South Africa.
- Pretorius, E. J. and Mokhwesana, M.M. 2009. Putting reading in Northern Sotho on track in the early years: Changing resources, expectations and practices in a high poverty school. *South African Journal of African Languages*, Volume 29, Issue 1, pp. 54- 73
- Pretorius, E.J., 2018. Reading in the African languages: An annotated bibliography 2004-2017. PrimTed Project.
- Ramaphosa, C. 2019. *President Cyril Ramaphosa: State of the Nation Address 2019*. 20 June 2019. South African Government. Available at: <https://www.gov.za/speeches/2SONA2019>
- Room to Read, 2018. Setting Data-Driven Oral Reading Fluency Benchmarks Guidance Note. Research Triangle Park, NC.
- RTI International. 2017. All Children Reading-Asia: EGRA Benchmarks and Standards Research Report
- Schutte, H. 2005. The development of early literacy skills among a group of urban Sepedi-speaking children. Unpublished Thesis. Pretoria: Department of Communication Pathology, University of Pretoria.
- Spaull, N., Pretorius, E, and Mohohlwane, N. 2020. Investigating the comprehension iceberg: Developing empirical benchmarks for early-grade reading in agglutinating African languages. *South African Journal of Childhood Education*. 10(1): 1-14.

- Spaull, N., & Pretorius, E. 2019. Still Falling at the First Hurdle: Examining Early Grade Reading in South Africa. In *South African Schooling: The Enigma of Inequality* (pp. 147–168). Cham, Switzerland: Springer Nature. https://doi.org/10.1007/978-3-030-18811-5_8
- Statistics South Africa. 2012: Census 2011 Statistical release – P0301.4. Statistics South Africa. Pretoria.
- Stein, N. 2011. Basic Education Rights Handbook – Education Rights in South Africa – Chapter 11: Language in schools.
- Wang, Z., Sabatini, J., O'Reilly, T., and Weeks, J. 2019. Decoding and Reading Comprehension: A Test of the Decoding Threshold Hypothesis. *Journal of Educational Psychology*. 111. 387-401. 10.1037/edu0000302.
- Wills, G., Ardington, C., Pretorius, E., Poole, E., Ramagoshi, R. 2022. Benchmarking Early Grade Reading Skills: Setswana and English First Additional Language. Technical Report. Khulisa Management Services. Johannesburg.
- Wilsenach, C. 2019. Phonological awareness and reading in Northern Sotho – Understanding the contribution of phonemes and syllables in Grade 3 reading attainment. *South African Journal of Childhood Education*. 9(1): 1-10.

8 APPENDIX

Table A1: Mean, median and logistic regression benchmarks

	Grade 1 Term III	Grade 2 Term IV	Grade 3 Term III	Grade 3 Term III*	Grade 6 Term III	Grade 6 Term III*
Mean lower bound	26.5	49.6	46.5	42.4	89.9	62.3
Mean	28.9	50.8	47.9	43.9	92.2	65.6
Mean upper bound	31.2	52.1	49.4	45.3	94.5	68.8
Median lower bound	25	48	47	42	88	57
Median	28	49	49	44	90	63
Median upper bound	36	52	52	48	96	72
Logistic 50% lower bound	29.9	33.4	28.7	23.2	100.8	94.3
Logistic 50%	34.8	35.0	31.8	25.5	108.1	110.2
Logistic 50% upper bound	39.8	36.6	35.0	27.8	115.4	126.0
Observations	282	1349	562	679	747	852

* Second passage

Published by the Department of Basic Education

222 Struben Street

Private Bag X895, Pretoria, 0001

Telephone: 012 357 3000 Fax: 012 323 0601

ISBN Number: 978-1-4315-3412-8

© Department of Basic Education

website: www.education.gov.za

facebook: www.facebook.com/BasicEd

twitter: www.twitter.com/dbe_sa



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA



FundaWande

Reading for Meaning

