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XITSONGA READING BENCHMARK STUDY

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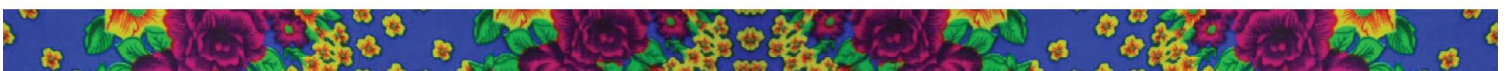
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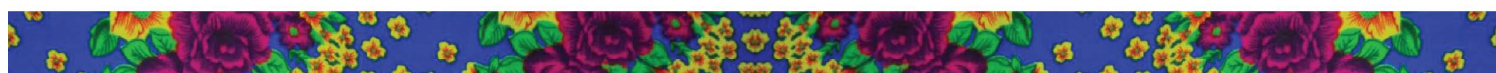
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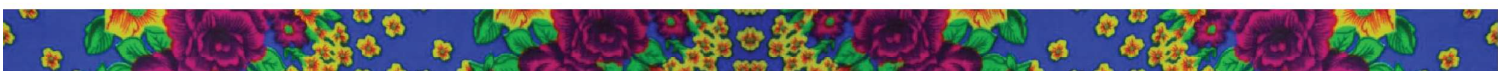Zamangwe Zwane (Department of Basic Education/World Bank)

CONTENTS

LIST OF TABLES

LIST OF FIGURES

DG FOREWORD

In early 2019 South African President Cyril Ramaphosa articulated a new and clear expectation for basic education: every child should be able to read for meaning by age 10 (Government, 2019). While reading for meaning is the goal of reading, reading is a complex and hierarchical process. A range of foundational reading subskills needs to be mastered before one can comprehend or understand what is in a text.

In response to this, the Department of Basic Education (DBE) in collaboration with various stakeholders has been leading the establishment of early-grade reading benchmarking for the eleven spoken South African Languages of Learning, Teaching, and Assessment (LoLTAs). It is my great honour to share the newly developed Tshivenḓa early-grade reading benchmarks. This is the eleventh language the Department of Basic Education has benchmarked since 2020. I believe these benchmarks will contribute to improvements in the teaching of early grade reading in several ways, including being a tool to support teachers with specific Tshivenḓa language nuances.

The collaboration between the government, universities, funders, and data analysts is commendable. I specifically want to thank United States Agency for International Development (USAID) which funded the work. As a department, we continue to be committed to improving learning and teaching throughout the education system. The Foundation Phase is a fundamental period to establish basic competencies and over time we have been working to strengthen the inputs and support for teachers for this phase. The Framework for Teaching Reading in African Languages was the first phase of this, and we have continued to build on this work through several efforts including the reading benchmarks. We are committed to continue making every effort to support reading with a special and necessary emphasis on African languages.

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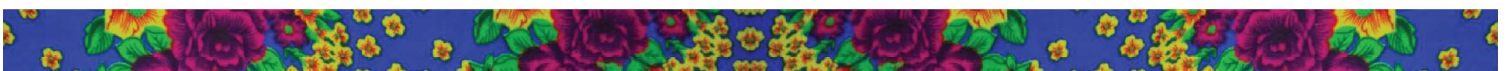
EXECUTIVE SUMMARY

In recognition of low learning outcomes in reading, the Department of Basic Education (DBE) has increasingly invested in supporting early grade reading through research such as the Early Grade Reading Studies; supplementary curriculum guidance including the Framework for Reading in African Languages and more recently, the creation of early grade reading benchmarks.

Under the leadership of the DBE, collaborative efforts involving African language linguists, donors, literacy organisations, and quantitative researchers have made considerable progress towards establishing reading benchmarks in all South African languages. Early-grade reading benchmarks have been developed and disseminated for the Nguni language group, the Sesotho-Setswana language group, Afrikaans, and English as a First Additional Language (EFAL) and now Xitsonga. The long-term goal is to have foundational reading benchmarks established for the nine African Home Languages, Afrikaans and for English at the Home Languages and English First Additional Language levels by 2024.

The aim of this study's findings is to support how Xitsonga-speaking learners develop early literacy skills in their mother tongue. In addition, the study may be used to support pedagogical practices in multilingual classrooms, particularly in early grade reading whereby English and African languages have differences in phonology (system of speech sounds), orthography (writing) and morphology (words and their constituent parts).

Why Do We Need Benchmarks?

International assessments such as the Progress in International Reading Literacy Study (PIRLS) show that the majority, 78 percent (2016) , of learners in South Africa cannot read for meaning by Grade 4. This has increased to 81% in the 2021 PIRLS cycle. While this implies that mastery of early reading skills is not taking place in the Foundation Phase, the PIRLS data provide no guidance on where these foundational gaps lie. Reading benchmarks in the early grades afford the sector a standard by which to measure its learners and to monitor progress towards targets such as having all ten-year- olds reading for meaning by 2030 (South African Government, 2019). Closer to the ground, benchmarks inform the teacher about which learners are on track to become proficient readers and which have gaps in foundational skills. Teachers can therefore implement informed and adequate intervention strategies early in the reading journey.

How Do We Establish Benchmarks?

The approach used to establish benchmarks was multidisciplinary. Three integrated features informed the benchmarks set: reading development theory, linguistic expertise of the Xitsonga language and quantitative analysis of primary data. These three features were balanced against the demands of the Home Language Foundation Phase curriculum. The Xitsonga early grade reading benchmarks are based on reading assessments of more than 7 000 unique learners and 700 no-fee schools in the Limpopo province.
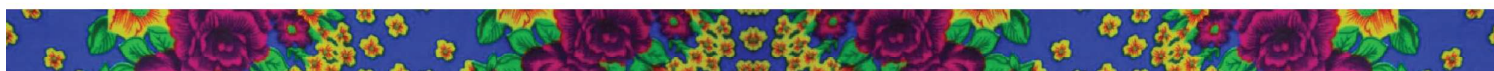
What are the Xitsonga Early Grade Reading Benchmarks?

85	**END OF GRADE 6** All learners should be able to read at least **85 CORRECT WORDS** per minute when reading a passage
50	**END OF GRADE 4** All learners should be able to read at least **50 CORRECT WORDS** per minute when reading a passage
40	**END OF GRADE 3** All learners should be able to read at least **40 WORDS** correct per minute when reading a passage
30	**END OF GRADE 2** All learners should be able to read at least **30 WORDS** correct per minute when reading a passage
40	**END OF GRADE 1** All learners should know their LETTER-SOUNDS well, sounding at least **40 LETTERS** correct per minute

As illustrated in the figure above, the benchmarks are as follows:

- By the end of Grade 1, all learners should be able to correctly sound 40 letters per minute.

  - This is the same benchmark as for the Nguni and Sesotho-Setswana languages. While pronunciation may be different, the letters across languages are the same supporting the use of one benchmark.

  - Letters are a good early predictor of oral reading fluency (ORF) levels acquired by the end of the Foundation Phase. Improvements in letter-sound speed stagnate at 40 letters.

  - Once learners have achieved this level of letter-sound knowledge, phonics instruction should focus on blending of sounds and complex consonants while decoding instruction should focus on helping learners apply word attack strategies.

- By the end of Grade 2, all learners should be meeting the fluency threshold, correctly reading from a passage at least 30 words per minute.

  - Below this threshold, accuracy is poor, and we find little evidence that learners can understand what they have read. For learners not meeting the Grade 2 benchmark, instruction should focus on improving decoding skills.

  - Once learners have reached this level, they would benefit from instruction that focuses on developing fluency and exposes them to a wider range of texts.

- By the end of Grade 3, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 40 words per minute.

  - 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.

- Once learners have reached this fluency level, instruction should shift to strengthening comprehension skills through continued development of vocabulary, language skills and encouraging learners to engage critically with text.

- By the end of Grade 4, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 50 words per minute.

  - This level of fluency allows learners to read independently and to use their reading skills in order to learn.

  - Instruction should focus on broadening learners vocabulary while developing mastery of reading various texts, such as literal, narrative and inferential text.

- By the end of Grade 6, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 85 words per minute.

  - Additional support for learners is required to master this fluency benchmark and to improve their reading comprehension skills.

  - Strengthening comprehension skills requires instruction that guides and assists learners in understanding comprehension strategies for different texts, when and how to apply such strategies.

Reaching these benchmarks is within reach of learners, including those attending less resourced schools. Examples from this study confirm that the benchmarks are attainable, yet learners are acquiring decoding skills (such as letter-sound knowledge) and fluency far too slowly. Considerable progress will need to be made for all learners to reach these benchmarks in the Foundation Phase.

As benchmarks are increasingly used to assess and track reading through systematic measurement in early grades, we will gain more understanding of how well children are able to keep pace with these African language benchmarks to support improvements in reading for meaning.
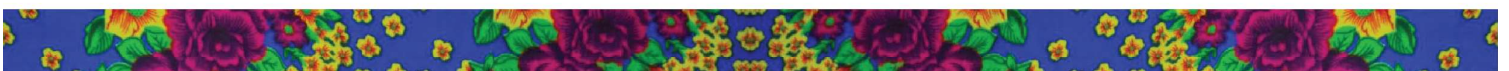
ABBREVIATIONS AND ACRONYMS

AWS	Amazon Web Services
CCV	Consonant Consonant Vowel
CV	Consonant Vowel
CyV	Consonant + semi-vowel 'y' + Vowel
DBE	Department of Basic Education
DG	Director General
EFAL	English First Additional Language
EGRA	Early Grade Reading Assessment
EMIS	Education Management Information Systems
ESRC	Economic and Social Research Council
HL	Home Language
ID	Identification
IQR	Interquartile range
LOLT	Language of Learning and Teaching
LSK	Learning Skills and Knowledge
OMF	Old Mutual Foundation
ORF	Oral Reading Fluency
PIRLS	Progress in Literacy Reading Study
PMT	Project Management Team
READ	Rural Education and Development
RON	Rapid Object Naming
RTI	Research Triangle Institute
SMT	School Management Teams
UKZN	University of KwaZulu-Natal
UL	University of Limpopo
WCPM	Words Correct Per Minute
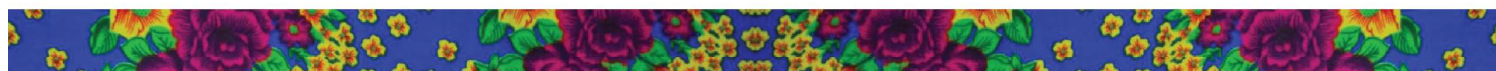
1. INTRODUCTION

1.1.   Aim and Structure

The aim of this report is to establish reading benchmarks for Xitsonga. The report proposes benchmarks for various skills and grades. It details the process of development as well as current profiles of learners against these benchmarks. The report is intended to inform and shape reading in Xitsonga in various ways by establishing educationally relevant, data-driven benchmarks.

The Department of Basic Education (DBE) in collaboration with the Old Mutual Foundation (OMF) appointed Decipher Data as a service provider for data collection and Data Innovators for data analysis and report writing. To support instrument development Xitsonga linguists were appointed, in addition they co-led training.

The report presents the theoretical framework for reading development and the need for reading benchmarks for African languages (Section 2). Section 3 provides Xitsonga language features which allows readers to understand the foundation for the development and testing of the study's instruments (Section 4). Section 5 details the methods for the Xitsonga benchmarking study with attention to the data collection and quality assurance processes. Finally, Section 6 suggests the recommended reading benchmarks for Xitsonga language.

1.2.   Background

Studies such as the Progress in International Reading Literacy Study (PIRLS) show that a 81% of children cannot reach the lowest PIRLS benchmark: understanding literal information in texts. This 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 alerts us that the large gaps in early literacy development occur in the Foundation Phase.

In response, the DBE has led efforts to develop reading benchmarks for South African languages since 2019. Establishing reading benchmarks can create greater awareness of *early* milestones in reading development and minimize the chance of literacy issues in the Intermediate Phase. This work has been in collaboration with stakeholders, including academics and funders. Several reports have been published since.

The design report*, Setting Reading Benchmarks in South Africa*, highlights the lack of reading benchmarks, the data needed as well as language-specific data gaps. The report also explores benchmarking methodology acknowledging statistical methodologies used nationally and internationally, and the limitations that exist. It proposes the most appropriate statistical methods with clear discussions on why these differences matter.

Following this report, decisions on which grades, skills, and the sequencing of language for benchmarking were agreed upon. So far early-grade reading benchmarks have been developed and
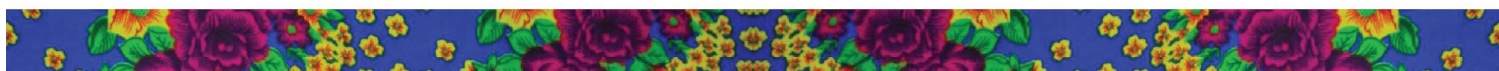
disseminated for the Nguni language group, the Sesotho-Setswana language group, Afrikaans, and English as a First Additional Language (EFAL). The long-term goal is to have foundational reading thresholds and benchmarks established for the ninen African Languages, Afrikaans and for English at the Home Language level and English First Additional Language levels by 2024.

Three quantitative data-driven approaches were agreed on depending on the availability of data for each respective language. While existing data was available to be reanalysed to create Nguni benchmarks, this was not possible for all languages. For Xitsonga, a specific data collection effort for benchmarking was necessary. Data were collected in Limpopo from Xitsonga Language of Learning and Teaching (LoLT) schools in the fourth term in 2022. Details on the data collection and instruments used are provided in the report as well as the statistical approach to benchmarking.
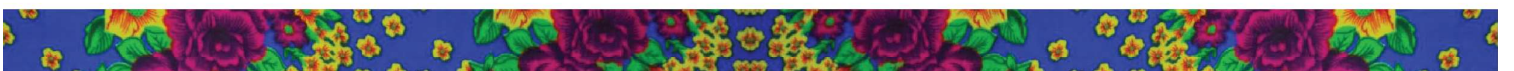
2. THEORETICAL FRAMEWORK FOR READING DEVELOPMENT

2.1. Reading acquisition and foundational skills

Early literacy refers to what children should know about reading and writing before they can learn to read and write (Spivey, 2022). It lays a foundation for the children to develop the necessary skills for learning to read. However, there is a variation in the pace at which children acquire language for school readiness, given that some develop speech and skills effortlessly while others are slow to develop these skills and continue to struggle with literacy and academic skills throughout schooling (Law, Rush, Clegg & Peters, 2010).

Reading comprehension is a complex task requiring learners to simultaneously function on several processes and skills. These hierarchical skills build on one another, with the ultimate result being reading comprehension. Oral language skills (vocabulary, listening comprehension, phonemic awareness), acquired through listening and speaking, reflect a child's language understanding. These are skills often developed in the home context and a critical foundational resource that children bring into the classroom. The initial connection between the language a child understands and the written code of that language is taught through phonics, that is, knowing how phonemes sounds are represented by letters (graphemes). This is alphabetic knowledge is the first level of decoding. The next level on this hierarchy is the blending together of these sounds represented by letters to form which can be facilitated through the subsidiary of syllables. The subsequent level of reading acquisition is fluency, the ability to read passages with accuracy, speed, and proper expression.

The Science of Reading (SoR) has been instrumental in our current understanding of the additional aspects necessary to learning how to read: accuracy and speed. Accuracy often develops first, followed by improvement in speed. Once both these skills are mastered, decoding becomes more automatic, allowing children to use their working memory to focus on meaning-making. While fluency builds a bridge between decoding and reading comprehension (Chard, Pikulski & McDonagh, 2006), the relationship is not entirely linear. Although mastering fluency is necessary to enable comprehension.

2.2. Which skills to benchmark and why

Reading is a complex process that requires learners to develop and master various skills to be proficient readers- meaning being able to comprehend what they have read at the most basic level and utilise what they have read for a specific purpose at a more advanced level. As mentioned in the previous section, the development of these skills may look different depending on the language the learner is learning to read in. However, the one commonality that alphabetic languages have, especially those with transparent orthographies like African languages of learning and teaching in South Africa, is that the development of these skills is hierarchical. Oral language provides the foundation for reading. Thereafter, the learner must learn the code, that is, how different sounds in their language are represented through letters. The building of this skill lends itself to decoding through blending of these
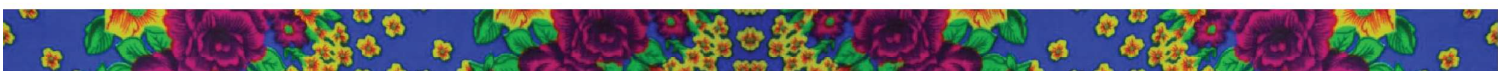
sounds into words (Mohohlwane et al., 2022). Learners who are able to decode words quickly and accurately gain fluency and free up their working memory to make meaning of what they read. The figure below from Mohohlwane et al (2022) depicts this reading acquisition process.
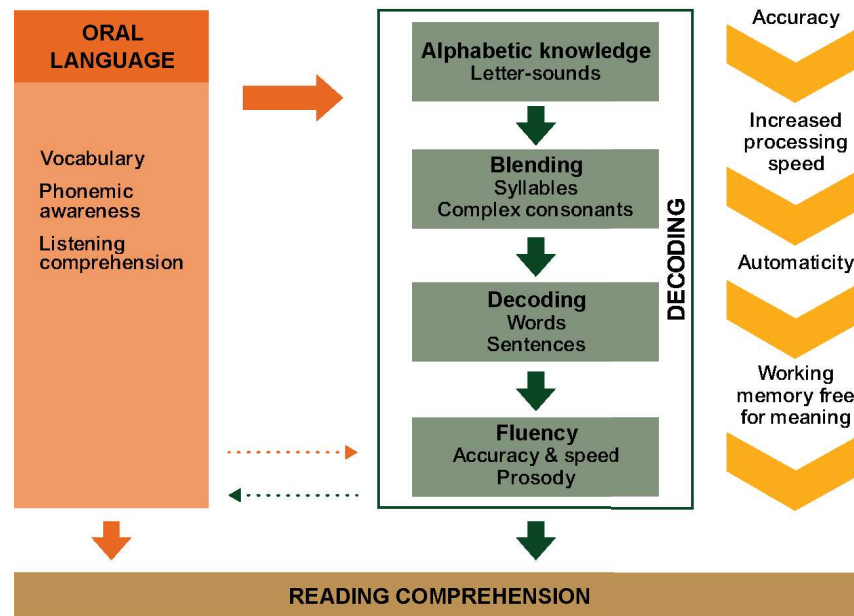
Figure 1. Reading acquisition process

Proficient readers are those that display two abilities: fluency (speed, accuracy, and prosody) and comprehension (Jukes et al., 2020). Given that comprehension is difficult to measure because it relies on so many other external factors, we decided that fluency would be benchmarked as its proxy as it can indicate probable levels of comprehension and is a more easily measurable (Jukes et al., 2020). The selected skills to be benchmarked are thus letter sound knowledge and oral reading fluency (passage reading). A description of these skills is given in Box 1 below.

In their paper, Wills et al (2022) document the levels of decoding of learners learning to read in Nguni and Sesotho-Setswana languages using what is currently the largest dataset of these early skills. What they found was that learners from no-fee-paying schools come into school with low oral language skills. Not only that, as they progress in the foundation phase, their decoding remains too slow even to the most basic skill which is letter-sound knowledge. This, of course, affected their fluency development. These findings are important in alerting where learners are stumbling in their reading journey. Benchmarking these early skills in each of the languages that South African learners are learning to read in gives greater awareness of the milestones that learners need to reach.

Alphabetic knowledge is the understanding of how sounds (phonemes) are represented by written letters (graphemes) in a language. In this report we measure alphabetic or **letter-sound knowledge** as the number of letters correctly sounded within one minute.

Oral Reading Fluency (ORF) is the ability to read aloud with accuracy, speed, and prosody. Accuracy is measured as the percentage of words read correctly while speed is measured as the number of words read within a time period, typically one minute. Prosody refers to the reading of words in a natural way that conforms to the speech rhythms with intonation patterns reflecting punctuation in the language. The assessment of prosody is subjective and difficult to measure in field studies. In this report we use the term fluency to describe the combination of speed and accuracy. Specifically, ORF is measured as the number of words read correctly within one minute.

Source: Mohohlwane et al, 2022

2.2.   Why we need benchmarks for African languages

Reading theory suggests that learners need to know how to read by the age of ten before they transition into learning through reading. In South Africa, this requirement has the added complexity of over 63% of learners switching their LoLT from what is most often their home language to English (Sapire & Roberts, 2017). Poor learners in South Africa continue to bear the brunt of performing worse academically compared to their more affluent peers. The majority of these learners develop early literacy skills in their home language with English as an additional language. They transition to English as the medium of instruction in Grade 4. Although most learners are taught early literacy skills in their African home language, little research on early reading has been done in these languages (de Vos, van der Merwe & van der Mescht 2014; Spaull et al. 2018).

It is therefore important that the teaching of reading in the first three grades is well-grounded. This coherent instruction includes being able to assess learners' progress at different times to see if they are on track to be reading with comprehension by Grade 4. Developing reading benchmarks means that there is a standard that learners can be marked against on their reading journey that not only helps the sector monitor, but also informs teachers where their learners are and how to intervene where learners are not on track.

Despite the knowledge that has been gleaned from research on how to teach reading in alphabetic languages, little is known as to what it takes to learn how to read in African languages specifically. The need for specific knowledge about African languages is necessitated by their distinction from Indo-European languages where a disproportionate amount of reading research has been done comparatively. Even within the Bantu language family group, where South African LoLTs fall under, there are linguistic typology differences. For example, the disjunctive orthography of Sesotho-Setswana languages is different from the conjunctive orthography of Nguni languages or pertinent to this report, the mixed disjunctive and conjunctive nature of Xitsonga orthography (Jukes et al, 2020). Share (2021) found that the differences in accuracy and speed when reading in different orthographies were a
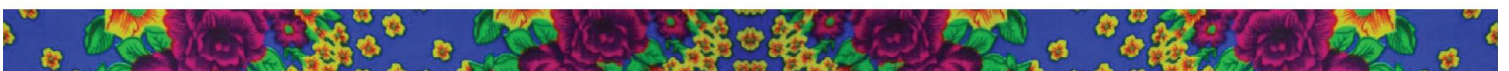
testament to the development of phonological recoding and reading strategies in response to specific orthographies. This aligns with Jukes et al (2020) proposition that there is a difference in the relationship between fluency and comprehension depending on the language.

2.3.   Review of studies of early reading development in Xitsonga

Studies that have been conducted to date indicate that performance in reading is unsatisfactory for South African learners despite being tested in their home languages (Spaull & Pretorius, 2019; Spaull et al., 2020; Khosa, 2021). For example, in a large-scale study that examined the sub-components of reading for South African Grade 3 learners across the three languages (Sepedi, Xitsonga and isiZulu), Spaull et al. (2020) revealed that majority of these learners had not mastered the basics of decoding and reading for meaning in their home language.

Little research has been done on the development of cognitive-linguistic skills like phonological processing (which is important for reading development) in Xitsonga. One of the few studies available is the 2021 study by Khosa. This study was conducted in the Limpopo province over a year in two phases (March and September 2018) in quintile 2 and 4 primary schools for the purpose of examining how Grade 1 learners perform on early literacy measures (i.e., phonological and phonemic awareness, letter-sound knowledge, word reading, oral reading fluency, and reading comprehension) in Xitsonga.

The study showed mutual benefits of phonemic and syllable awareness skills in terms of developing letter-sound knowledge in Xitsonga. It further revealed that the learners' performance in all their early reading measures was low (Khosa, 2021). This suggested that the learners' early literacy skills were not solidified to prepare them for school. The recommendation was that teachers should be trained and mentored effectively through coaching. This will help them develop basic knowledge of reading instruction which includes explicit teaching of associations between letters and sounds, blending these, developing their vocabulary, and practising reading with them daily.

Given the fact that Xitsonga has a rich morphological system which may pose additional steps for the children when learning to read, it is recommended that foundational reading instruction for Xitsonga learners should be explicit and systematic. Since it is well established that children enter their first grade with varying degrees of learning abilities, it is suggested that teachers should consider the reading model proposed by Stern, Dubeck and Dick (2018) in terms of categorising learners according to the five reading levels (e.g., non-readers, emergent/beginning readers, basic/instructional readers, fluent readers, and grade level readers). This will help teachers prepare instruction according to the learners' reading levels.
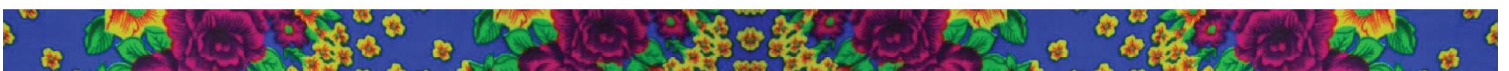
3. XITSONGA LANGUAGE FEATURES

South Africa has twelve official languages. Except for sign language, all eleven languages are alphabetic, with several common features. As mentioned earlier, linguistic typography differences such as the orthography and morphology of the languages necessitate distinct language-specific benchmarks.

[1]Xitsonga was recognised as an official language in South Africa in 1996. It is spoken as the first language by 4.5% of the South African population. It is mainly spoken in Limpopo with 17% of speakers; Mpumalanga accounting for 10% and Gauteng 7% (Statistics South Africa, 2011). Figure 2 below from Mohohlwane (2023) shows the classification of the official South African languages that are mediums of instruction in schools. As a Southern Bantu language, Xitsonga is also recognised as one of the official languages in Mozambique, Swaziland and Zimbabwe. Junod (1912) posits that the Xitsonga language consists of the following dialects: Ronga, Hlanganu, Djonga, Bila, Nwalungu, and Hlengwe. Xitsonga belongs toTswa-Rhonga family in Guthrie's (1971) classification which encompasses 14 sub-families: Tswa, Dzibi, Dzonga, Hlengwe, Changana, Xiluleke, N'walungu, Hlave, Nkuna, Gwamba, Nhlanganu, Djonga, Bila, and Rhonga (Maho, 2009).
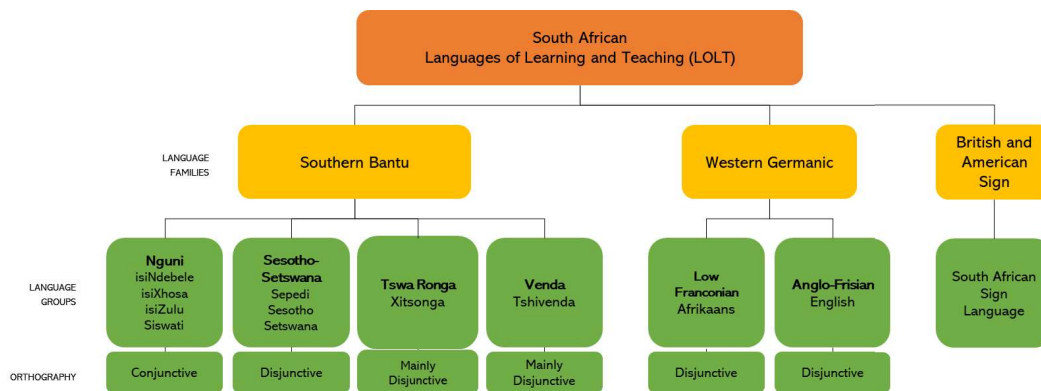
Figure 2. Classification of South African Languages of Learning and Teaching

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[1] The word Bantu is "a frequently occurring plural form of the word meaning person". It is not only linguistic, but it was also objectified almost immediately and used for ethnographic purposes. The term remains controversial due to its politicized nature, especially in South Africa. However, the linguistic label remains official.

3.1. Vowels

Xitsonga, like other African languages, consists of three types of sounds: vowels, semi vowels and consonants. This language has seven phonemic vowels that differ according to the position of the tongue within the oral cavity during their articulation. The next sections discuss these aspects.

Figure 3 below shows seven phonemic vowels in Xitsonga. The vowels [e] and [ɛ] are referred to as allophones for /e/, and the vowels [o] and [ɔ] as allophones for /o/ (Jansen, 2001). The closed allophones are used in syllables that come before /i/ or /u/; the open ones are used in all other positions.
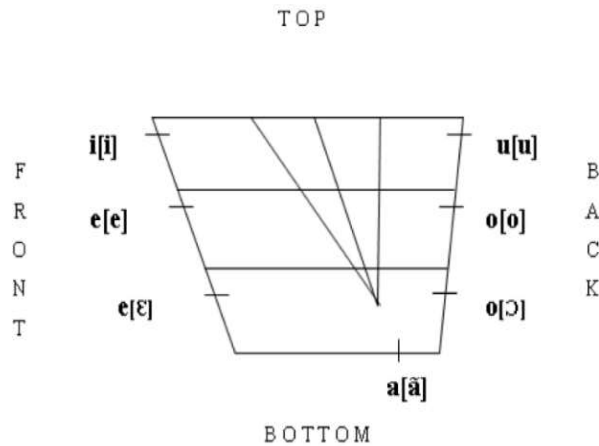
Figure 3. Vowel system in Xitsonga (Baloyi, 2012)

Table 1 Xitsonga vowel sounds and the allophones in more detail and provides examples of words in which various vowels and allophones appear.

Table 1. Vowels in Xitsonga with example words

Vowels in Xitsonga	Examples	Gloss
a [a]	**A**ka	build
e [e]	V**ele**	breast
e [ɛ]	**E**ka	to
i [i]	**I**nkomu	thank you
o[o]	**o**ka	take an ember from one fireplace to another
o[ɔ]	**Do**mu	fool
u [u]	Huk**u**	fowl

Semi-vowels are phonetically similar to vowel sounds, but they function as the syllable boundary rather than as the nucleus of a syllable. The consonants *y* and *w* are two semi-vowels in Xitsonga. *Table 2* shows the semi-vowels in Xitsonga with examples.

Table 2. Semi-vowels in Xitsonga with example words

Semi-vowel	Xitsonga	English
w	<u>w</u>ela	fall into
	<u>w</u>ena	you
y	<u>y</u>ona	this one
	<u>y</u>ima	stand up

Table 3 presents double vowels which are used to indicate one long sound. These sounds are used in idiophones or storytelling, but not in written language.

Table 3. Double vowels in Xitsonga with examples

Vowels in Xitsonga	Examples	Gloss
aa	a:a	surprise
ee	e:e	agreement
ii	i:i	disapproval
oo	o:o	recollection/remembering
uu	u:u	shock

3.2. Consonants

Xitsonga 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 Xitsonga due to its simple and transparent orthography, as in other African languages, but the challenge is with the complex consonants which make it difficult for learners to learn the orthography easily, especially in the Foundation Phase.

There is a larger code set of simple and complex consonants represented as single consonants, diagraphs, two-letter consonant blends, trigraphs, three-letter consonant blends, four-letter consonant blends, and five-letter consonant blends, as reflected in the tables below.

Table 4 displays simple consonants consisting of single sounds that are not complicated to read and write since they are represented by only one letter.

Table 4. Simple consonants in Xitsonga with examples

Simple consonant				Example	Gloss
b	b	in	**b**ed	**b**asa	clean
c	ch	in	**ch**ew	**c**ina	dance
d	d	in	**d**onkey	**d**omu	stupid
f	f	in	**f**un	**f**ole	tobacco
g	g	in	**g**ame	**g**ama	eagle
h	h	in	**h**ate	**h**a**h**a	fly
j	j	in	**j**ive	**j**aha	lad
k	k	in	**k**an (in Afrikaans)	**k**ambe	but
l	l	in	**l**eave	**l**eha	long
m	m	in	**m**oney	**m**ahungu	news
n	n	in	**n**othing	**n**avela	admire
n'				**n'**wana	child
p	p	in	**p**adkos (in Afrikaans)	**p**ambula	pick
q	q		click sound	**q**uva	compost
r	r	in	**r**ent	**r**ila	cry
s	s	in	**s**and	**s**angu	large mat
t	t	in	**t**afel (in Afrikaans)	**t**andza	egg
v	v	in	**v**iolin	**v**abya	sick
w	w	in	**w**ax	**w**achi	clock
x	sh	in	**sh**ip	**x**aka	relative
y	y	in	**y**ellow	**y**ima	stand up
z	z	in	**z**one	**z**ambhala	potato
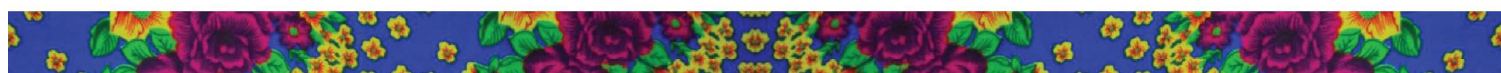
Table 5. Non-existing consonants in Xitsonga

		Labial		Labio-dental	Dental		Alveolar				Lateral		Post-alveolar		Velar		Glottal		
		plain	pal.		plain	lab.	plain	lab.	pal.	wstld.	plain	lab.	plain	lab.	plain	lab.	plain	lab.	pal.
Click	voiceless				kǀ														
	aspirated				kǀh	kǀwh													
	voiced				gǀ	gǀw													
Nasal	voiced	m	mʲ				n	nʷ					ɲ	ɲʷ	ŋ	ŋʷ			
	breathy	mʱ					nʱ	nʷʱ							ŋʱ	ŋʷʱ			
Stop	voiceless	p	pʲ				t	tʷ	tʲ		tˡ	tˡʷ			k	kʷ			
	aspirated	pʰ	pʲʰ				tʰ	tʷʰ	tʲʰ		tˡʰ	tˡʷʰ			kʰ	kʷʰ			
	voiced	b	bʲ				d	dʷ	dʲ		dˡ	dˡʷ			g	gʷ			
	breathy	bʱ	bʲʰ				dʱ								gʱ	gʷʱ			
Affricate	voiceless			p̪f			ts	tsʷ		tsɸ			tʃ	tʃʷ					
	aspirated			p̪fʰ			tsʰ	tsʷʰ		tsɸʰ			tʃʰ	tʃʷʰ					
	voiced			b̪v			dz			dzβ	dɮ		dʒ	dʒʷ					
	breathy			b̪vʱ			dzʱ	dzʷʰ					dʒʱ						
Fricative	voiceless	ɸ		f			s	sʷ		sɸ	ɬ	ɬʷ	ʃ	ʃʷ	x	xʷ			
	voiced	β		v			z	zʷ					ʒ				ɦ	ɦʷ	ɦʲ
	breathy			vʱ															
Trill	voiced						r	rʷ											
	breathy						rʱ	rʷʰ											
Approximant	voiced										l	lʷ	j	jʷ		w			
	breathy												jʱ			wʱ			

Table 6 shows consonant digraphs where two letters represent one new sound.

Table 6. Consonant digraphs with examples

Consonant digraph	Sounds like			Example	Gloss
bv				**bv**e**bv**e	blue bird
by				**by**anyi	grass
ch	ch	in	**ch**arm	**ch**ukele	sugar
dl				**dl**aya	kill
dz				**dz**aha	smoke
hl				**hl**amba	bath
hw				hu**hw**a	play
kh	c	in	**c**ake	**kh**e**kh**e	cake
mh				**mh**angu	accident
ng				**ng**ati	blood
nh				**nh**e**nh**a	warrior
pf				**pf**ula	open
ph	p	in	**p**ie	**ph**ata	praise
qh				**qh**avula	shake hands
rh	r	in	**r**un	**rh**avi	branch
th	t	in	**t**ime	**th**agavele	grasshopper
tl				**tl**ula	jump
vh	v	in	**v**iolence	**vh**ilwa	wheel
ny				**ny**oka	snake

Table 7 shows two-letter consonant blends. When a blend is pronounced, both individual consonant sounds can be heard.

Table 7. Two letter consonant blends with examples

Consonant blends	Xitsonga	English
	Examples	Gloss
dy	**dy**ambu	sun
gw	**gw**eva	convict
kw	**kw**ata	sad
lw	**lw**angu	roof
mb	**mb**ilu	heart
mf	**mf**umo	government
mp	**mp**ahla	clothes
nc	**nc**ila	tail
nj	**nj**ovela	to fish
nk	**nk**arhi	time
ns	**ns**uku	gold
nt	**nt**amu	strength
nw	**nw**ela	drown
n'w	**n'w**hari	partridge
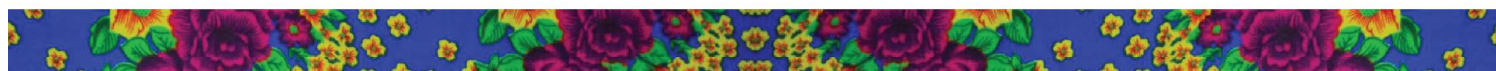
Consonant blends	Xitsonga	English
ny	**ny**oka	snake
nx	**nx**axameto	list
sw	**sw**ifaki	mealies
ts	**ts**ala	write
tw	**tw**ala	be heard
xw	**xw**ela	be late

Table 8 shows Xitsonga three-letter consonant trigraphs representing one new sound.

Table 8. Xitsonga three-letter trigraphs with examples

Consonant blend	Example	Gloss
dlh	**dlh**omu	sound of an object falling into water
mbh	**mbh**uri	beautiful woman
ngh	**ngh**ala	lion
pfh	**pfh**umba	journey
tlh	**tlh**ela	go back
tsh	**tsh**anga	kraal

Table 9 shows three-letter consonant blend. When the blend is pronounced, the letters keep their individual sounds.

Table 9. Xitsonga three-letter consonant blends with examples

Consonant blends	Example	Gloss	Consonant blends	Example	Gloss
dzw	**dzw**avi	expert diviner	nhl	**nhl**anga	reed
hlw	**hlw**ela	delay	nhw	**nhw**ana	lady
khw	**khw**iri	stomach	nkh	**nkh**aviso	designs
mbv	**mby**ana	dog	nkw	**nkw**ama	bag
mpf	**mpf**umawulo	sound	nth	**nth**onono	insect
mph	**mph**akelo	distribution	ntl	**ntl**angu	game
nch	nchumu	something	nts	**nts**ako	happiness
ndl	ndlela	path	ntw	**ntw**anano	understanding
ndh	ndhawu	space	phy	**phy**embye	gorgeous lady
ndy	ndyangu	household	rhw	**rhw**ala	carry load
ndz	ndzalama	emarald	thy	**thy**aka	dirty
ngw	ngwidi	metal	tlw	**tlw**eba	light a match

Four-letter consonant (quadgraphs) representing one new sound are rarer than four-letter consonant blends in Xitsonga. Table 10 shows four-letter consonant blends which keep their individual sounds when the blend is pronounced.
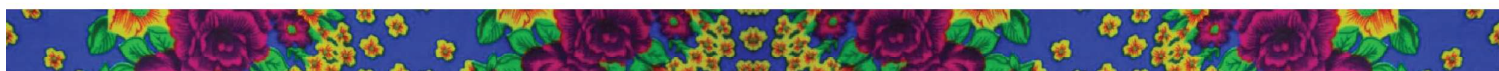
Table 10. Xitsonga four-letter consonant blends with examples

Consonant blends	Example	Gloss
mbvh	**mbvh**utamelo	ambush
mpfh	**mpfh**uka	distance
ntsh	**ntsh**ava	mountain
ndlw	**ndlw**ini	inside the house
ndzh	**ndzh**ope	mud
nghw	**nghw**avava	slut
nkhw	**nkhw**akhwa	drought
ntlh	**ntlh**anu	five
ntsw	**ntsw**amba	milk

Five-letter consonants (tetragraphs) representing one new sound are also rare in Xitsonga. What is presented in Table 11 are five-letter consonant blends.

Table 11. Xitsonga five-letter consonant blends with examples

Consonant blends	Example	Gloss
ntshw	**ntshw**a-vusiku	blister
ndzhw	**ndzhw**alo	load

3.3.   Syllables

According to the Collins English Dictionary, a syllable is a part of a word that contains a single vowel sound and is pronounced as a unit. Xitsonga has a strict Consonant Vowel (CV) syllable structure (van Wyk et al. 1989). Only syllables of the form CV, V, and CyV are allowed in this language.
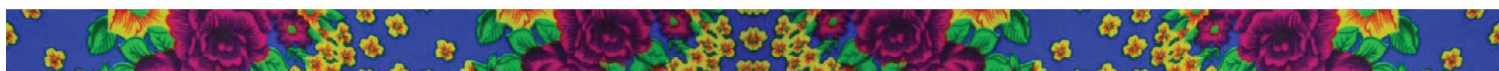
Table 12 presents the types of syllables in Xitsonga. The C part of the syllable make up is not restricted to single consonants but includes also blends and n-graphs.
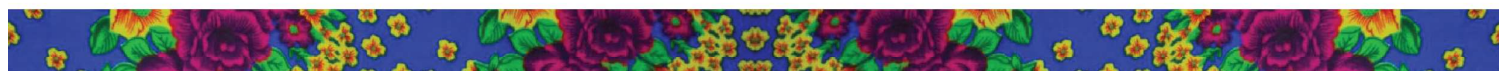
Table 12. Types of syllables in Xitsonga

Type of syllable	Word	Analysis	Results
CV (Consonant + Vowel)	rima	ri > CV ma > CV	CV + CV
V (Vowel only)	riendli	ri > CV e > V ndli > CV	CV + V + CV
CyV (Consonant + semi-vowel 'y' + Vowel)	byako	bya > CyV ko > CV	CyV + CV

Xitsonga words vary in the number of syllables they have. Some words are monosyllabic while others are multisyllabic. Multisyllabic words make it more challenging for learners to read with understanding as it is difficult obtain meaning from the syllables individually. The syllables collectively create the meaning. Examples are words like *xirhendzevutana* (circle) with six syllables and *xilepulana* (spoon) with five syllables.

3.4. Tone features in Xitsonga

Xitsonga is a tonal language spoken using two contrasting tones: low and high. There is no mid tone. 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 the same syllables/phonemes and yet have different characteristic tones. The example below is based on the Xitsonga homonyms. These are words that have the same structure but are different in meaning with the meaning being influenced by the tone. Tone can alter the meaning of a word or expression completely.

Example 1: *vele* (maize) and *vèlè* (breast).

Example 2: *nsele* (cruel) and *nsèlé* (hole)

It is difficult for learners at the Foundation Phase level to differentiate homonyms according to their tonal differences. Tonal differences may also make it difficult for learners to pronounce and comprehend the words effectively if they do not have sufficient understanding of the context. An additional complexity emerges from the orthography in Xitsonga which does not use tonal markings; the tone and meaning can only be derived from context.

3.5. Sentence structures in Xitsonga versus Nguni and Sesotho-Setswana language groups

The Xitsonga language is written both disjunctively and conjunctively unlike Nguni languages which are solely conjunctive, and Sesotho-Setswana languages which are written disjunctively. When Xitsonga is written conjunctively, verbs in the conjunctive form are followed by some elements, e.g., *hì dyá vù:swá* ('we eat hard porridge'), and when it is written disjunctively, no element follows the verb, e.g., *hà dyá*
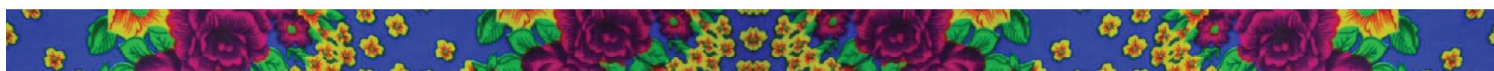
('we eat'). When comparing this across languages, the sentence *She is my child* in the Xitsonga language is written as: *I n'wana wa mina.* The four words form a disjunctive sentence in the Xitsonga language but are represented by two words isiZulu, a Nguni language, *uyingane yami*. For this reason, Spaull, Pretorius, and Mohohlwane (2020) suggest that the presence and prevalence of complex consonants and the differing conjunctive or disjunctive writing systems in these languages may affect their individual reading development. To mitigate these orthographic complexities, it is important for teachers to understand the dynamics involved in agglutinating nature of African languages and be aware of the reading benchmarks for the languages in which they teach reading.

Learners should be assisted in dealing with these different features to acquire reading skills and vocabulary in their early years. They should be given reading activities regularly to get used to reading and learning simple and complex words.
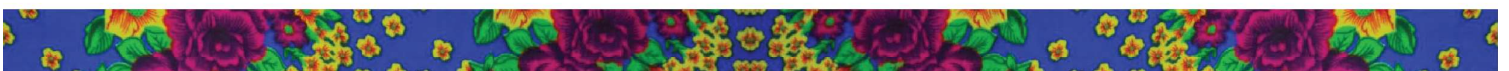
4. INSTRUMENT DEVELOPMENT

There are two possible approaches to the benchmarking process: using norm-referenced benchmarks which are not helpful where the bulk of the population would be unable to attain it and requires that the norms set represent the whole population. The second, criteria referenced benchmark, can either be expert-based or data-driven (Jukes et al., 2020). The obstacle to setting expert-based criteria is setting early skills' benchmarks based off learners' actual or desired attainment on higher order skills like passage reading without verifiable data. This is where criteria set on data closes the gap. Data analytical methods are able to explain the gap between early skills and comprehension. For this reason, criterion-referenced data analytical methods were decided to be used with the support of experts. This section will detail the development process of the instruments used to gather data for the Xitsonga benchmarking project.

The data used for the establishment of these early-grade Xitsonga reading benchmarks was primary data collected from 120 schools (6997 learners) in the Mopani and Vhembe districts in Limpopo where the majority of the speakers live. Additional exiting data from the Leadership for Literacy study was also analysed.
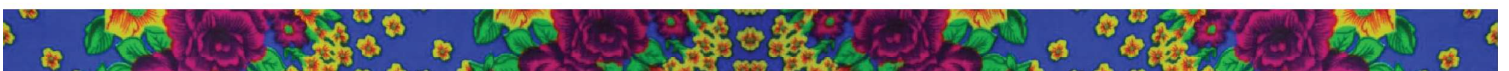
The instruments were sourced, reviewed, and developed by a language team comprised of two Xitsonga language experts from the University of KwaZulu-Natal (currently affiliated with the University of Free State) and the University of Limpopo as well as three DBE officials from the Research Coordination, Monitoring and Evaluation leading the overall work. The DBE also sourced a junior linguist to work with the language team.

The development process began with sourcing assessment tasks readily available in Xitsonga and those that could be appropriately versioned into Xitsonga. These were largely from the Ulwazi Lwethu series funded by Zenex Foundation and developed by Room to Read. Priority was given to instruments previously used in other credible studies and then versioned. The complete bank of instruments was piloted at least once in Pilots 1 and 2.

4.1. Piloting

The instrument development process underwent three rounds of pilot tests, analysis, and refinement. The pilot schools were selected by the DBE in line with the main sample. Decipher Data was responsible for the recruitment of field officers for both the pilot testing as well as the main data collection. For the pilot testing, eight potential supervisors were recruited to assist with pilot testing. The assumption was that the eight researchers would undergo three rounds of pilot testing and capacity development to become fieldwork supervisors for the main data collection.

The piloting phase entailed field officer training and instrument refinement, in-school pilot testing as well as post-pilot instrument review. The pilot testing process was concluded with the post pilot review workshop and final alterations were made to all developed instruments. The pilot test process was administered for a period of four months (from February 2022 to June 2022). Instruments were finalised

and used during the main data collection which happened between October and November 2022. For the first pilot test, both the training and piloting was administered in Limpopo province, South Africa. For Pilot 2 and Pilot 3, the training took place in Gauteng.

Since the first two pilots were scheduled for earlier in the year, the instruments were piloted with learners in one grade higher than the intended grade of assessment. This was to counter for the learning that would be gained by the main data collection at the end of the year where the appropriate grade would be assessed. In the third pilot the instruments aligned with the grade being assessed. Table 13 presents a summary of the pilot data collected.

Table 13. Pilot process summary

	# of schools	Grade 3	Grade 4	Grade 5	Grade 7
Pilot 1	6	54	52	59	56
Pilot 2	6	60	58	61	60
		Grade 2	**Grade 3**	**Grade 4**	**Grade 6**
Pilot 3	6	44	51	58	59

4.2. Tasks

A battery of assessment tasks was developed and administered. Task selection was based on the underlying skills that are important for reading and language development. In addition, Xitsonga specific nuances were included as well as the skills identified for benchmarking. Table 14 below provides a summary of the tasks – this is followed by detailed rationale and administration of the tasks.

Table 14. Xitsonga reading assessments by skill, task language, type, resource and grade

Skill/Task	Language	Type	Resource	Gr 2	Gr 3	Gr 4	Gr 6
Expressive Vocabulary	HL	Untimed	Shopping list Animals	X			
Rapid Object Naming	HL	20-second Timed Grid 36 items	The original RON chart: The sun could have 3 names: hisa/mumu/dyambu	X	X		
Phonemic Awareness	HL	Untimed	Administered as a listening/oral task. Starting with two examples; the learner name being one followed by 7 items: Eg: Tinyiko- if you take away T, what are you left with. Assess: Phoneme: elision, identification and substitution.	X			
Syllabic Awareness	HL	Untimed	Administered as a listening/oral task. Starting with two examples followed by 6 items: Assess syllable elision, substitution and identification	X			

Letter-sound Knowledge	HL	60-seconds Timed Grid 60 Letters	Adapted from the Sepedi benchmarking chart. Removed the diacritic s and include the tonal e and i (high and low) In the examples, remove the f and include a vowel (e.g., O) Move the i to second/third row and then include lowercase a in the first row Also check the LSK chart from ESRC and EGRA (Charts are different across grades)	X	X		
Complex Consonants	HL	60-seconds Timed Grid 30 sounds	30 complex consonants that can be sounded out without vowel insertion Test: tlh and tsh important **Grade 2 and 3 -** one chart **Grade 4 -** own chart Check the LSK chart from ESRC and EGRA (Charts are different across grades)	X	X	X	
Syllable reading	HL	60-second Timed Grid 20 Syllables	Syllable reading **(Grade 2 and 3)-** three different charts (20 per grade): **- Grade 2:** CV, digraphs+V, trigraph+V **- Grade 3:** 1xCV, digraphs+V, trigraphs+V and quadgraphs+V **- Grade 4:** 1xCV, digraphs+V, trigraphs+V; quadgraphs+V and pentagraphs+V	X	X	X	
Word Reading	HL	60-second Timed Grid 40/60/70 Words	Based on ESRC, EGRA and VulaBula High Frequency word lists. There should be an overlap in the words. The Grade 4 chart will have less words from the Grade 2 chart. Up to 7 syllables (Grade 4)	X	X	X	
HL Oral Reading Fluency and ORF Comprehension	HL EFAL	60-seconds + 120-seconds Timed Grid Untimed ∞ 5-11 Questions	Pilot 3 HL passages and select 2 for main data collection. Use EFAL passages used in previous benchmarking work. **For Grade 2 and 3** both be narrative **For Grade 4 and 6** one should be narrative and the other informative Find middle ground between Nguni and Sotho languages for passage length. Xitsonga is semi-conjunctive At least 7-8 questions according to the PIRLS Framework (3xLit. 2xSI, 2x I&I and 1xE&E) **Grade 2: word range (50-70)** • *Nhlampfi a kuma munghana* from EGRA-MK. Review and extend questions • *Sopo ya maribye* (ESRC) Translate questions from Siswati/Isizulu • *Pule le Mosidi* Version text and questions from Setswana/Sepedi passages (Comparability) **Grade 3: word range (80-130)**	X X	X X	X X	X X

			• *Siku ra Nomsa ro Sungula Exikolweni* (EGRA) Review and extend questions • *Sopo ya maribye* (ESRC) Review questions from ESRC and previous questions from Siswati/Isizulu • *Tshoswane le lephoi* Version text and questions from Setswana/Sepedi passages (Comparability) • *How the elephant got its trunk* (EGRS/Benchmarking) **Grade 4:** • *Vusokoti byo sika* EGRA Review and extend questions • *Sopo ya maribye* (ESRC) Review questions from ESRC and previous questions from Siswati/Isizulu*How the elephant got its trunk* (EGRS/Benchmarking) **Grade 6:** • *Mudoro wu dlawa hi xivundza* (EGRA) Review and extend questions • *Human Rights story* (Ulwazi Lwethu) • *An Unbelievable Night* (PIRLS)				
Listening Comprehension	HL	Untimed ∞ 7 Questions			X		
Written Comprehension : Text Comprehension	HL EFAL	15-25 min 6-11 Questions	**Grade 3** HL: How the Hippo lost his fur (versioned from EGRS/Benchmarking) EFAL: The Boy and His Dog (EGRS I&II) **Grade 4** HL: How the Hippo lost his fur (versioned from EGRS/Benchmarking) EFAL: The life cycle of plants (EGRS/Benchmarking) **Grade 6** HL: PIRLS- Ndzalama Pearls story EFAL: The life cycle of plants (EGRS/Benchmarking) Potential text: Informative Comp text from DBE Systemic Instruments Include vocabulary for Grade 4 and 6. 12 minutes. 10 vocabulary items	X X	X X	X X

4.2.1. Expressive vocabulary

A learner's literacy journey begins at birth by observing human behaviours and imitating sounds and social cues (Schiller, 2003). These interactions help children develop oral language skills, including vocabulary, grammar, phonology and morphology. The knowledge and development of oral language
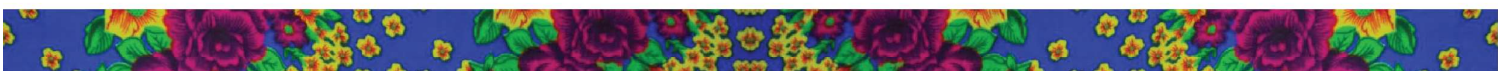
greatly impacts learners' ability to learn how to read. More importantly, developing vocabulary is significant for future reading achievements. To establish the level of Xitsonga Grade 2 learners' vocabulary and their ability to retrieve words, we used an expressive vocabulary untimed task, which included 36 items (e.g., shopping list and animals). This task was administered to the Grade 2 learners only, given its basic level of knowledge.

4.2.2. Rapid object naming

A Rapid Object Naming (RON) task was used to assess the learner's ability to quickly recognise, remember, and retrieve regular objects. In this task, learners were given 20 seconds (not communicated to learners) to name the six common objects presented on a chart of 36 items in random order as fast as they could. The RON was not used in Pilot 2.

4.2.3. Phonemic awareness

Phonemic awareness is necessary for children to understand that sounds systematically represent the letters in words, and this helps children develop reading and spelling skills. For this study, phonemic awareness task was administered orally to Grade 2 learners to check whether they can notice, think about, and work with the individual sounds (phonemes) in spoken words. This was an untimed task.

4.2.4. Syllabic awareness

Given the syllabic nature and morphological structure of the African languages, it is important that teachers develop their children's syllabic awareness skills by teaching them to identify, delete or replace the syllables in words given. In order to establish whether Grade 2 learners can notice, think about, and work with the individual syllables in spoken words.

4.2.5. Letter-sound knowledge and complex consonants

In a language that subscribes to an alphabetic writing system, it is imperative that learners are taught the visual representation of phonemes (sounds) and graphemes (letters) so that they can connect the sound they hear with the letter that represents that sound.

A letter chart of 60 items consisting of all the letters of the alphabet appearing in random order but prioritizing those that exist in Xitsonga in both upper and lower case was presented to learners in Grades 2 and 3 and they were asked to sound as many as they could in 60 seconds. Each letter appeared at least once with the least common letters appearing at the latter part of the chart. For letters where the uppercase and lowercase forms were dissimilar, both versions were included.

4.2.6. Complex consonants

A 30-item chart of complex consonants in Xitsonga was given to learners in Grades 2, 3 and 4 in Pilots 1 and 2. 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).
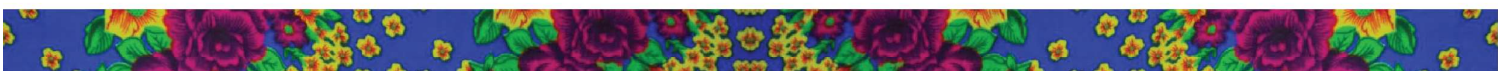
This task was administered for the purpose of checking whether learners can fluently recognise letter groups by saying out their collective sound without vowel insertion, measuring both accuracy and fluency. This was a timed task of 60 seconds.

4.2.7. Syllable reading

Because of the highly syllabic nature of African languages, decoding happens on two levels (phonemic and syllabic levels). 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). This distinction in syllables and letters, as well as their importance, is the reason we assessed both aspects. The syllable reading task was administered to Grades 2, 3 and 4 learners and assessed whether learners could recognise and fluently read syllables. The task comprised 20 items and was timed, where learners were asked to say the correct sound for each syllable within one minute.

The syllables used 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.

4.2.8. Word reading

Grades 2, 3 and 4 were assessed in isolated word reading, a timed task of 60 seconds. In each grade, word length and complexity increased with up to seven syllables in Grade 4. The word list was sourced from the Leadership for Literacy study, as well as the Vula Bula high frequency word list, although a few were replaced at the discretion of the language experts and the data analysis from the piloting process. The words were generally arranged in order of difficulty determined by the number of syllables. Although there are single syllable words in Xitsonga, 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 2 assessment and two to seven syllables for the Grade 3 assessment. The word reading task was administered for the purpose of assessing the learners' ability to automatically read words as a precursor to fluent reading needed for successful comprehension. Oral reading fluency and comprehension

4.2.9. Oral Reading Fluency

All grades (Grade 2, 3, 4 and 6) had two passages to read. Grade 2 and 3 learners' passages were both narrative passages where Grades 4 and 6s had one narrative and one informative text. 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. Longer passages were used deliberately, and learners were allowed one minute to read and record their correct words per minute in a passage and then allowed them a further two minutes to read the rest of the passage in order to answer the comprehension questions.
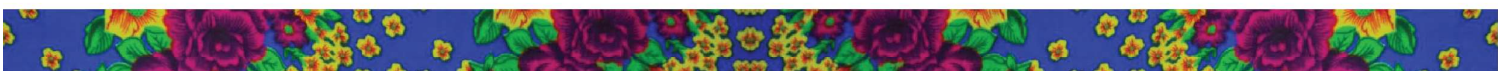
The development of the comprehension questions followed the PIRLS conceptual framework that includes four types of questions to assess whether learners can 1) retrieve explicitly stated information (literal); 2) make straightforward inferences; 3) interpret and integrate ideas and information; and 4) evaluate and examine the content, language and textual elements. For all Oral Reading Fluency (ORF) passages, a combination of all four of these question types was used, but the first question was always a literal question. The adoption of this taxonomy was agreed upon as part of a design process for reading benchmarks to ensure that reading benchmarks are based on a range of skills, not only literal or simple questions. Learners were only asked questions related to the parts of the passage that they were able to read within the total 3 minutes given to them to read.

The Grades 3, 4 and 6s had an additional English narrative ORF passage that followed the same protocol.

4.2.10. Listening comprehension

The listening comprehension task was administered for the purpose of assessing whether learners have understood what was been read aloud to them. This was an untimed task administered to Grade 2 learners because it forms part of their early oral literacy skills. In this task, the enumerator read a short narrative text to the learner twice before asking seven (7) questions which were related to the story. The same PIRLS matrix was used for the comprehension questions.

4.2.11. Written comprehension: Text comprehension

By the end of Grade 3, learners are expected to have acquired the skill of reading independently at the 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 narrative texts and informational texts (the latter for Grade 4 and 6) to read independently and answer the accompanying comprehension questions in written form. In the final instruments, the written assessments utilised the pre-PIRLS structure where the text was broken up into sections by questions as a way of scaffolding. This task was administered in Xitsonga HL, and EFAL. It was timed for approximately 15-25 minutes, with approximately six (6) to 11 questions asked per subject.

4.2.12. Written comprehension: Vocabulary

This task was administered in Xitsonga HL to Grades 4 and 6 learners. It was timed for approximately 12 minutes and ten (10) questions were asked for this purpose.

5. SAMPLING, FIELDWORK, TRAINING AND DATA COLLECTION

5.1.   Sampling

The sample for this study was drawn by the DBE based on criteria agreed upon for all benchmarking efforts. A sampling report is available detailing this. The Xitsonga reading benchmarking study entailed collecting data of learner literacy skills for grades 2, 3, 4 and 6 in 120 schools across Mopani and Vhembe districts in Limpopo. Limpopo was selected as the province with the largest Xitsonga population.
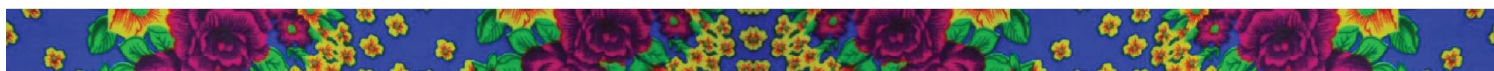
Room to Read has started to implement its Xitsonga Literacy Program, funded by Old Mutual Foundation in 25 schools in Mopani district of Limpopo since the start of the academic year 2023. Due to the geographic overlap between the set of schools included in DBE's reading benchmarking study sampling framework and Room to Read's Old Mutual Foundation funded Xitsonga Literacy Program schools in Limpopo, a partnership was formed between the two entities so that the school sampling framework for the DBE's reading benchmarking study could be leveraged for the Room to Read Xitsonga Literacy Program pre-intervention baseline evaluation in November 2022.

The sample contains 31 Limpopo schools selected by Old Mutual and Room to Read. These are Xitsonga Quintile 1 to 3 schools; 25 of which are in Mopani East and 6 of which are in Mopani West. This means that of the 120 schools, 31 were selected by Old Mutual and Room to Read. In addition, 20 replacement schools were selected, making a total of 140 schools.

The DBE used probability sampling for the 89 Xitsonga LOLT primary schools selected. Two datasets were used to derive the sampling frame. The first is the quarter 3 2020 Masterlist, published annually by the Education Management Information System (EMIS) Directorate. This was an excel file in a combined sheet of all schools in the country across all 9 provinces with 332 Xitsonga schools in Limpopo. Of these, 328 were primary schools. Exclusion criteria were applied to exclude Quintile 4 and 5 schools, small schools with a learner-teacher ratio lower than 30 (8% of schools), large schools with a learner-teacher ratio higher than 45 (3%) and special needs centres. Schools outside the two selected districts were also excluded. To get to 140 schools, we randomly dropped all excess schools and once a decision was made to include the 31 Old Mutual and Room to Read school, we dropped a further 31 schools. The 140 schools sample included 20 randomly allocated replacement schools should these be required.

The table below provides a summary of the sample and criteria used:

Table 15. Sample characteristics

Learner characteristics	Grade 2	Grade 3	Grade 4	Grade 6
Number of schools	120	120	120	120
Quintile range	1-3	1-3	1-3	1-3
Number of learners	1919	1719	1736	1727
Male	51%	52%	53%	54%
Female	49%	48%	47%	46%
Average age	7 years 8 months	8 years 9 months	9 years 11 mo.	12 years 1 month

5.2.   Recruitment and Training

Decipher Data was responsible for all field officer training. For the main field officer training, Decipher Data recruited 54 potential field officers who underwent a 6-day training workshop. Decipher Data selected 40 from 54 to collect data from 120 schools in Limpopo Province, South Africa. The minimum requirement for recruitment were:

- Fluency in Xitsonga and English
- Minimum Bachelor's degree in education and/or social sciences
- Minimum 2-3 years research, data collection or Monitoring & Evaluation experience
- Experience working in the South African education field specifically (Foundation and/or Intermediate Phases)
- Experience collecting data in schools (preferably primary schools)
- Experience conducting assessments with learners in primary school (preferably EGRA)
- Familiarity with tablet-based data collection

As part of the recruitment process, the screening of field officer competencies consisted of, amongst others, (1) comparing the applicant education vs the project requirements, (2) comparing the applicant language proficiency vs the project requirements as well as comparing applicant suitability for working with learners and in schools.

As mentioned earlier, various inter-rater reliability assessments were administered during the main training. The analysis and results from these assessments conducted showed good reliability. This means that the participants who had been trained had internalised the knowledge and could successfully execute the desired responsibilities as field officers.

The main field officer training was completed in Pretoria, Gauteng province during October 2023. The training was attended by approximately 64 participants who fulfilled various roles during the 6-day training workshop. During the workshop, trainees were expected to engage in theory-based training,

role-playing real world scenarios, participate in break-away sessions as well as undergo various competency assessments. Continuous assessment of trainee progress throughout the 6-day training workshop was implemented.

The competency assessment data was analysed, and the results were fed back to trainees to indicate progress and areas of improvement. The trainees were also exposed to an in-school simulation on the 5th day of training. The competency tests used were based on the achievement levels expected from the instruments developed. Another form of checking field officer reliability was to test their readiness during an in-school simulation day, which was administered on the 5th day of the field officer training.

The Project Management Team (PMT), fieldwork coordinators and fieldwork supervisors observed the performance of the trainees to assess their suitability as a field officer. Observations of the in-school simulation assisted the PMT during the final field officer selection process. On the last day of the training workshop, all trainees were requested to participate in a full competency assessment which required them to administer a complete learner assessment as expected in the field. The results from the assessment were used to inform the PMT's final field officer selection process.

5.3. Data Collection

The DBE made initial contact with all 120 sample schools to inform the schools about the anticipated data collection. Decipher Data contacted all schools once introduced by the DBE. Decipher Data communicated all relevant logistics with the School Management Teams (SMT) to ensure efficient planning and visitations to the sample schools. Data collection took place from 17 October to 18 November 2022. The data collection scheduling process entailed:

- Plotting all sample schools (120) on Google maps
- Clustering schools so that equal workloads are allocated to each team
- Contacting schools to arrange visitation dates.

The fieldwork team consisted of two (2) fieldwork coordinators, 4 fieldwork supervisors and 40 field officers. The field officers were divided into 8 teams of 5. Each team was scheduled to visit a school per day, where they administered learner assessments to the four grades and teacher questionnaires to relevant Grade 3, 4 and 6 teachers. The Fridays of each of the four weeks were issued to administer school mop-ups. The school mop-ups included collecting data from schools where field officers could not collect their allotted number of assessments and observations during their initial school visit.
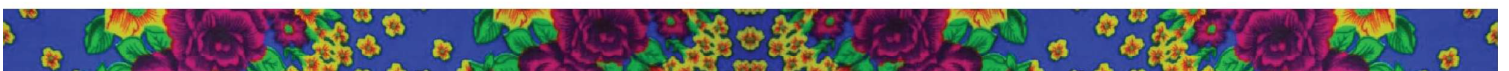
5.4.   Data Quality Assurance, Storage and Completeness

Decipher Data administered in-field data quality assurance. As an initial step, data from day 1 and 2 were analysed by Data Innovators to identify themes of errors observed during the first 2 days of data collection. This approach was used to enable the PMT to identify any issues, inconsistency in understanding as well as inaccurate data capturing. A PMT meeting was convened during the first 2 days of data collection and observations and feedback was shared with the field team soon after. The errors observed were the normal entry errors such as school name misspelling, learner unique ID capturing errors, learner name and surname capturing errors etc. The errors were reviewed and corrected with the respective fieldworkers, where possible. Unresolved errors resulted in data being expunged.

Due to the array of instruments used during the data collection, quality assurance was administered as follows:

- *Learner oral one-on-one assessments*: these instruments were administered to each sampled learner at the school. Tablets (with data collection software "Tangerine") were used to capture the oral assessments. Supervisors were tasked to observe the one-on-one administration process and guide assessors if they observe inconsistencies in the delivery of such assessments. Coordinators were also tasked with providing technical support to supervisors and field officers daily.

- *Learner written assessments*: these instruments were administered in a group setting (classroom examination style). Only Grade 3, 4 and 6 learners were required to participate in written assessments. Learners were expected to complete written assessments which were administered on paper. These completed paper-based instruments would then be collected after the assessment and marked during the afternoon of the day of assessment. The quality assurance processes administered required supervisors and coordinators to check the marks applied by field officers to ensure accuracy. Field teams had group marking sessions each day after data collection. This activity included field officers and supervisors all sit in a group and mark written assessment scripts collected on the day. Supervisors would then address any issues that arose during the marking session. Marking of scripts were recorded directly on paper-based instruments. Capturing of the written assessment was administered after the conclusion of fieldwork. Tangerine was used for capturing the already marked scripts.

- *Teacher questionnaire*: these instruments were administered to relevant Grade 3,4 and 6 teachers. The instruments were handed out and collected from the relevant teachers before the end of the school day. These instruments were administered on paper and captured on Tangerine after the school visit.

- *Sample sheets*: sample sheets were used to capture the details of the sampled learners. The sampled sheets were also used to fill in the linking forms.
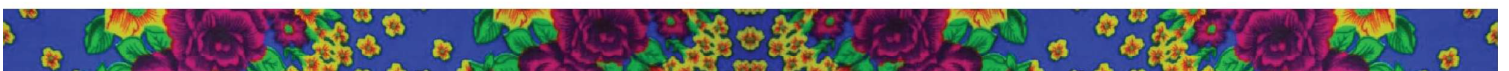
- *Linking forms*: were administered for all four grades assessed. The linking forms contains learner and teacher information. Supervisors and coordinators were tasked to check whether the sample sheet and linking form data correspond.

- *Quality assurance*: coordinators and supervisors held daily check-ins to execute various quality assurance activities. This was also important as mop-ups were arranged with schools in cases where the quality standard has not been reached. Field officers used paper-based and electronic instruments for data collection and capturing purposes.

These were managed and stored as below:

- *Paper-based instruments*: Decipher Data implemented a box system per school. Each school was allocated a box filled with all the instruments to be administered. The "school box" was used as the immediate storage vessel for the data collection instruments. All paper-based instruments were stored in the boxes and transported to storage areas identified by Decipher Data. All boxes were returned to Decipher Data offices once the fieldwork was concluded.

- *Electronic Instruments*: these instruments were developed in Tangerine and were administered via a tablet. The data collected via these devices were initially stored on the devices and later synced to Decipher Data's secure data storage cloud. Decipher Data uses Amazon Web Services (AWS) as their data storage and hosting service provider. All data saved on this server is secure and can only be accessed by a select number of Decipher Data representatives.
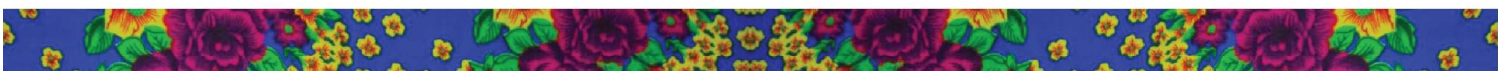
5.5.   Data Completeness

Prior to the data collection process, it was expected that field officers would assess 15 learners per grade. Additionally, teacher questionnaires were expected to be completed by a maximum of two (2) teachers per grade. The table below depicts the intended data requirement vs the collected data achievement:

Table 16. Data collected per instrument

Instruments	Intended	Collected	Completion
Grade 2 Learner Oral Assessment	1800	2097	117%
Grade 3 Learner Oral Assessment	1800	1896	105%
Grade 3 EFAL Learner Written Assessment	1800	2250	125%
Grade 3 HL Learner Written Assessment	1800	2229	124%
Grade 4 Learner Oral Assessment	1800	1883	105%
Grade 4 EFAL Learner Written Assessment	1800	2067	115%
Grade 4 HL Learner Written Assessment	1800	2193	122%
Grade 6 Learner Oral Assessment	1800	1815	101%
Grade 6 EFAL Learner Written Assessment	1800	2018	112%
Grade 6 HL Learner Written Assessment	1800	2107	117%
Grade 3 Teacher Questionnaire	1800	127	106%
Grade 4 Teacher Questionnaire	1800	133	111%
Grade 6 Teacher Questionnaire	1800	118	98%

Table 16 above depicts the raw numbers collected from the field. The number of Grade 2 learners assessed during the main data collection is more than intended as this assignment was leveraged by another project that also required Grade 2 data. Similarly, written assessment data collected also reflected higher than intended targets due to the leveraged work previously described. The data collected from the field is subject to completeness reviews and whether it could be used for the main data analysis. The completion numbers depicted in Table 16 indicate effort in the field.
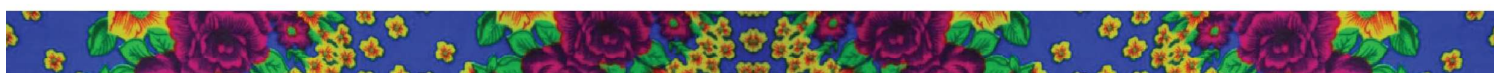
6. BENCHMARKING

6.1. Model description

A non-parametric locally weighted polynomial regression model was fit to capture the general pattern in the speed-accuracy relationship while making minimal assumptions about this relationship. It is nonparametric in that it does not learn a fixed set of parameters as is the case with ordinary linear regression.

A specific width of points along the x-axis is selected (which can also be a proportion of points in the dataset). A low degree polynomial (one degree polynomial) is fitted with points closest to the point we are predicting (anchor point) given more weights. The weighting function used is the tricube kernel function. The resulting model is then used to predict the value of the anchor point. The data is then shifted to the right and the process continues with a new prediction for the second point and so on. The resulting points are connected with a line. The size of the window (30% to 50% of the data) was chosen through K-fold cross validation (K=10).

6.2.   Speed calculation challenges

Time remaining was a variable recorded in the dataset. However, for a large group of learners who were auto stopped or could not continue with the task (for some reason), the time remaining was a large value and so using it to estimate the time taken to complete a task and then computing the speed (letters attempted per minute) resulted in high-speed values. To address this problem, we divided the learner population into four groups:

Group 1: Completed the task in less than the allocated time (usually 60 seconds). For these learners, the time taken to complete the task was calculated as the difference between the duration of the task and the time remaining.

Group 2: These learners ran out of time and could not finish the task within the allocated time. For these learners, the time remaining was correctly captured as zero.

Group 3: These learners were auto stopped and opted out after incorrectly attempting the first five in a task.

Group 4: These learners did not run out of time, they were not auto stopped, or did not attempt to complete the task. However, the time remaining was large and could be misleading. We thus assumed that they were only able to read the few letters/words within the entire duration of the task.

To establishing benchmarks for different grades and tasks, we excluded learners who were classified as either Group 3 or Group 4 from the analysis. The actual sample sizes are shown in each section.
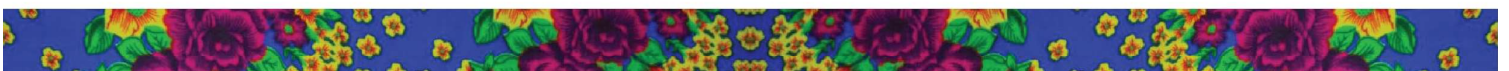
6.3.   Letter-Sound Recognition Analysis

A letter chart of 60 items consisting of letters of the alphabet appearing in random order in both upper and lower case was presented to learners in grades 2 and 3 and they were asked to sound as many as they could in 60 seconds. Each letter appeared at least once.
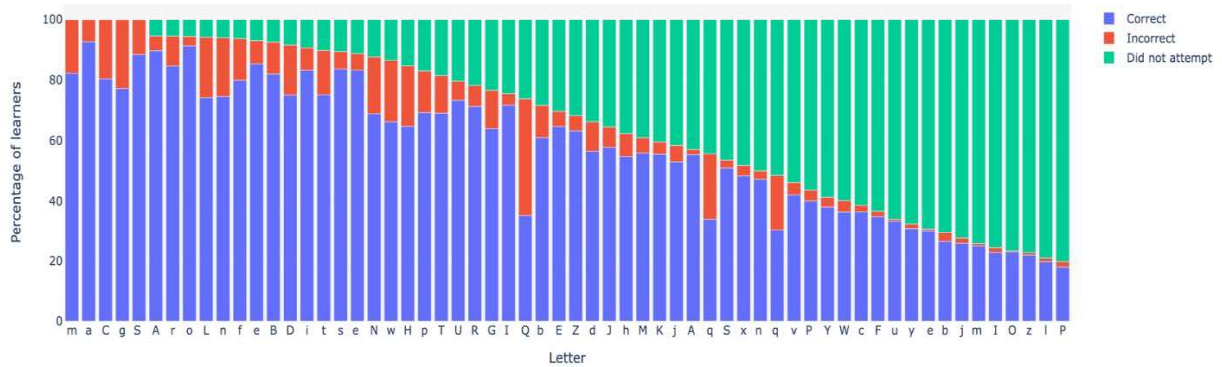
Figure 4. Grade 2 learners (%) reading each letter correctly, incorrectly or did not attempt to read
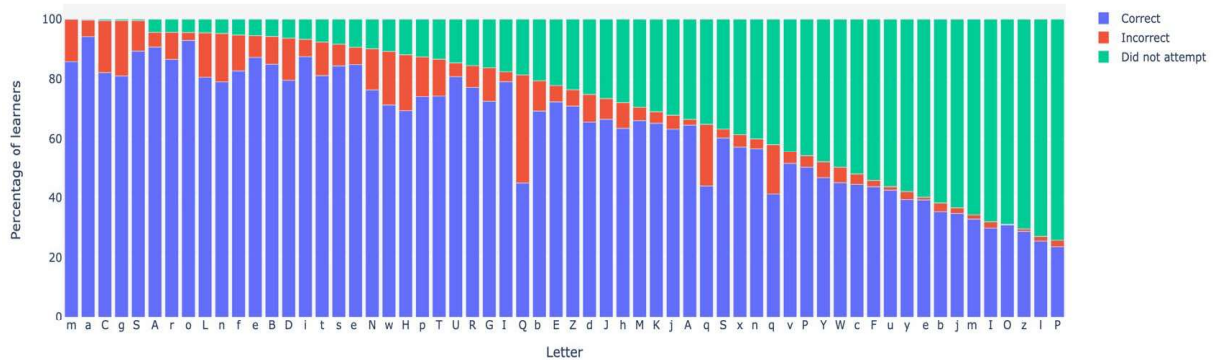
Figure 5. Grade 3 learners (%) reading each letter correctly, incorrectly or did not attempt to read

We analysed data from the letter-sound recognition section by computing the percentage of learners who read a letter sound correctly, incorrectly or those who did not attempt to read the letter. The sound recognition pattern for grade 2 and grade 3 was very similar. Figure 4 andFigure 5 show that the letter-sound /q/ seemed difficult for both grades with only 35% and 45% respectively pronouncing it correctly. The letter-sound /q/ appeared thrice in this exercise and although the ratio of those who read it correctly to those who read it incorrectly improved, this was still lower than all the other letters that were in the exercise suggesting that indeed letter Q is a problem letter in Xitsonga.

6.4.   Speed and Accuracy relationship in alphabetic knowledge

Reading speed is measured by the number of letters attempted per minute while accuracy is measured by the percentage of those letters correctly attempted.

Table 17 shows the number of learners who participated in the letter sound recognition assessment disaggregated by group. For establishing a letter sound benchmark, we dropped learners who were classified as either Group 3 or Group 4. Thus, for grade 2 and grade 3, we had a sample size of 1809 and 1636 respectively.

Table 17. Letter sound recognition assessment sample size

Group	Grade 2	Grade 3
Group 1	1485	1245
Group 2	324	391
Group 3	101	70
Group 4	4	12
Total	1914	1718

Table 18. Home language letter sound recognition properties and learner speed

	Number of letters	Median letter sounds per minute (clspm)
Grade 2	60	38 (IQR, 23-53)
Grade 3	60	43 (IQR, 27-58)

Table 18 shows the summary statistics for the home language letter-sound recognition task. Grade 2 learners managed to sound out 38 correct letter sounds per minute (clspm), while Grade 3 learners managed 43 clspm. Of all the Grade 2s, 5% could correctly sound one letter while 4% of Grade 3s could not sound a single letter.
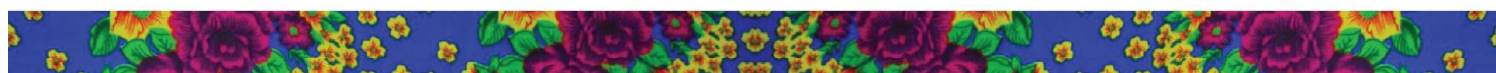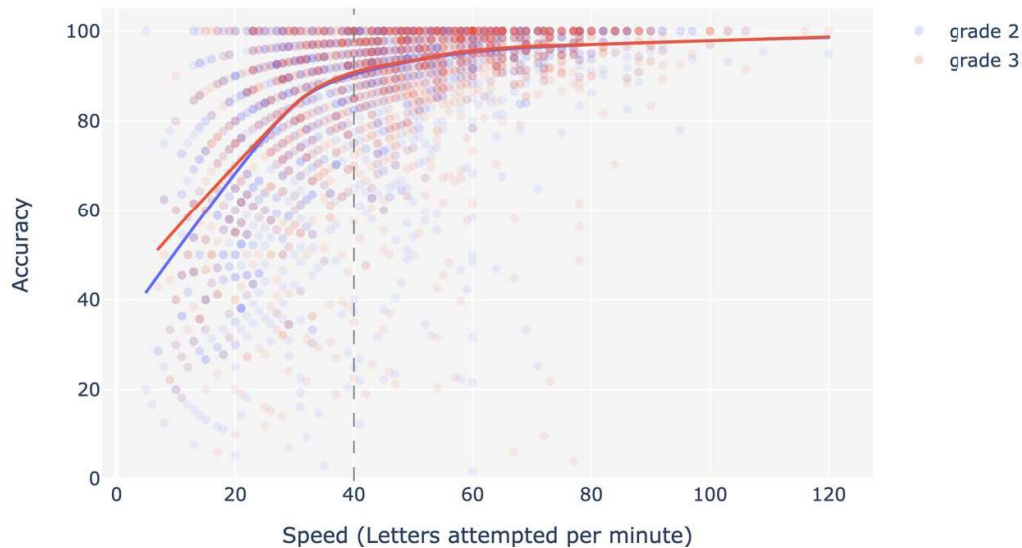
Figure 6. Letter-sound knowledge speed and accuracy relationship with trendlines

The relationship between speed and accuracy in letter-sound knowledge is summarised in Figure 6. For lower speeds (less than 30 lspm), Grade 3 learners had a higher accuracy than Grade 2 learners. Beyond 30 lspm, the letter-sound knowledge speed accuracy relationship for grades 2 and 3 learners was nearly identical. Generally, learners with low speed tend to have low accuracy in sounding letters. Speed and accuracy increase together steeply until 35 lspm (accuracy is 88%) for both grades after which the increase is gradual. Beyond 40 lspm (accuracy is 90% and 91% for Grade 2 and Grade 3 respectively), there is very little improvement in accuracy for both grades.

However, letter-sound skills provide the necessary foundation for reading and should be mastered in the first year of reading instruction. Therefore, 40 clspm is the appropriate letter-sound benchmark for Xitsonga Grade 1 learners.

6.5.   Establishing a Letter-Sound Benchmark

To establish the attainability of the above letter-sound benchmark, we classified all grade 2 and grade 3 learners who participated in the letter-sound recognition assessment into three groups:

    i.   not being able to correctly sound a letter,

    ii.   not reaching the benchmark or

    iii.   reaching the benchmark of 40 clspm.

Figure 7 shows that about half (44%) of Grade 2s were able to reach the letter-sound benchmark of 40 clspm whereas over half (54%) of the Grade 3s reached the letter-sound benchmark.Only 5% and 4% of Grades 2 and 3 learners respectively could not sound any letter correctly.
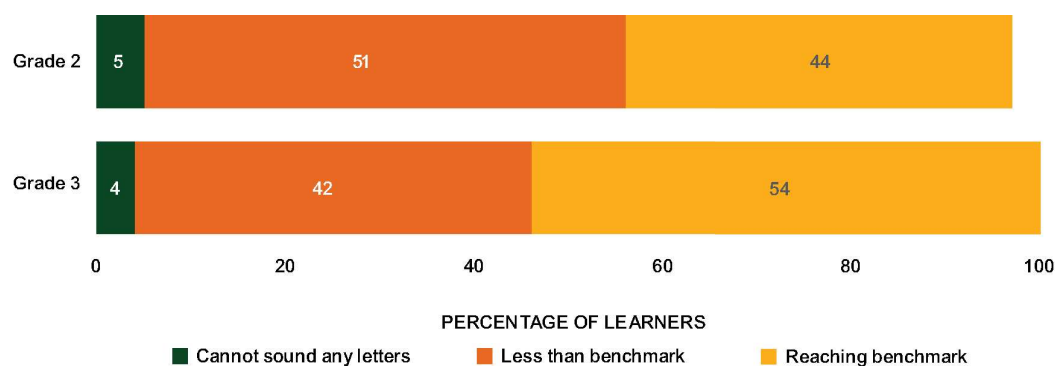
Figure 7. Percentage of learners reaching the letter-sound benchmark

In summary, a letter-sound benchmark of 40 clspm is attainable by a reasonable portion of learners in the sample. However, given the literature and national curriculum, mastery of this benchmark is expected for Grade 1 learners.

6.6. Isolated Word Reading

Isolated word reading was assessed with grades 2, 3 and 4 and the sample sizes are show in Table 19. We excluded group 3 and group 4 learners from this analysis. Thus, we had the final sample sizes of 1421, 1390 and 1470 for grades 2, 3 and 4 respectively.

Table 19. Isolated word reading sample and size

Group	Grade 2	Grade 3	Grade 4
1	11	13	11
2	1410	1377	1459
3	491	305	253
4	3	24	12
Total	1915	1719	1735

While there are differences in the speeds associated with different accuracies for all the grades, *Figure 8* shows a similar pattern in the speed-accuracy relationship for isolated word reading. Accuracy in general increases steeply up to about 87% – 90% after which it flattens off.

The accuracy for grades 3 and 4s, however, increases slightly after the 60 correct words per minute (wcpm) score, with learners in those grades attaining an accuracy measure as high as 100% by the speed of 90 words per minute. This suggests that reading very fast does not have a negative impact on the accuracy of the learners in Grades 3 and 4.

For Grade 2 learners, reading at a speed of 23 wcpm represents the point where majority of the learners reach the highest accuracy (88%). Beyond this speed, there is very small increase in accuracy. The accuracy for Grade 2 however starts dipping slightly after a speed of 60 wcpm, suggesting that reading

very fast can compromise the accuracy in reading to some extent. For Grade 3 learners, reading at a speed of 29 wcpm represents the point where majority of the learners reach the highest accuracy (95%). Beyond this speed, there is very small increase in accuracy. For Grade 4 learners, reading at a speed of 25 wcpm represents the speed where majority of the learners reach the highest accuracy (95%). This lower reading speed for Grade 4 in comparison to Grade 3 could suggests that the words in the task for Grade 4 learners were harder than the words for Grade 3 chart.
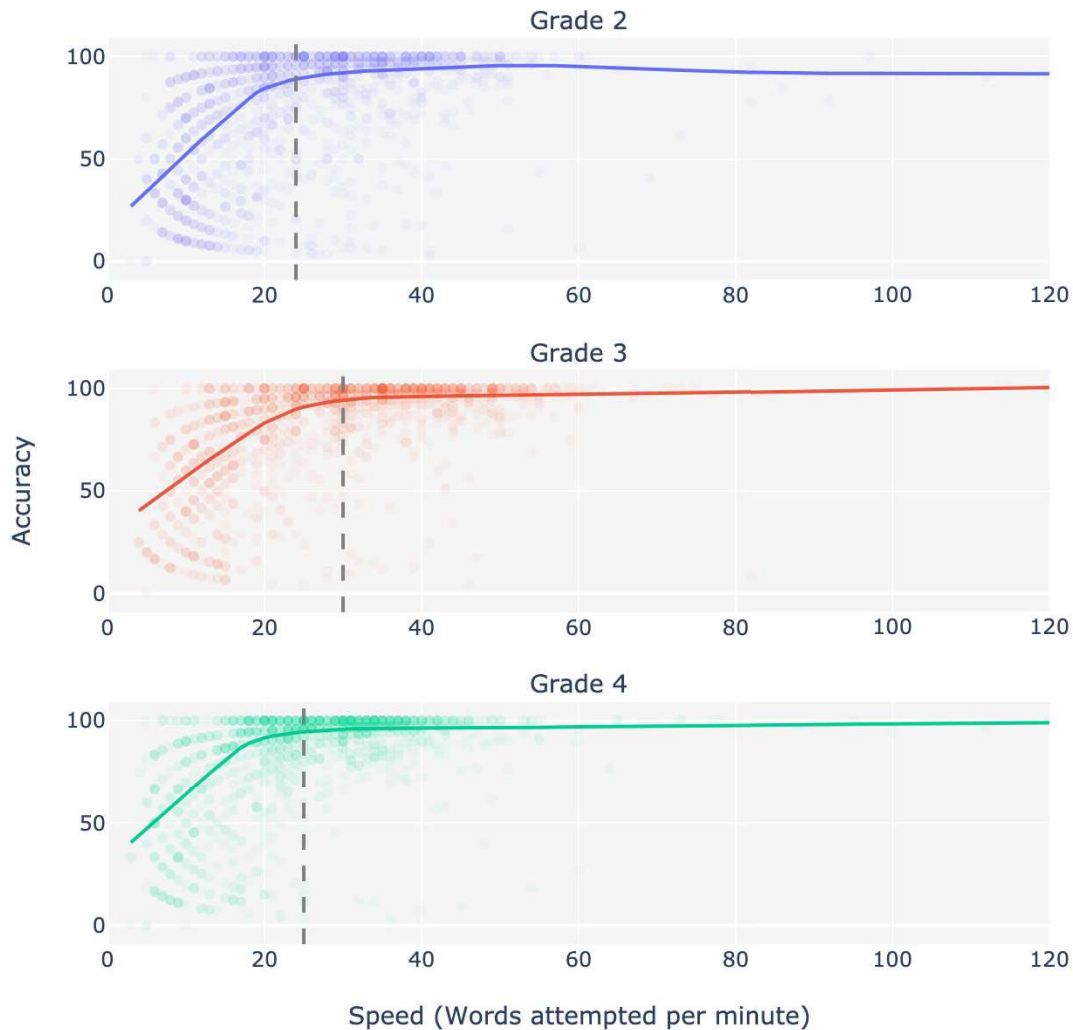
Figure 8. Isolated word reading speed accuracy relationship with trendlines disaggregated by grade

The dotted line shows the speed at which most learners in each grade attain the highest accuracy. However, for Grades 2 and 3, it would be appropriate to set the reading benchmarks slightly higher than learners' scores as noted above, making the Grade 2 benchmark at 25 wcpm and 30 wcpm for Grade 3. Given the fact that Grade 4 learners attempted words with different criteria than those in Grades 2 and 3, it is suitable that 25 wcpm reflect the benchmark for this group.

6.7. Reading Speed and Accuracy

This section addresses learners' performance for reading words in a paragraph. Table 20 shows the sample sizes for each grade and task.

Table 20. ORF sample size

	Grade 2		Grade 3		Grade 4		Grade 6	
	ORF 1	ORF 2	ORF 1	ORF 2	ORF 1	ORF 2	ORF 1	ORF 2
Group 1	102	50	3	10	2	0	0	0
Group 2	1201	1257	1372	1478	1381	1396	1637	1623
Group 3	607	597	319	0	336	322	70	82
Group 4	8	14	25	194	13	15	5	10
Total	1918	1918	1719	1682	1732	1733	1712	1715

Group 3 and group 4 were dropped from this analysis. The final sample sizes for each grade and ORF assessment are shown in Table 21 below.

Table 21. ORF passage properties and learner speed

	Task	Words in passage	Sample size	Median words attempted in one minute	Median correct words per minute (wcpm)
Grade 2	ORF 1	58	1303	34 (IQR, 21–45)	31 (IQR, 16–44)
	ORF 2	66	1307	32 (IQR, 19–44)	29 (IQR, 15–43)
Grade 3	ORF 1	93	1375	33 (IQR, 20–43)	31 (IQR, 17–42)
	ORF 2	93*	1488	35 (IQR, 21–47)	32 (IQR, 15–45)
Grade 4	ORF 1	119	1383	37 (IQR, 26–54)	36 (IQR, 23–53)
	ORF 2	112	1396	41 (IQR, 29–51)	40 (IQR, 26–49)
Grade 6	ORF 1	234	1637	66 (IQR, 45–85)	64 (IQR, 42–84)
	ORF 2	158	1623	58 (IQR, 41–68)	57 (IQR, 39–66)

* The questionnaire shows that there were 92 words, but the data shows 93 words

The median number of words attempted in one minute for Grade 2 learners was 34 and 32 for ORF1 and ORF2, respectively. For Grade 3, the median number of words attempted in one minute was 33 and 35 for ORF1 and ORF2, respectively. The median number of words attempted in one minute for Grade 4 was 37 and 41 for ORF1 and ORF2, respectively. For Grade 6, the median number of words attempted in one minute was 66 and 58 for ORF1 and ORF2 respectively. It is interesting to see these differences as the texts were different, with learners performing lower on information text than narrative texts. In both grades ORF 1 was a narrative test and ORF 2 was an information text.
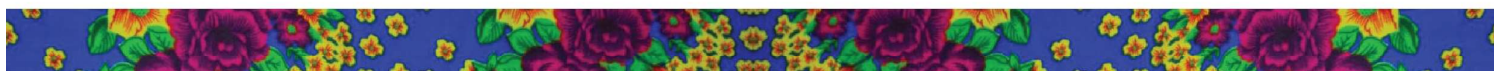
Figure 9 the percentage of learners scoring zero on ORF assessments in Xitsonga. As expected, the percentage of non-readers (i.e., ORF is zero) declines with each grade suggesting fluency continues to develop into the Intermediate and Senior Phase. For Grade 2, the percentage of non-readers is 31%–32% while for Grade 6 learners, the percentage of non-readers is 4%–5% depending on the level of complexity defining the passage. Fifteen to twenty percent of Grade 3 learners could not read a single word correctly from a Xitsonga text, and this is not much different for Grade 4 (19–20% non-readers).

Figure 9. Percentage of learners scoring zero on ORF assessments

In the relationship between speed and accuracy in Xitsonga oral reading, speed is measured as the number of words attempted in a minute while accuracy refers to the percentage of attempted words that are read correctly.
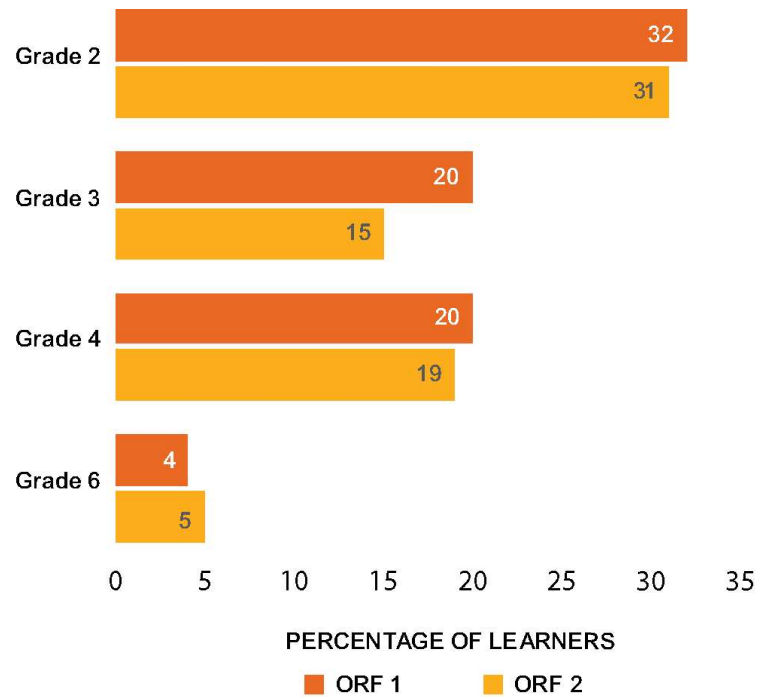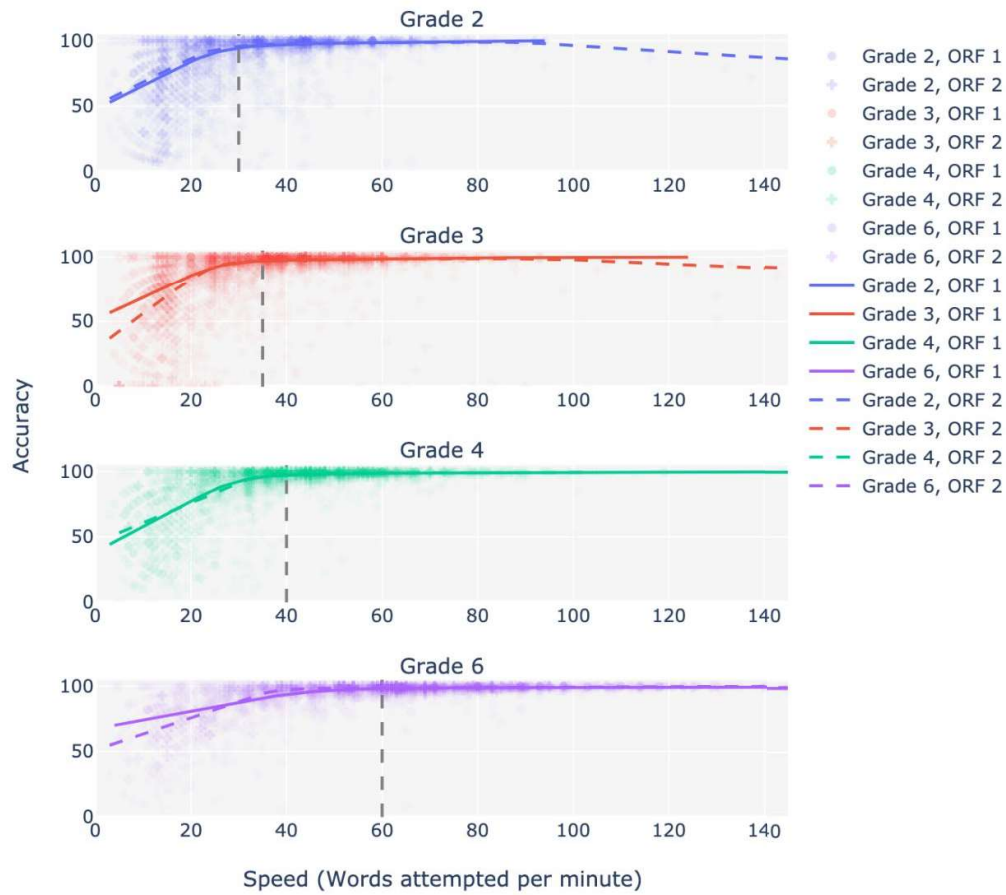

Figure 10. ORF word reading speed accuracy relationship with trendlines

Across all grades and reading passages, a consistent pattern emerges where initially accuracy and speed increase quite steeply together, but then the relationship flattens off as shown in Figure 10. For Grade 2, accuracy and speed increases steeply together until the speeds of around 27 wcpm (accuracy is 92%-94%). At 30 wcpm, the accuracy is between 95% and 96% depending on the task. Beyond this speed, there is very little increase in accuracy. Like for Grade 2, accuracy and speed for Grade 3 increases steeply together until the speeds of around 30 wcpm (accuracy is 95%). At 35 wcpm, the accuracy is between 97% and 98% depending on the task. Beyond this speed, there is very little increase in accuracy. For grade 4, accuracy and speed increases steeply together until the speeds of around 35 wcpm (accuracy is 96%-97%). At 40 wcpm, the accuracy is between 97% and 98% depending on the task. Beyond this speed, there is very little increase in accuracy. Finally, for grade 6 accuracy and speed increases steeply together until the speeds of around 60 wcpm (accuracy is 98%) for ORF 1 and 50 wcpm (accuracy is 98%) for ORF 2. Beyond these speeds, there is very little increase in accuracy. For Grade 6, the differences in the number of wcpm confirms that learners read informative/non-fiction texts slower.

A common criticism of setting fluency benchmarks is that by encouraging speed, this ignores the possibility that there are students that read slowly but with accuracy (Dowd & Bartlett, 2019). Figure 10 shows that there are learners who read slowly but accurately and even fewer with poor accuracy but reasonable speed.

Figure 11 shows the speed distribution for learners in grades 2, 3, 4 and 6 with at least 95% accuracy (accurate readers). The box represents the middle 50% of the data (from the 25th to the 75th percentile) with the median indicated by the horizontal line inside the box. The figure includes grey dashed reference lines at 30, 40, 50 and 60 wcpm. For Grade 2s and 3s, at the 25th percentile, reading speed tends to lie around or above 30 wcpm. This means that there are very few accurate readers who read slower than 30 words per minute who are reaching accuracy levels of 95% or higher. For Grade 4s, at the 25th percentile, reading speed tends to lie around or above 40 words attempted per minute. For Grade 6s, at the 25th percentile, reading speed tends to lie around or above 50 words per minute for informative text and 60 words per minute for narrative/fictional text.
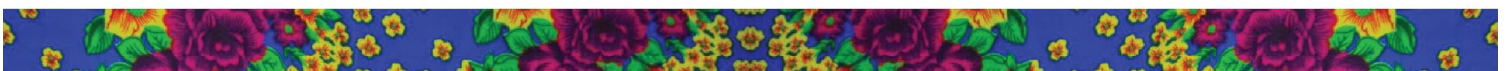
Figure 11 shows the speed distribution for learners with less than 95% accuracy (inaccurate readers). For all grades, we see that majority of the readers who are making decoding errors tend to read very slowly. For grades 2 and 3, the bulk of the distributions for inaccurate readers is lying well below the 30 words per minute line. For grade 4, the bulk of the distribution is lying below 40 words per minute while for grade 6, the bulk of the distribution is lying below 50 words per minute.

Figure 11. Speed distribution for learners reading with at least 95% accuracy in Xitsonga
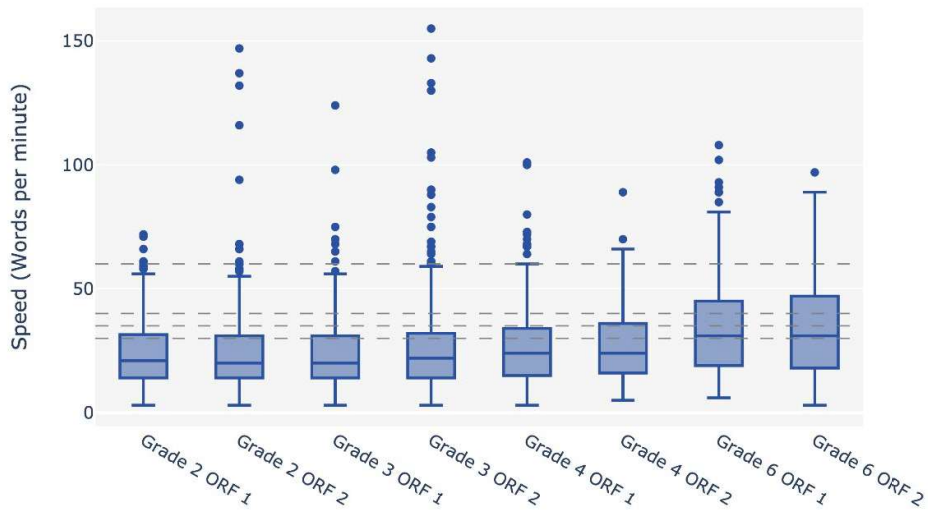
Figure 12. Speed distribution for learners reading with less than 95% accuracy in Xitsonga

6.8.   Fluency and Comprehension

Figure 13 shows how learners perform on individual comprehension questions classified as per the Progress in International Reading and Literacy Study (PIRLS) based on the underlying comprehension process they aimed to assess. The height of the bars 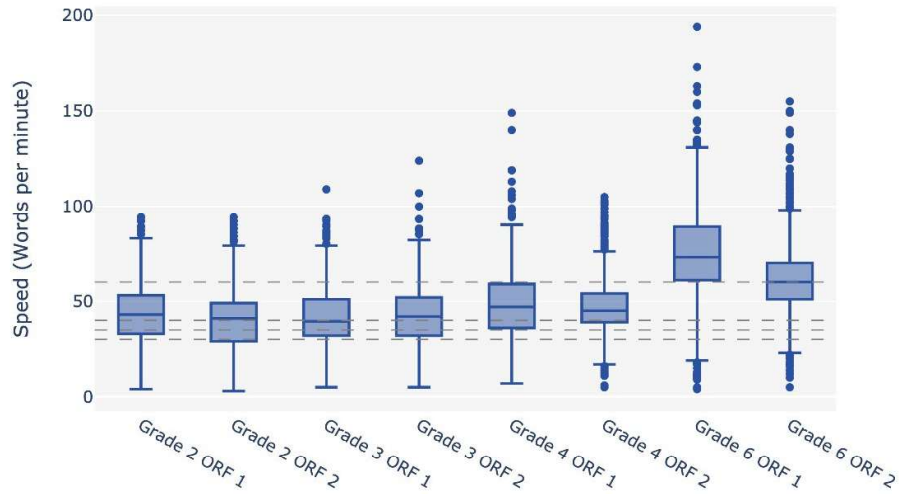indicates the percentage of all learners who answered each question correctly. The bar colours indicate the types of comprehension processes engaged in the questions: literal (Lit), straightforward inference (SI), interpret and integrate ideas and information (I&I) and examine or evaluate (E&E). Across all grades, learners struggled to answer examine and evaluate (E&E) questions with less than 20% answering the question correctly. On the other hand, learners excelled in answering the easier literal (Lit) questions.
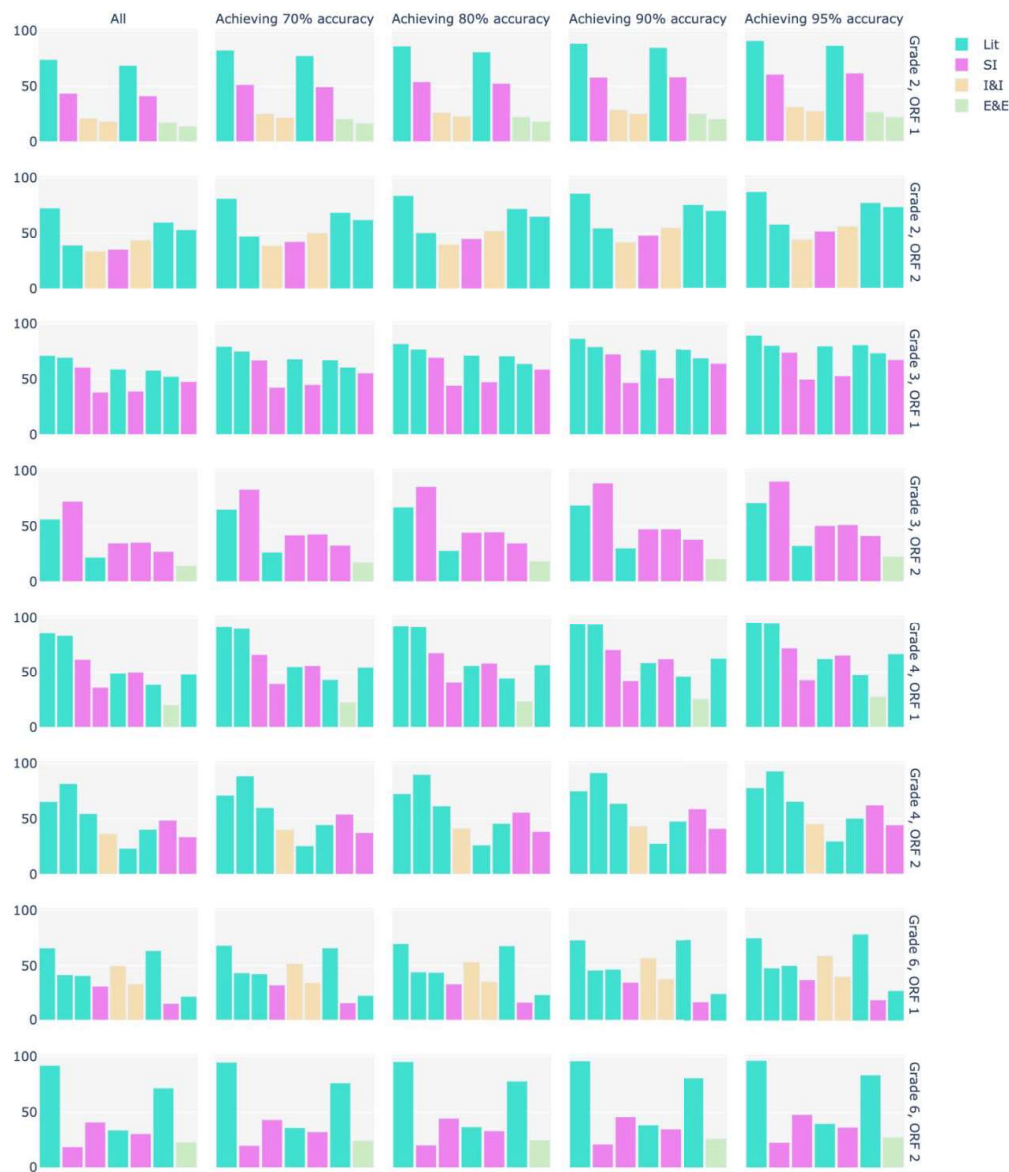
Figure 13. Percentage of learners answering each comprehension question correctly

6.9.   Comprehension

The total comprehension score for each task was computed for all the learners in each grade. Each question that was correctly answered had a mark of 1 while partially correct responses were assumed to be 0,5. Questions that were incorrectly answered, no response or the learner responded with don't know were given a score of zero.

Figure 14 shows the percentage of learners with zero score or floor effects for the oral reading fluency comprehension task for each grade. Grade 2 learners had the highest percentage of learners with zero score while Grade 6 had the least number of learners with floor effects. For Grade 6, there was notable difference in the percentage of learners with zero score for ORF1 and ORF2.
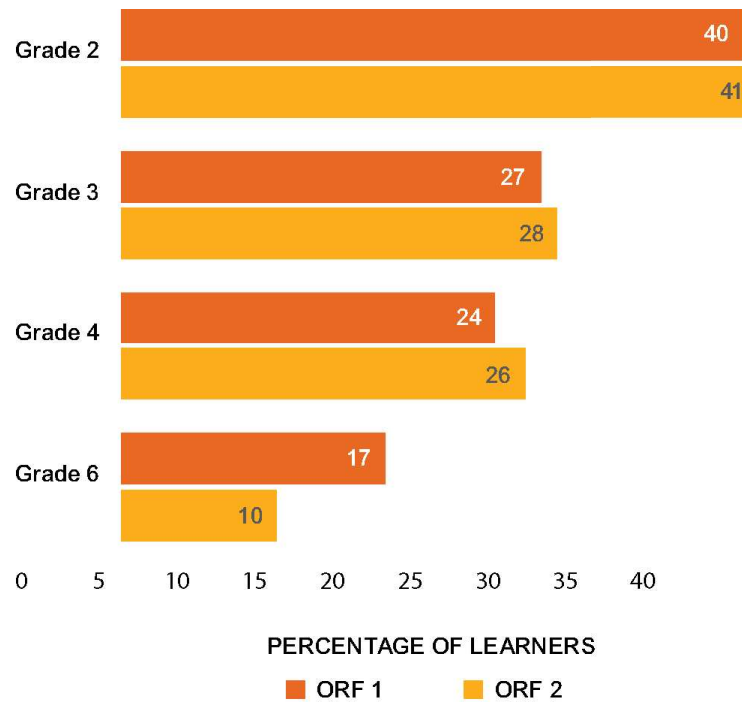
Figure 14. Percentage of learners with zero scores on comprehension questions per task

Figure 15 shows the percentage of learners with zero score for the oral reading fluency comprehension task for learners attempting at least a subset of comprehension questions (after removing learners who skipped all comprehension questions).
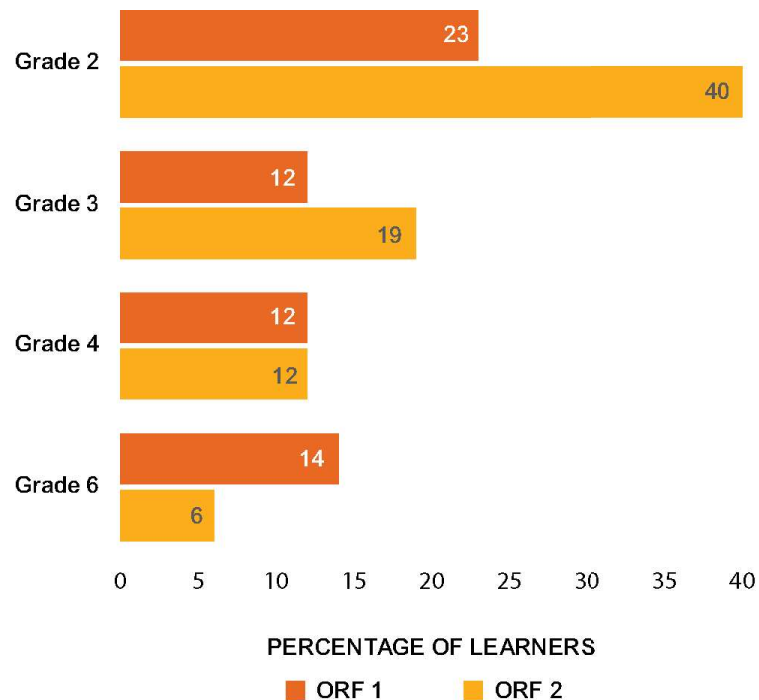
Figure 15. Percentage of learners who attempted a subset of comprehension questions with zero scores per task

There were many Grade 2 learners (23%) who skipped all comprehension questions for task 1 hence a large decline in the percentage with zero scores. For all the other grades, the percentage of learners who skipped all comprehension questions ranged from 5% to 17%. Grade 2s had the highest percentage of learners with zero score while Grade 6 had the least number of learners with zero score. For Grade 3s, between 12% and 19% of learners had zero scores on comprehension questions while 12% of Grade 4 learners had zero scores.

Figure 16 demonstrates the relationship between fluency and comprehension. The figures include grey dashed reference lines at 30, 35, 40, 60, 95 and 120 wcpm.
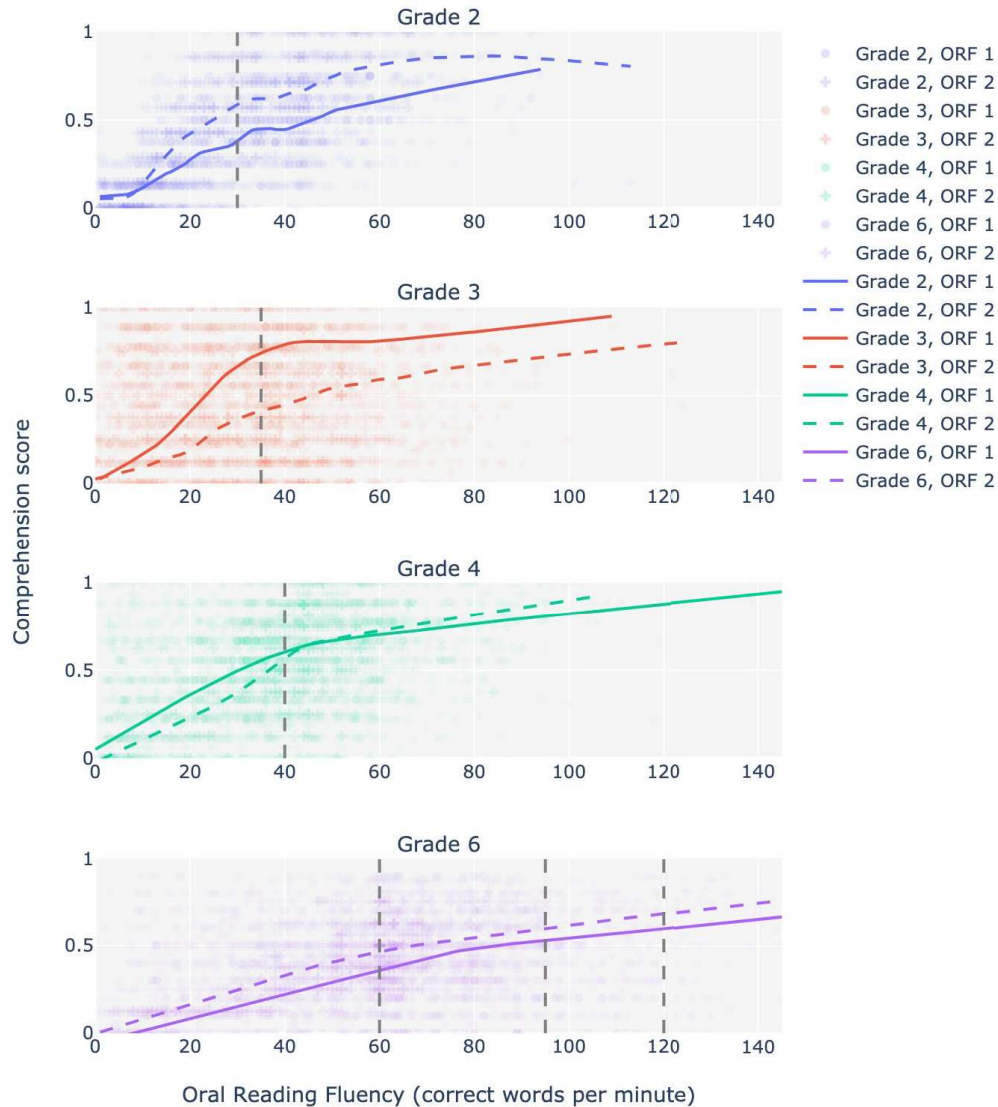
Figure 16. Relationship between fluency and comprehension for learners attempting a subset of comprehension questions

There are differences in the average comprehension levels between grades. For Grades 2, 3 and 4 learners, this relationship is a bit steep below 40 wcpm. For Grade 2 learners reading at 30 wcpm, the comprehension score was 37% for ORF 1 and 59% ORF 2. (See *Figure 16*). For Grade 3 learners reading at 35 wcpm, the comprehension score was 41% and 74% for ORF 1 and ORF 2 respectively. For Grade 4 learners reading at 40 wcpm or more, the comprehension score was above 58%. Grade 6 learners reading below 60 wcpm tend to have very poor comprehension, attaining comprehension scores of below 47%. For all the grades, comprehension scores improve as the fluency increases.

6.10 Xitsonga Fluency Thresholds: Learner profiles and attainability

We outline the extent at which different thresholds correspond to meaningful and distinguishable zones along the reading development cline. Reading profiles are explored by combining all the samples and summarizing accuracy, comprehension, and letter-sound knowledge across four fluency categories.

Table 22. Grade 2 Learner profiles by threshold level

| GRADE 2	ORF 1	ORF 2
CANNOT READ: 0 WCPM		
Mean correct letter-sounds per minute	18.7	18.8
Letter-sounds scoring zero	14%	13%
Observations (%)	608 (32%)	599 (31%)
> 0 WCPM		
Mean correct letter-sounds per minute	44.4	44.2
% with at least 95% accuracy in word reading	56%	56%
Mean comprehension score (% of correct from total)	37%	48%
Mean comprehension score (% of correct out of attempted)	39%	51%
Comprehension scoring zero (%)	14%	14%
Observations (%)	1310 (68%)	1319 (69%)
>= 30 (At least 30) WCPM		
Mean correct letter-sounds per minute	53.6	53.5
% with at least 95% accuracy in word reading	86%	86%
Mean comprehension score (% of correct from total)	52%	68%
Mean comprehension score (% correct out of attempted)	52%	68%
Comprehension scoring zero (%)	2%	1%
Observations (%)	685 (36%)	637 (33%)
>= 35 (At least 35) WCPM		
Mean correct letter-sounds per minute	54.8	54.8
% with at least 95% accuracy in word reading	88%	88%
Mean comprehension score (% of correct from total)	53%	69%
Mean comprehension score (% correct out of attempted)	53%	69%
Comprehension scoring zero (%)	1%	1%
Observations (%)	577 (30%)	509 (27%)

Learners who cannot read a single word

- 13%–14% of Grade 2 learners who cannot read were also unable to correctly sound a letter.
- Grade 2 learners who are unable to read one word correctly in one minute can correctly sound 19 letters per minute.

Learners reading at least 1 WCPM

- Grade 2 learners reading at least 1 wcpm can correctly sound 44 letters per minute.
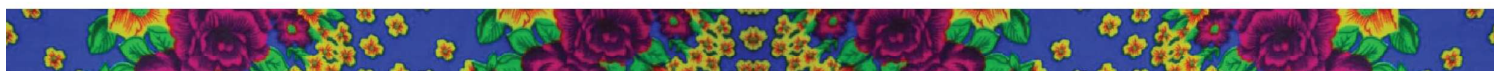
- 56% of Grade 2 learners reading at least 1 wcpm reach 95% accuracy.

- 14% of Grade 2 learners reading at least 1 wcpm scored zero in the ORF comprehension task.

- They comprehend very little of what they read with the average comprehension score of between 39% and 51% of the questions that they attempted.

Learners reading at least 30 WCPM

- Grade 2 learners reading at least 30 wcpm can correctly sound 54 letters per minute.

- Percentage of accurate readers (at least 95% accuracy) greatly improved to 86%

- Only 1%-2% of Grade 2 learners reading at least 30 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 58% and 69% of the questions that they attempted.

Learners reading at least 35 WCPM

- Grade 2 learners reading at least 35 wcpm can correctly sound 54 letters per minute.

- Percentage of accurate readers (at least 95% accuracy) improved to 88% among learners with at least 35 wcpm reading speed.

- Only 1% of Grade 2 learners reading at least 35 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 53% and 69% of the questions that they attempt.
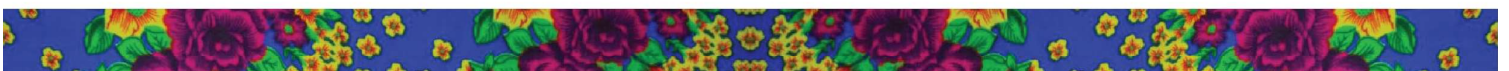
Table 23. Grade 3 learner profiles by threshold level

GRADE 3	ORF 1	ORF 2
CANNOT READ: 0 WCPM		
Mean correct letter-sounds per minute	18.3	18.4
Letter-sounds scoring zero	14%	13%
Observations (%)	338 (20%)	252 (15%)
> 0 WCPM		
Mean correct letter-sounds per minute	46.5	45.3
% with at least 95% accuracy in word reading	57%	60%
Mean comprehension score (% of correct from total)	55%	35%
Mean comprehension score (% of correct out of attempted)	60%	48%
Comprehension scoring zero (%)	9%	15%
Observations (%)	1381 (80%)	1430 (85%)
>= 35 (At least 35) WCPM		
Mean correct letter-sounds per minute	54.8	53.7
% with at least 95% accuracy in word reading	89%	87%
Mean comprehension score (% of correct from total)	78%	50%
Mean comprehension score (% correct out of attempted)	78%	58%
Comprehension scoring zero (%)	1%	2%
Observations (%)	598 (35%)	690 (41%)
>= 40 (At least 40) WCPM		
Mean correct letter-sounds per minute	56.7	55.3
% with at least 95% accuracy in word reading	92%	90%
Mean comprehension score (% of correct from total)	79%	53%
Mean comprehension score (% correct out of attempted)	79%	61%
Comprehension scoring zero (%)	1%	2%
Observations (%)	424 (25%)	517 (31%)
>= 45 (At least 45) WCPM		
Mean correct letter-sounds per minute	58.1	56.2
% with at least 95% accuracy in word reading	93%	90%
Mean comprehension score (% of correct from total)	79%	55%
Mean comprehension score (% correct out of attempted)	79%	63%
Comprehension scoring zero (%)	1%	2%
Observations (%)	298 (17%)	382 (23%)
>= 50 (At least 50) WCPM		
Mean correct letter-sounds per minute	58.5	56.1
% with at least 95% accuracy in word reading	94%	91%
Mean comprehension score (% of correct from total)	79%	57%
Mean comprehension score (% correct out of attempted)	79%	65%
Comprehension scoring zero (%)	1%	2%
Observations (%)	226 (13%)	284 (17%)

Learners who cannot read a single word
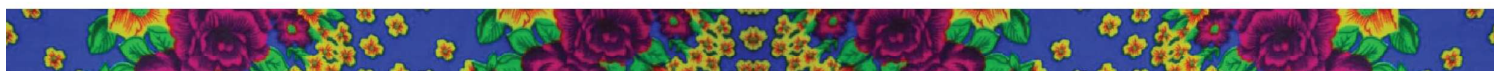
- 13%–14% of Grade 3 learners who cannot read were also unable to correctly sound a letter.
- Grade 3 learners who are unable to read one word correctly in one minute can correctly sound 18 letters per minute.

Learners reading at least 1 WCPM

- Grade 3 learners reading at least 1 wcpm can correctly sound 45–46 letters per minute on average.
- 57%–60% of Grade 3 learners reading at least 1 wcpm reach 95% accuracy.
- 9%–15% of Grade 3 learners reading at least 1 wcpm scored zero in the ORF comprehension task.
- They comprehend very little of what they read with the average comprehension score of between 48% and 60% of the questions that they attempt.

Learners reading at least 35 WCPM

- Grade 3 learners reading at least 35 wcpm can correctly sound 54–55 letters per minute.
- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 87%–89% among learners with at least 35 wcpm reading speed.
- Only 1%–2% of Grade 3 learners reading at least 35 wcpm scored zero in the ORF comprehension task.
- The comprehension is above average with a mean comprehension score of 58% and 78% of the questions that they attempt.

Learners reading at least 40 WCPM

- Grade 3 learners reading at least 30 wcpm can correctly sound 55–57 letters per minute.
- Percentage of accurate readers (at least 95% accuracy) have greatly improved to between 90%–92%
- Only 1%-2% of Grade 3 learners reading at least 40 wcpm scored zero in the ORF comprehension task.
- The comprehension is above average with a mean comprehension score of 61% and 79% of the questions that they attempt.

Learners reading at least 45 WCPM

- Grade 3 learners reading at least 45 wcpm can correctly sound 56–58 letters per minute.
- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 90%–93%
- Only 1%-2% of Grade 3 learners reading at least 45 wcpm scored zero in the ORF comprehension task.
- The comprehension is above average with a mean comprehension score of 63% and 79% of the questions that they attempt.

Learners reading at least 50 WCPM

- Grade 3 learners reading at least 50 wcpm can correctly sound 56–59 letters per minute.
- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 91%–94%
- Only 1%-2% of Grade 3 learners reading at least 50 wcpm scored zero in the ORF comprehension task.
- The comprehension is above average with a mean comprehension score of 65% and 79% of the questions that they attempt.
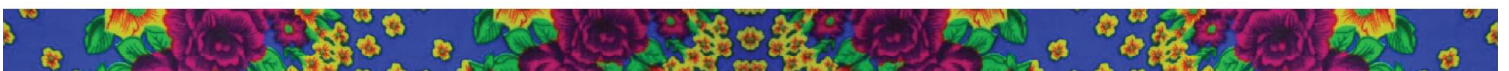
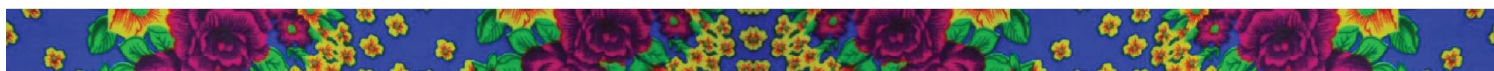*Table 24. Grade 4 learner profiles by threshold level*

GRADE 4	ORF 1	ORF 2
CANNOT READ: 0 WCPM		
Observations (%)	345 (20%)	331 (19%)
> 0 WCPM		
% with at least 95% accuracy in word reading	63%	72%
Mean comprehension score (% of correct from total)	52%	50%
Mean comprehension score (% of correct out of attempted)	56%	54%
Comprehension scoring zero (%)	7%	9%
Observations (%)	1387 (80%)	1402 (81%)
>= 40 (At least 40) WCPM		
% with at least 95% accuracy in word reading	93%	93%
Mean comprehension score (% of correct from total)	68%	68%
Mean comprehension score (% correct out of attempted)	68%	68%
Comprehension scoring zero (%)	1%	1%
Observations (%)	600 (35%)	745 (43%)
>= 50 (At least 50) WCPM		
% with at least 95% accuracy in word reading	95%	97%
Mean comprehension score (% of correct from total)	70%	72%
Mean comprehension score (% correct out of attempted)	70%	72%
Comprehension scoring zero (%)	1%	1%
Observations (%)	411 (24 %)	350 (20%)
>= 55 (At least 55) WCPM		
% with at least 95% accuracy in word reading	96%	97%
Mean comprehension score (% of correct from total)	71%	75%
Mean comprehension score (% correct out of attempted)	71%	75%
Comprehension scoring zero (%)	1%	1%
Observations (%)	318 (18%)	237 (14%)
>= 60 (At least 60) WCPM		
% with at least 95% accuracy in word reading	96%	97%
Mean comprehension score (% of correct from total)	73%	77%
Mean comprehension score (% correct out of attempted)	73%	77%
Comprehension scoring zero (%)	1%	1%
Observations (%)	201 (12%)	146 (8%)

Learners who cannot read a single word:

- 19%–20% of Grade 4 learners cannot read.

Learners reading at least 1 WCPM

- 63%–72% of Grade 4 learners reading at least 1 wcpm reach 95% accuracy.

- 7%–9% of Grade 4 learners reading at least 1 wcpm scored zero in the ORF comprehension task

- They comprehend very little of what they read with the average comprehension score of between 54% and 56% of the questions that they attempt.

Learners reading at least 40 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 93%

- Only 1% of Grade 4 learners reading at least 40 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 68% of the questions that they attempt.

Learners reading at least 50 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to between 95%–97% among learners with at least 50 wcpm reading speed.

- Only 1% of Grade 4 learners reading at least 50 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 70% and 72% of the questions that they attempt.

Learners reading at least 55 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to between 96%–97% among learners with at least 55 wcpm reading speed.

- Only 1% of Grade 4 learners reading at least 55 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 71% and 75% of the questions that they attempt.

Learners reading at least 60 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to between 96%–97% among learners with at least 60 wcpm reading speed.

- Only 1% of Grade 4 learners reading at least 60 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 73% and 77% of the questions that they attempt.
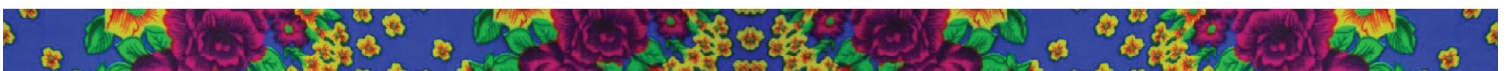
Table 25. Grade 6 learner profiles by threshold level

GRADE 6	ORF 1	ORF 2
CANNOT READ: 0 WCPM		
Observations (%)	70 (4%)	83 (5%)
> 0 WCPM		
% with at least 95% accuracy in word reading	77%	78%
Mean comprehension score (% of correct from total)	37%	41%
Mean comprehension score (% of correct out of attempted)	47%	49%
Comprehension scoring zero (%)	13%	5%
Observations (%)	1642 (96%)	1632 (95%)
>= 60 (At least 60) WCPM		
% with at least 95% accuracy in word reading	96%	97%
Mean comprehension score (% of correct from total)	48%	52%
Mean comprehension score (% correct out of attempted)	56%	60%
Comprehension scoring zero (%)	2%	0%
Observations (%)	985 (56%)	725 (42%)
>= 70 (At least 70) WCPM		
% with at least 95% accuracy in word reading	98%	98%
Mean comprehension score (% of correct from total)	51%	57%
Mean comprehension score (% correct out of attempted)	58%	65%
Comprehension scoring zero (%)	1%	0%
Observations (%)	712 (42%)	304 (18%)
>= 80 (At least 80) WCPM		
% with at least 95% accuracy in word reading	99%	99%
Mean comprehension score (% of correct from total)	52%	59%
Mean comprehension score (% of correct out of attempted)	59%	67%
Comprehension scoring zero (%)	1%	0%
Observations (%)	517 (30%)	180 (10%)
>= 85 (At least 85) WCPM		
% with at least 95% accuracy in word reading	99%	99%
Mean comprehension score (% of correct from total)	54%	61%
Mean comprehension score (% of correct out of attempted)	60%	70%
Comprehension scoring zero (%)	1%	0%
Observations (%)	405 (24%)	117 (7%)
>= 90 (At least 90) WCPM		
% with at least 95% accuracy in word reading	99%	99%
Mean comprehension score (% of correct from total)	55%	62%
Mean comprehension score (% correct out of attempted)	62%	71%
Comprehension scoring zero (%)	1%	0%
Observations (%)	295 (17%)	86 (5%)

Learners who cannot read a single word

• 4%–5% of Grade 6 learners cannot read.
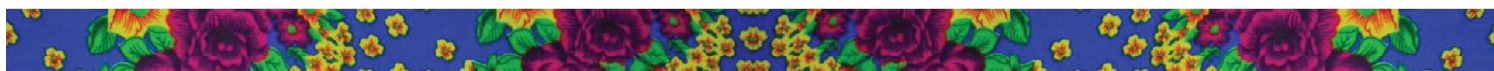
Learners reading at least 1 WCPM

- 77%–78% of Grade 6 learners reading at least 1 wcpm reach 95% accuracy.

- 5%–13% of Grade 6 learners reading at least 1 wcpm scored zero in the ORF comprehension task.

- They comprehend very little of what they read with the average comprehension score of between 47% and 49% of the questions that they attempt.

Learners reading at least 60 WCPM

- Percentage of accurate readers (at least 95% accuracy) have improved to between 96%–97%

- Only 2% of Grade 6 learners reading at least 60 wcpm scored zero in the ORF comprehension task.

- Reading comprehension is above average with a mean comprehension score of 56% and 60% of the questions that they attempt.

Learners reading at least 70 WCPM

- Percentage of accurate readers (at least 95% accuracy) improved to 98% among learners with at least 70 wcpm reading speed.

- Only 1% of Grade 6 learners reading at least 70 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 58% and 65% of the questions that they attempt.

**Learners reading at least 80 WCPM**

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 99% among learners with at least 80 wcpm reading speed.

- Only 1% of Grade 6 learners reading at least 80 wcpm scored zero in the ORF comprehension task

- The comprehension is above average with a mean comprehension score of 59% and 67% of the questions that they attempt.

Learners reading at least 85 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 99% among learners with at least 85 wcpm reading speed.

- Only 1% of Grade 6 learners reading at least 85 wcpm scored zero in the ORF comprehension task

- The comprehension is above average with a mean comprehension score of 60% and 70% of the questions that they attempt.

Learners reading at least 90 WCPM

- Percentage of accurate readers (at least 95% accuracy) have greatly improved to 99% among learners with at least 90 wcpm reading speed.

- Only 1% of Grade 6 learners reading at least 90 wcpm scored zero in the ORF comprehension task.

- The comprehension is above average with a mean comprehension score of 62% and 71% of the questions that they attempt.
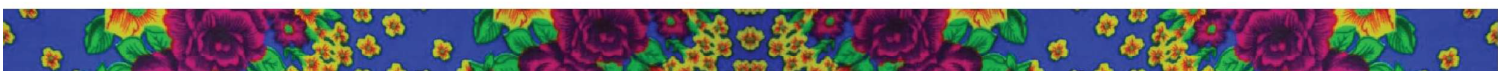
We thus propose the following reading benchmarks for Xitsonga in the different grades:

i. For grade 2, 30 wcpm
ii. For grade 3, 40 wcpm
iii. For grade 4, 50 wcpm for both narrative and informative text
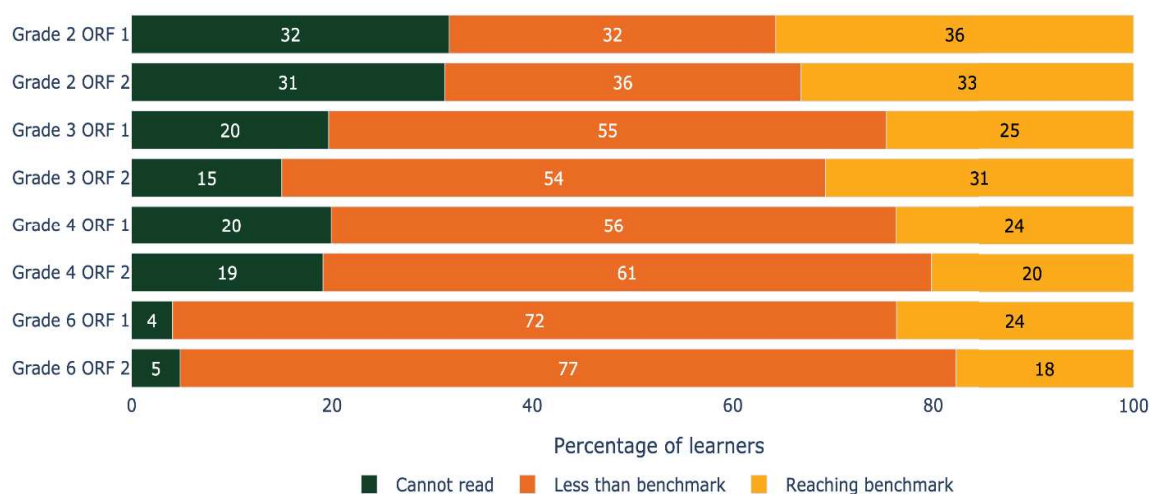iv. For grade 6, 85 wcpm for narrative text and 70 wcpm for informative text

Figure 17. Early grade fluency profiles

- For Grade 2, about one third (32% and 31%) of learners were unable to read a single word correctly (non-readers). An additional 32% and 36% of learners read slower than the benchmark of 30 wcpm. Thirty six percent (36%) of Grade 2 learners meet the benchmark of 30 wcpm.

- For Grade 3, about 15–20% of learners are unable to read. Fifty four percent (54%) to 55% of learners read slower than the benchmark of 40 wcpm while 25%–31% meet the benchmark.

- For Grade 4, the percentage of non-readers is at 19%–20%, while 56%–61% of learners read slower than the benchmark of 50 wcpm. Twenty percent (20%) to 24% of learners meet the benchmark.

- For Grade 6 ORF 1 (narrative text), there are very few non-readers (4%), and 24% of the learners reach the benchmark of 85 wcpm.

- For Grade 6 ORF 2 (informative text), there are very few non-readers (4%), and 18% of the learners reach the benchmark of 70 wcpm.

6.10. Written and Listening Comprehension

Written and listening comprehension assessment performance by grade is show in Figure 18 below. Grade 2 learners participated in the listening comprehension task while Grades 3, 4 and 6 did a written comprehension assessment.

The listening comprehension assessment comprised seven (7) questions. Only 2% of Grade 2 learners scored zero in the listening comprehension. Sixty four percent (64%) of Grade 2 learners obtained a score of 4 out of 7 (57%) or more.

The written assessments contained six (6), eight (8), and 10 questions for Grades 3, 4, and 6, respectively. Fifty percent (50%) of Grade 3 learners scored zero in the written comprehension. The percentage of learners scoring zero in the written comprehension decreased to 25% in Grade 4 and 6% in Grade 6. For Grade 3, 25% of the learners obtained a score of 3 out of 6 (50%) or more. For Grade 4, 37% of the learners obtained a score of 4 out of 8 (50%) or more. For Grade 6, 42% of the learners obtained a score of 5 out of 10 (50%) or more. For all three grades, a large proportion of learners failed to get at least a 50% score in the written assessment.
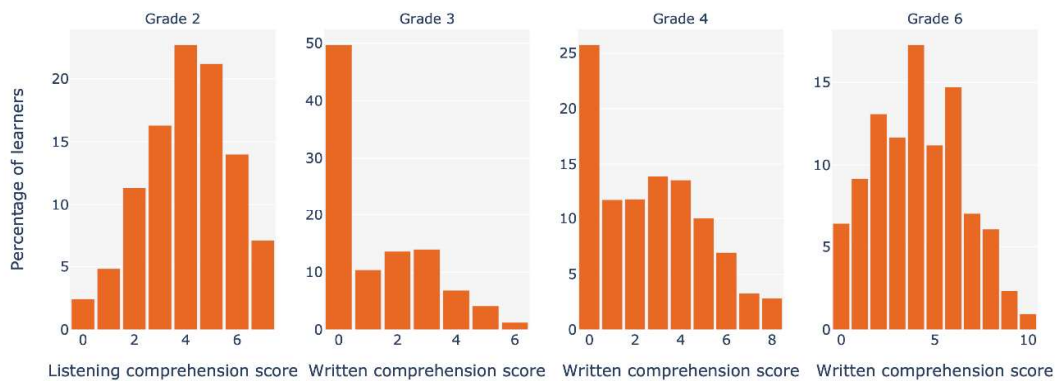

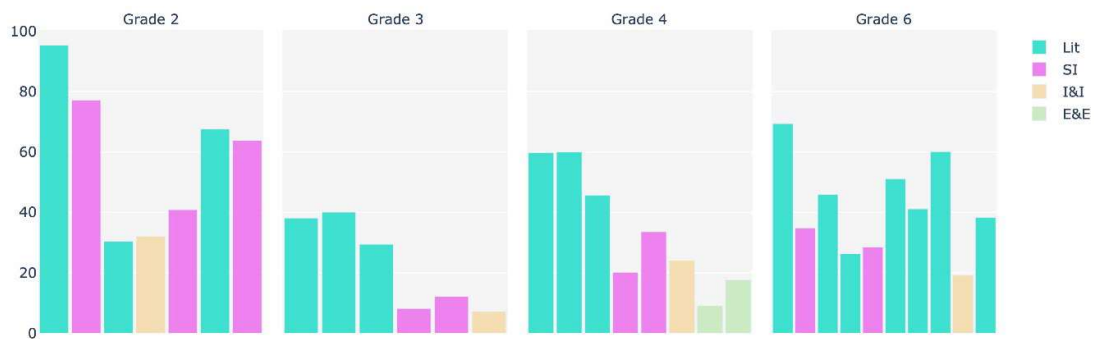*Figure 18. Written comprehension performance by grade*

*Figure 19. percentage of learners answering each question correctly*

Figure 19 shows how learners perform on individual written and listening assessment questions classified as per PIRLS. The bar colours indicate the types of comprehension processes engaged in the questions: turquoise: *Literal* (Lit), violet: *Straightforward Inference* (SI), brown: *Interpret and Integrate ideas* (I&I), and light green: *Examine and Evaluate* (E&E). There was no clear hierarchy of process in terms of difficulty of questions. For Grades 2 and 6 there was considerable variation in difficulty (as indicated by the height of the bars) within literal comprehension questions. However, this variation was subtle for Grades 3 and 4.

6.11. Concurrent Validity: Written comprehension

We investigate the validity of the fluency threshold in predicting learners' written comprehension skills. *Figure 20. Oral reading fluency distribution by written comprehension score – Grade 3 ORF 1* shows the concurrent relationship between Xitsonga fluency (y-axis) and written comprehension scores (x-axis) for Grades 3, 4 and 6. The dashed grey lines represent the proposed benchmarks for each grade (Grade 2: 30 wcpm; Grade 3: 40 wcpm; Grade 4: 50 wcpm; Grade 6 narrative text: 85 wcpm and Grade 6 informative text: 70 wcpm). Figure 20 and Figure 21 show the concurrent relationship between Xitsonga fluency (y-axis) and written comprehension scores (x-axis) in Grade 3. Both figures show a similar pattern. Learners who correctly answered all the comprehension questions in Grade 3 were reading below the benchmark of 40 wcpm.

In Grade 4, learners who obtain more than half of the written comprehension questions correctly, tend to read above the threshold of 50 wcpm (Figure 22 and Figure 23)

In grade 6, the bulk of learners who score 8 or more questions correct in the written comprehension are reading narrative text fluently at or above the threshold of 85 wcpm (Figure 23). Similarly, Figure 25 shows that grade learners scoring 8 or more questions correct in the written comprehension read informative text fluently at or above the benchmark of 70 wcpm.
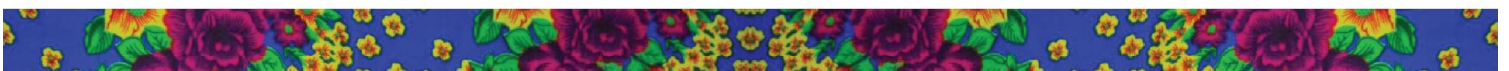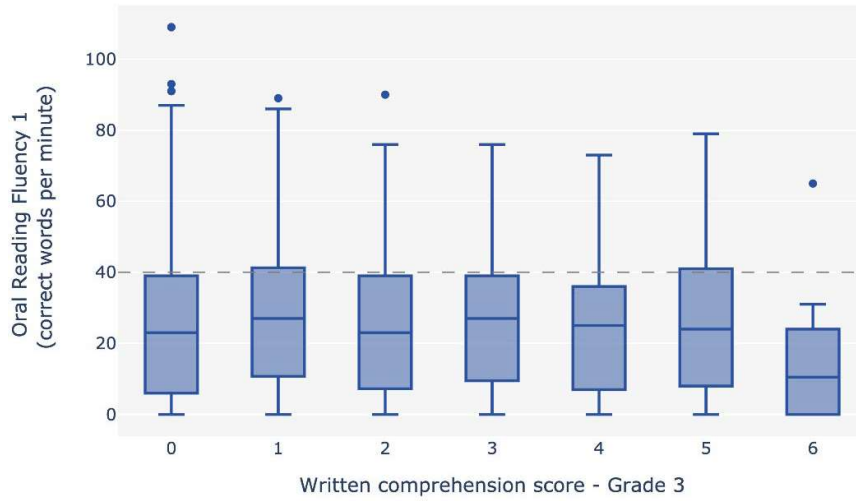
Figure 20. Oral reading fluency distribution by written comprehension score – Grade 3 ORF 1

Figure 21. Oral reading fluency distribution by written comprehension score – Grade 3 ORF 2

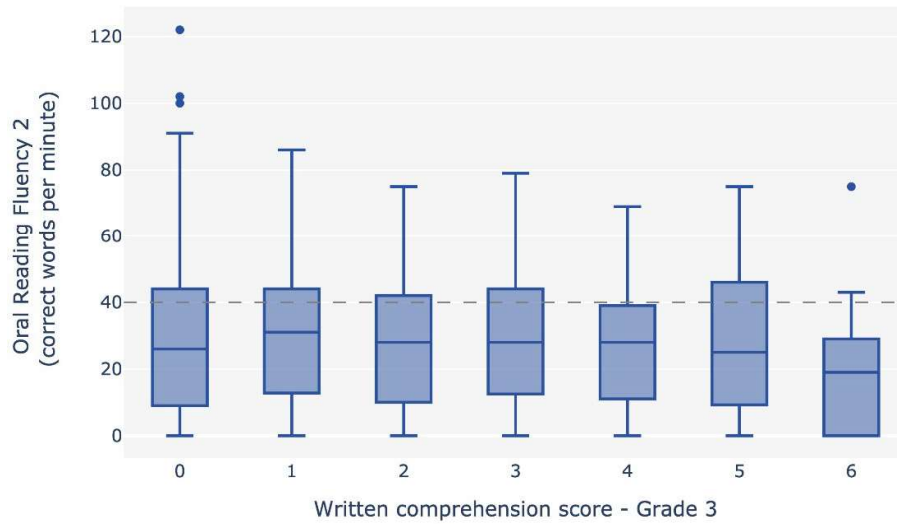*Figure 22. Oral reading fluency distribution by written comprehension score – Grade 4 ORF1*

Figure 23. Oral reading fluency distribution by written comprehension score – Grade 4 ORF2

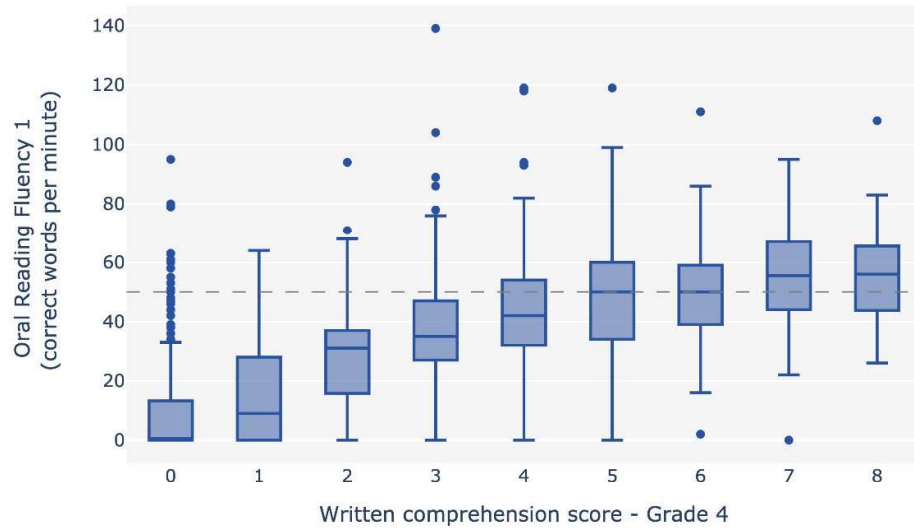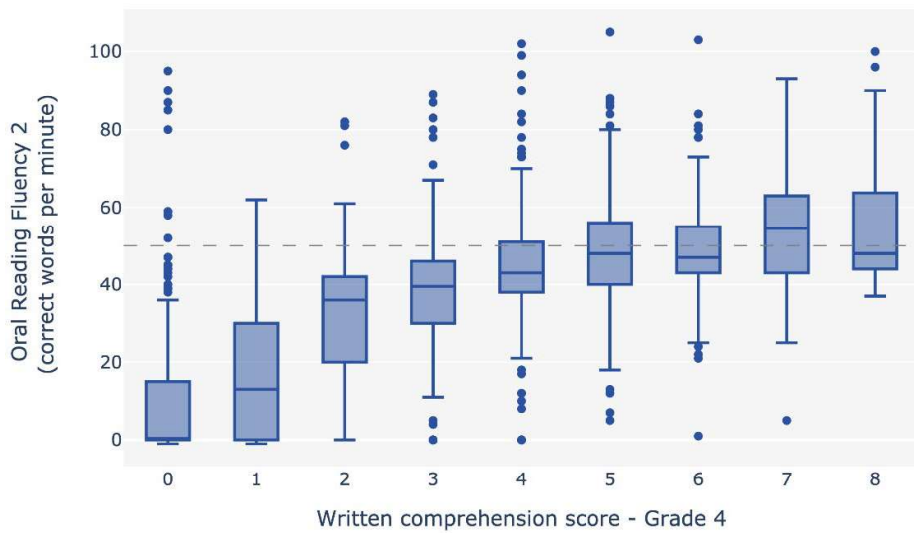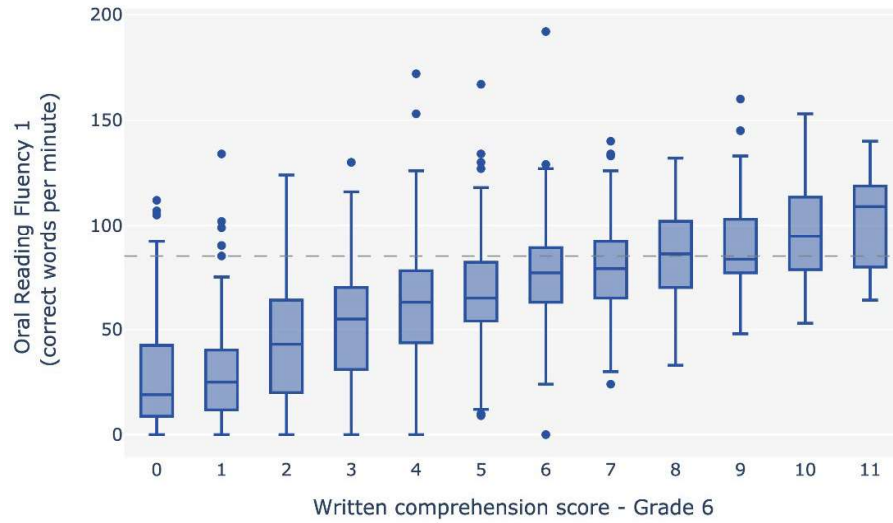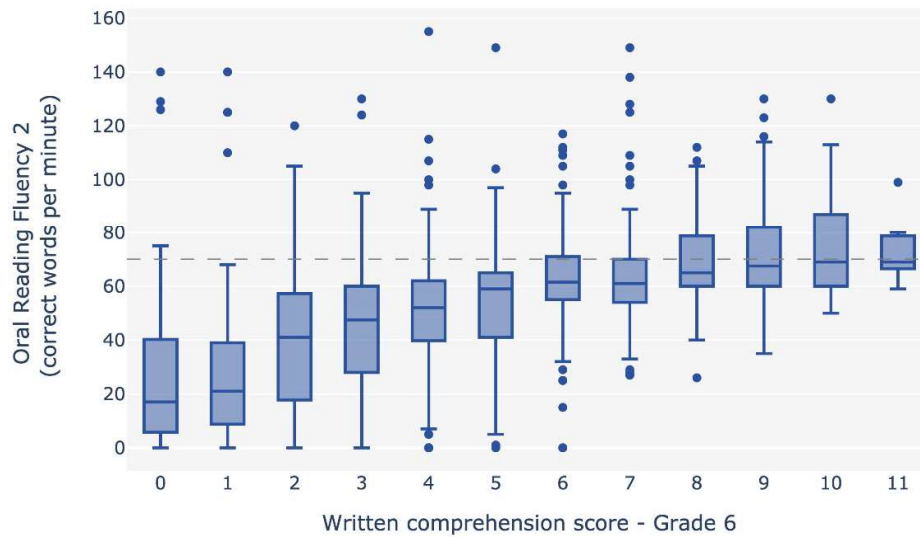*Figure 24. Oral reading fluency distribution by written comprehension score – Grade 6 ORF1*

Figure 25. Oral reading fluency distribution by written comprehension score – Grade 6 ORF2
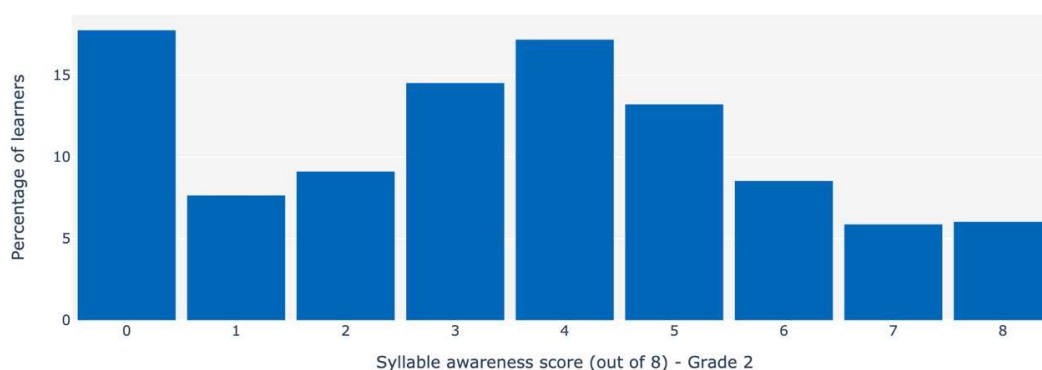
6.12. Syllable Reading

Figure 26. Syllable awareness score

Table 26. Syllable awareness score in relation to proposed benchmarks

Grade	Task	Threshold Categories	Sample size	Median syllable awareness score (out of 8)
Grade 2	ORF 1	Cannot read	608	2 (IQR, 0–4)
		Less than benchmark	625	4 (IQR, 2–5)
		Reaching benchmark	685	4 (IQR, 3–6)
	ORF 2	Cannot read	599	2 (IQR, 0–4)
		Less than benchmark	682	4 (IQR, 2–5)
		Reaching benchmark	637	5 (IQR, 3–7)

Figure 26 shows that 18% of Grade 2 learners could not sound a single syllable correctly. About 50% of Grade 2 learners were able to sound 4 or more syllables correctly. Relating the syllable reading performance of learners with the proposed benchmark shows that for learners who cannot read, the median score is 2 (out of 8) while for learners reaching benchmark, the median score is 4–5 (out of 8).

Table 227. Syllable reading speed

	Number of syllables	Sample size	Median syllables attempted in 1 minute	Median correct syllables per minute
Grade 2	20	1917	27 (IQR, 17–43)	18 (IQR, 4–39)
Grade 3	20	1717	27 (IQR, 18–39)	19 (IQR, 5–35)
Grade 4	20	1736	27 (IQR, 16–39)	21 (IQR, 5–35)

For all the grades, the median number of syllables attempted in one minute was 27 although there were small differences in the variation in the grades. The median number of correctly read syllables in per minute were 18, 19 and 20 for Grades 2, 3 and 4 respectively (Table 27).

Table 28. Syllable reading speed in relation to proposed benchmarks

Grade	Task	Threshold Categories	Sample size	Median syllables attempted in 1 minute	Median correct syllables per minute
Grade 2	ORF 1	Cannot read	607	17 (IQR, 12–23)	1 (IQR, 0–6)
		Less than benchmark	625	23 (IQR, 17–31)	15 (IQR, 10–25)
		Reaching benchmark	684	48 (IQR, 38–60)	44 (IQR, 35–57)
	ORF 2	Cannot read	598	17 (IQR, 12–23)	1 (IQR, 0–6)
		Less than benchmark	682	24 (IQR, 17–32)	17 (IQR, 10–27)
		Reaching benchmark	636	48 (IQR, 39–60)	46 (IQR, 36–57)
Grade 3	ORF 1	Cannot read	337	15 (IQR, 11–23)	0 (IQR, 0–3)
		Less than benchmark	957	25 (IQR, 18–34)	17 (IQR, 9–28)
		Reaching benchmark	423	44 (IQR, 36–55)	41 (IQR, 33–52)
	ORF 2	Cannot read	251	14 (IQR, 10–23)	0 (IQR, 0–3)
		Less than benchmark	913	24 (IQR, 18–32)	15 (IQR, 7–25)
		Reaching benchmark	516	41 (IQR, 34–52)	40 (IQR, 31–50)
Grade 4	ORF 1	Cannot read	345	14 (IQR, 10–20)	1 (IQR, 0–4)
		Less than benchmark	976	26 (IQR, 18–34)	20 (IQR, 11–29)
		Reaching benchmark	411	43 (IQR, 35–52)	40 (IQR, 32–50)
	ORF 2	Cannot read	331	14 (IQR, 10–20)	1 (IQR, 0–4)
		Less than benchmark	1052	27 (IQR, 18–36)	21 (IQR, 11–31)
		Reaching benchmark	350	43 (IQR, 34–52)	40 (IQR, 31–50)

Relating the syllable reading speeds of learners with the proposed benchmark shows that across all grades and tasks, non readers struggle to correctly sound syllables within a minute. The median number of correctly read syllables per minute among non readers was 1, 0 and 1 for Grades 2, 3 and 4 respectively. Among learners reading below the proposed benchmarks, the syllable reading speed was 15–17 for Grades 2 and 3, and 20–21 for Grade 4. For learners meeting the benchmarks, the median number of correctly sounded syllables per minute was at least 40 for all grades.

6.13. Complex Consonants

Table 28 shows that for Grades 2, 3 and 4, the median number of consonants attempted in a minute range between 27-31. However, the median number of correct consonants sounded in a minute only ranges from 11-19. For all the grades, there is high variability in the number of correct consonants sounded.

|	Number of complex consonants	Sample size	Median consonants attempted in 1 minute	Median correct consonants per minute
Grade 2	30	1915	27 (IQR, 18–36)	11 (IQR, 0–26)
Grade 3	30	1718	31 (IQR, 21–41)	19 (IQR, 0–33)
Grade 4	30	1733	30 (IQR, 20–40)	18 (IQR, 0–32)

Table 28. Complex consonants reading speed

Relating the complex consonants performance of learners with the proposed benchmark shows that across all grades and tasks, non readers were unable to correctly sound a complex consonant within a minute. On the other hand, learners reaching the proposed benchmarks for each grade were correctly sounding complex consonants at a speed significantly higher than the non reader counterparts. In particular, for grade 2 learners reaching the proposed benchmark, they correctly sounded 29 complex consonants in a minute. For grade 3 learners reaching the proposed benchmark, they correctly sounded 37–38 complex consonants in a minute. Lastly, for grade 4 learners reaching the proposed benchmark, they correctly sounded 35–36 complex consonants in a minute.

Table 29. Complex consonants reading speed in relation to proposed benchmarks

Grade	Task	Threshold Categories	Sample size	Median number of consonants attempted in 1 minute	Median number of correctly consonants sounded in 1 minute
Grade 2	ORF 1	Cannot read	606	19 (IQR, 14–28)	0 (IQR, 0–0)
		Less than benchmark	624	23 (IQR, 17–29)	9 (IQR, 0–17)
		Reaching benchmark	684	35 (IQR, 29–44)	29 (IQR, 22–38)
	ORF 2	Cannot read	597	20 (IQR, 14–30)	0 (IQR, 0–0)
		Less than benchmark	681	23 (IQR, 17–29)	10 (IQR, 0–18)
		Reaching benchmark	636	35 (IQR, 30–44)	29 (IQR, 22–38)
Grade 3	ORF 1	Cannot read	337	19 (IQR, 12–27)	0 (IQR, 0–0)
		Less than benchmark	955	29 (IQR, 21–37)	18 (IQR, 5–28)
		Reaching benchmark	424	44 (IQR, 37–51)	38 (IQR, 31–48)
	ORF 2	Cannot read	251	18 (IQR, 12–27)	0 (IQR, 0–0)
		Less than benchmark	911	27 (IQR, 20–35)	16 (IQR, 2–27)
		Reaching benchmark	517	43 (IQR, 35–51)	37 (IQR, 29–47)
Grade 4	ORF 1	Cannot read	343	17 (IQR, 12–27)	0 (IQR, 0–1)
		Less than benchmark	976	29 (IQR, 21–36)	18 (IQR, 4–28)
		Reaching benchmark	410	42 (IQR, 35–50)	36 (IQR, 27–46)
	ORF 2	Cannot read	329	17 (IQR, 12–25)	0 (IQR, 0–2)
		Less than benchmark	1052	29 (IQR, 21–38)	19 (IQR, 4–29)
		Reaching benchmark	349	42 (IQR, 35–50)	35 (IQR, 26–45)

6.14. Summary of reading thresholds and benchmarks

In concluding this section, we establish the following thresholds and benchmarks for early grade reading sub-skills in Xitsonga:
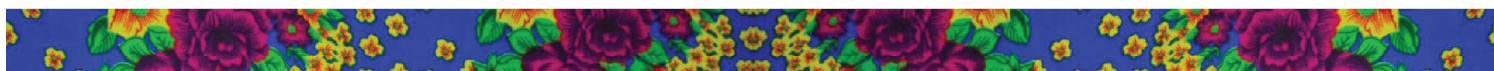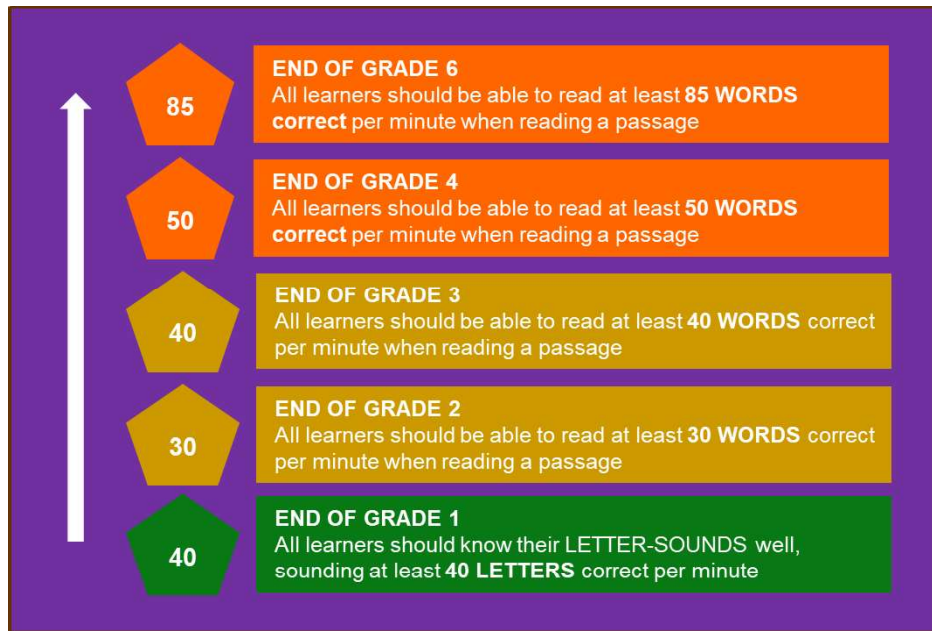
Figure 27. Summary of Xitsonga reading benchmarks

- By the end of Grade 1, all learners should be able to correctly sound 40 letters per minute.

- By the end of Grade 2, all learners should be meeting the fluency threshold, correctly reading from a passage at least 30 words per minute.

- By the end of Grade 3, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 40 words per minute.

- By the end of Grade 4, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 50 words per minute.

- By the end of Grade 6, all learners should be meeting the fluency benchmark, correctly reading from a passage at least 85 words per minute.

These benchmarks complement recent efforts to provide greater specificity in the teaching of African languages in South Africa (DBE, 2020b).

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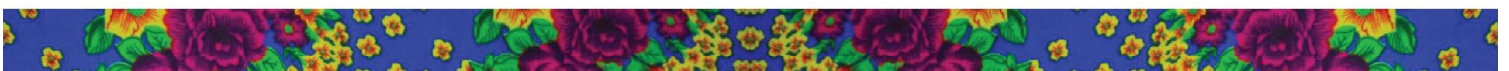
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