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BENCHMARKING EARLY GRADE READING SKILLS IN SOUTH AFRICA: SETSWANA

Summary Report

Photo: Teaching early grade literacy, Mogokonyane Primary School, North West Province, South Africa

Photo credit: Khulisa Management Services

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ACRONYMS

cwpm	correct words per minute
clspm	correct letter sounds per minute
CAPS	Curriculum and Assessment Policy Statement
DIBELS	Dynamic Indicators of Basic Early Literacy Skills
DBE	Department of Basic Education
EC	Eastern Cape
EFAL	English First Additional Language
EGRA	Early Grade Reading Assessment
EGRS	Early Grade Reading Study
ESL	English Second Language
HL	home language
LFL	Leadership for Literacy
LOLT	language of learning and teaching
FW	Funda Wande
KZN	KwaZulu-Natal
LP	Limpopo Province
LSK	letter sound knowledge
MP	Mpumalanga Province
NW	North West
ODH	orthographic depth hypothesis
ORF	oral reading fluency
RC	reading comprehension
PGST	psycholinguistic grain size theory
PIRLS	Progress in International Reading and Literacy Study
RSP	Reading Support Project
SPS	Story Powered Schools
SVR	simple view of reading

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PREAMBLE

This report, produced by Khulisa Management Services (Pty) Ltd. (Khulisa), is submitted under the Data Collection and Analysis for the Early Grade Reading Study (EGRS), the Reading Support Project (RSP) and Language Benchmarking to the United States Agency for International Development (USAID) under PERFORMANCE Indefinite Delivery Indefinite Quantity (IDIQ) Contract Number: 72067418D00001, Order Number: 72067421F00001.

This report derives from the 2021 data collection and analysis for the EGRS I (wave 5 data), the RSP Impact Evaluations and the Language Benchmarking study in two districts in North West Province, South Africa.

A number of reports have been published under this task order and are useful as background.

- Methodology Plan and Study Protocol: Data Collection and Analysis for the EGRS, RSP and Benchmarking. https://pdf.usaid.gov/pdf_docs/42132810ec2c48809efe8ca11e155aff.pdf
- For the full instrument development process refer to the "Report on the Development of Learner Assessment Tools and Contextual Tools"
- The Quality Assurance Surveillance Protocol (QASP). The QASP documents the quality assurance elements of both data collection and analysis. https://pdf.usaid.gov/pdf_docs/PA00Z8SX.pdf
- Task Order 4 Data Collection and Analysis EGRS, RSP, Benchmark and COVID-19: Fieldwork Report https://pdf.usaid.gov/pdf_docs/e4563ed819164a79956698c3a1998964.pdf

As part of this task order, Khulisa conducted additional research on COVID-19 in the schools and two reports were provided. The Preliminary COVID-19 Report submitted in 2021 enabled the DBE to consider the policy implications to prepare for the 2022 school year. https://pdf.usaid.gov/pdf_docs/PA00XGST.pdf. Thereafter, the Consolidated Final COVID-19 Report was submitted in 2022 https://pdf.usaid.gov/pdf_docs/PA00ZBHD.pdf.

The EGRS I Impact Evaluation report and further reports on the EGRS are available on the Department of Basic Education website https://www.education.gov.za/Programmes/EarlyGradeReadingStudy.aspx.

Data was analysed to recommend Setswana Home Language (HL) reading benchmarks and English First Additional Language (EFAL) reading benchmarks. The complete technical reports for EFAL and Setswana HL, as well as Summary Reports and Learning Briefs are available on the USAID Development Experience Clearinghouse and the Department of Basic Education Research Repository https://www.education.gov.za/ResearchRepository.aspx.

The methodology for Setting Reading Benchmarks In South Africa is outlined in this report https://pdf.usaid.gov/pdf_docs/PA00X1NZ.pdf.

The data used for this work was based on studies funded by the Department of Basic Education, the Department of Planning, Monitoring and Evaluation, the North West Provincial Department of Education, the Initiative for Impact Evaluation, Zenex Foundation, UNICEF, USAID, and Anglo American Chairman's Fund

INTRODUCTION

This report outlines minimum standards for reading in Setswana in the Foundation Phase grades summarising key findings pertaining to Setswana from the technical report "Benchmarking early grade reading skills: Setswana and English First Additional Language". The reading standards established here reflect minimum reading levels to be met by all home language Setswana learners at the ends of Grades 1 to 3. They provide a guide for teachers, officials, and parents to track and assess learners' reading development in Setswana in the early school years. Specifically, we identify the following reading standards:

- **A grade 1 minimum letter-sound benchmark of 40 correct letter-sounds per minute (clspm).** This identifies whether learners are developing sufficient alphabetic knowledge that underpins decoding skills necessary for accuracy in reading.

- **A Grade 2 minimum Oral Reading Fluency (ORF) benchmark of 40 correct words per minute (cwpm).** This signals an emergent level of fluency which supports reading accuracy but which is not yet sufficient to support reading with understanding. This Grade 2 minimum ORF benchmark is identified by finding a 'threshold' that supports progress towards reaching a Grade 3 benchmark. Reading at or above 40 cwpm supports improved reading development in current and later grades. But, reading below 40 cwpm impedes reading development. Learners who, not having yet reached this 'threshold', are seriously at risk of reading failure.

- **A Grade 3 minimum ORF benchmark of 60 cwpm.** This identifies a fluency level that is necessary (but not sufficient) for learners to comprehend what they are reading and articulates to teachers a point at which they should concentrate on further developing comprehension skills.

This summary report provides context behind why these benchmarks are important, how they support system improvements in education and then outlines the process by which these standards have been established. We briefly summarise the theoretical processes underpinning reading development and acknowledge the language specific features of Setswana that inform learning to read in this language. The report then takes the reader through a two-stage empirical process to establish the grade-specific minimum benchmarks using contextually relevant reading assessment data.

WHY IS ASSESSING AND DEVELOPING DECODING AND FLUENCY IN HOME LANGUAGE IMPORTANT?

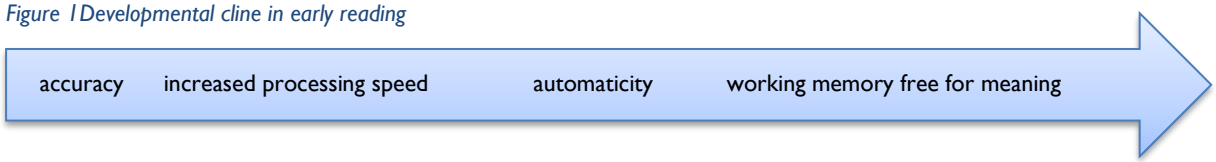
Reiterating the importance of learning to read to be able to learn, South African president Cyril Ramaphosa articulated a clear goal for basic education: every child should be able to read for meaning by age 10, which roughly aligns with the end of the Foundation Phase (South African Government, 2019). This important yet aspirational goal is, however, set against a sobering reality. The 2016 round of the Progress in International Reading Literacy Study (PIRLS) found that 78% of South African Grade 4 learners could not reach the low international PIRLS benchmark – a signal for being able to read for meaning. This compares to 4% among Grade 4 learners internationally. When broken down into language groups, almost 90% of Grade 4 Setswana learners could not read for meaning (Howie et al. 2017).

To read with understanding in African languages or English, various foundational reading subskills need to be mastered before children can, when reading on their own, comprehend (or understand) what is in a text. For example, knowledge is required of the written 'code' of the language in which learners are reading, which we refer to as decoding skills. Decoding skills can include knowledge of

letter-sounds or reading isolated words. Decoding culminates in being able to read connected words from a text or passage with high levels of accuracy and sufficient speed. Fluency in turn can support the development of both lower and higher order comprehension skills, because as accuracy and speed increase, this leads to automaticity in processing. This frees up working memory and attention for meaning construction. The arrow in Figure 1 depicts the direction of this developmental trajectory.[1]

To identify if learners are developing decoding skills, they need to be assessed one-on-one, with

Figure 1 Developmental cline in early reading



suitable reading assessments. If not, decoding problems can go unnoticed, with undeveloped decoding skills showing up only later in very poor written reading comprehension such as PIRLS. The poor identification of decoding skills is further perpetuated through a lack of agreed standards as to what constitutes an on-track reading development trajectory across different African or home languages or among learners having to acquire second language reading proficiencies.

WHAT ARE READING BENCHMARKS?

Reading benchmarks provide standards against which teachers can measure learners' decoding skills. Benchmarks are numerical measures of proficiency in reading subskills which can be used to monitor whether children are on track to be able to read fluently and with understanding. Benchmarks can also be used for the early identification of learners who are at risk of not learning to read for meaning by age 10, highlighting where effective remediation should take place (Jukes et al. 2020)

Box 1 Why are language specific benchmarks needed?

Benchmarks for reading exist in many other languages and countries, with well-defined oral fluency norms and benchmarks for early grade reading in English home language (Hasbrouck & Tindal, 2006, 2017). Due to differences in the phonological, morphological, and orthographical features of African languages, one cannot simply apply English reading benchmarks to other languages. Furthermore, across African language groups, one cannot apply the benchmarks from one language group such as Nguni languages to others such as Seotho languages. At the most basic level, it makes no sense to impose the same fluency standards across languages with vastly different word lengths (Spaull et al., 2020). Beyond that, one needs to allow for language specific accuracy-speed and fluency-comprehension relationships that reflect reading development. Despite advances in establishing benchmarks in Nguni languages, until now, detailed work on the development of reading benchmarks in Sesotho-Setswana languages has not been done.

Source: Adapted from Jukes et al, 2020, Setting Reading Benchmarks in South Africa (https://pdf.usaid.gov/pdf_docs/PA00X1NZ.pdf)

In recent years, the Department of Basic Education and various stakeholders have been working to establish benchmarks in African home language reading subskills with benchmarks published for Nguni languages (Ardington et al., 2020, 2021), and Sesotho-Setswana language benchmarks to

[1] The points or thresholds at which accuracy or increased alphabetic knowledge lead to automaticity in word reading (in or out of context), thereby enabling reading comprehension, may differ across languages depending on their linguistic and orthographic features.

follow. In processes to establish reading benchmarks, it is not only important that language specific benchmarks are set (as discussed in Box 1), but it is also important to decide which reading subskills should be benchmarked. Developing skills in all subcomponents of reading are important, but too many benchmarks can be confusing and hard to track. This report focuses on just two: letter-sound knowledge as a basic skill which refers to alphabetic knowledge of the written code; and oral reading fluency (ORF), referring to the ability to read words in context with speed and accuracy.

Box 2 What is oral reading fluency?

Oral reading fluency (ORF) refers to the ability to read words in context with speed and accuracy.

- Accuracy refers to the percentage of words attempted that are read correctly from a given text;
- Speed reflects the number of words that are attempted from a given text in a time period.

When considered together as fluency, this is measured as the number of correct words per minute (abbreviated as 'cwpm') read from a passage of text. Fluency can be assessed by teachers and officials using Early Grade Reading Assessments.

It is noted that fluency can also incorporate reading with prosody which reflects how natural reading sounds (how it conforms to speech rhythms and intonation patterns and reflects punctuation conventions). It is very important for teachers to be aware of whether learner's read with prosody, but measuring prosody requires subjective judgements, and this can be difficult to apply in large-scale in-field studies.

READING IN SETSWANA

LINGUISTIC AND ORTHOGRAPHIC FEATURES OF SETSWANA

Setswana is one of the 11 official languages in South Africa. It is mostly spoken in the north-western parts of South Africa, where the country borders Botswana.[2] Setswana belongs to the family of Sesotho languages and is closely related to Sepedi or otherwise known as Northern Sotho[3], and Sesotho or otherwise known as Southern Sotho[4]. The Census 2011 indicates that 2,826,464 people speak Setswana as their first language in the North West Province,[5] and 9.4% of the South African population speak Setswana outside of households (2018).[6] As an indication of the extent to which Setswana is spoken as a home language in South African schools at the Grade 4 level, about 7% of learners were tested in Setswana in the 2016 PIRLS assessment (Howie et al., 2017).

As seen in **Error! Reference source not found.**, Setswana's vowel system is relatively small and straightforward (with just 7 vowels) compared to the more complex system of about 20 different

[2] Setswana is also Botswana's national language where as many as 70% of Botswana's population speak it although there are variations across countries in how it is spoken. In addition, there are small groups speaking variations of Setswana in Namibia and Zimbabwe.
[3] Spoken widely in Limpopo Province.
[4] Spoken in Free State Province and Lesotho.
[5] Census in Brief updates 28 Oct 2012, https://www.statssa.gov.za/census/census_2011/census_products/Census_2011_Census_in_brief.pdf
[6] https://www.statista.com/statistics/1114302/distribution-of-languages-spoken-inside-and-outside-of-households-in-south-africa/

vowels in English.[7] In Setswana, the circumflex sign/diacritic mark is be used to differentiate the ê from e and ô from o.[8]

Table 1 Vowel set and combination vowel set in Setswana

Vowels in Setswana		Example	
		Setswana	English
a	as in	rata	like, want, love
e	as in	lema	plough
ê	as in	rêma	chop
i	as in	dira	do
o	as in	motho	person/human-being
ô	as in	tôrô	dream
u	as in	khudu	tortoise

Combination Vowel	Example	
	Setswana	English translation
ae	mae	eggs
ao	maoto	feet
êi	êiye	onion
ia	diatla	hands
oa	boatla	careless
oê	Mokoêna	A common surname

Because African languages have largely transparent orthographies, this should, in principle, confer an advantage on learning to read in African languages. However, this advantage might be offset by the more complex consonant sounds that occur in African languages. Despite the smaller vowel set, overall Setswana and other Sesotho languages have a larger code set than English, comprising a large number of simple and more complex consonants. The complex consonants consist of two, three (or even four consonants) and need to be pronounced as a blended sound (as in ngw and tshw) (see Appendix Table A 1 and **Error! Reference source not found.** for a list of single and complex consonants in Setswana). As with Nguni languages, knowledge of these consonant sequences is a key foundational reading skill that should be mastered in the early grades (Katz, 2020). However, we find that there is poor knowledge of complex consonant sequences among South African Setswana home language learners, and they also struggle with 'diacritics'. We highlight a key finding from the technical report:

- Learners find reading single letter-sounds much easier than reading complex consonant clusters and diacritics (see **Error! Reference source not found.**). By term 3, a large

[7] By comparison Nguni languages typically have 5 vowels (Katz, 2020). Setswana also has the following semi-vowels: w as in wena (you), bolawa (be killed); y as in yo (this one referring to personal class only) and y as in ya (to go). Setswana unlike English, does not have diphthongs, but has a combination of some basic vowels and consonants.
[8] The following are examples of words to be distinguished by using diacritics (Department of Education and Training, 1988:6): pholo (ox) vs phôlô (health) or pholô (harvest); lema (plough) vs. lêma (spoil a child or shape horns)

sample of North West Province learners in Grade 3 and 4 correctly sound less than half as many complex consonant clusters / diacritics as they do single letter sounds. Of the sample of Grade 4s in 2021 (who are probably performing at a Grade 3 pre-pandemic level), 15% cannot correctly sound one complex consonant cluster or diacritic, despite this being a fundamental decoding skill in Setswana.

In contrast to Nguni languages, all the Sesotho-Setswana languages are written disjunctively. By example, the phrase *O ka tsamaya* (You may go) in Setswana would be written conjunctively in isiZulu as *Ungahamba*. For this reason, we expect that benchmarks for early grade reading in Setswana will exceed those established for Nguni languages (Ardington et al., 2020, 2021).[9]

Having considered some of the key features[10] of Setswana, we now explain the approach we use to set reading benchmarks in this language.

Table 2 Letter-sound knowledge vs. knowledge of complex consonants and diacritics, EGRS I and RSP 2021

	Single letter-sounds		Complex consonants and diacritics	
	% scoring zero	correct letter-sounds per minute (clspm)	% scoring zero	correct items per minute
Grade 3, term 3 of 2021	4	45.6	19	19.0
Grade 4, term 3 of 2021	2	45.9	15	22

HOW DID WE SET READING BENCHMARKS FOR THE SOUTH AFRICAN CONTEXT?

Reading benchmarks are not determined in an arbitrary manner. Scientific literature on reading across language groups should inform benchmarks. They should be based on strong empirical work and should be sensitive to current realities of learning and curriculum requirements. Through exploratory analysis of large-scale reading data, grounded in theory of how reading develops in alphabetic writing systems for home language and second language readers, combined with expert consultation, we have developed minimum grade-specific reading benchmarks in Setswana.

DATA

We compiled the largest existing source of data on Setswana reading skills. Drawing the first Early Grade Reading Study (EGRS I) and Reading Support Project (RSP) in North West province schools, assessment data is available for 16,300 learners from Grades 1 to 7 from 230 schools. These data

[9] This is also implied in the work of Spaull et al. (2020) that suggest tentative benchmarks in Sepedi (a Sesotho language) that are higher by more than double the number of correct words per minute compared with isiZulu benchmarks. They find that isiZulu learners reading at 21 cwpm or faster read with 95% accuracy or higher. In contrast, 95% accuracy is associated with reading at 51 cwpm or faster in Sepedi (Northern Sotho).

[10] Although the disjunctive orthography of the Sesotho languages yields many single syllable V or CV morphemic word units (e.g., in Sepedi - *a, o, ka, ke, sa, se, ga, go)* there are also longer multisyllabic words (e.g., in Sepedi - *botlhabatsatsi, ditlhatlhagangwa)* and many syllables within words that display strong visual similarity and are therefore more difficult for novice readers to tell apart (Land 2015; Pretorius 2018). These linguistic and orthographic features might delay mastery in decoding skills. This can be exacerbated if early reading instruction is not well taught; if children are left to their own devices to figure out the complex code; and if they are not given opportunities to read on a regular basis to practice their fledgling decoding skills. Another key feature of Setswana is that it is a tone (or otherwise known as tonal) language, which makes use of high (H) and low (L) tones. Tones can alter the meaning of a word or expression completely.

are exclusively drawn from no-fee schools[11], in a predominately Setswana speaking province, so that resulting benchmarks are relevant to home language Setswana speaking learners in typical school contexts in South Africa. New assessment data from these studies collected in 2021, are particularly suited to establishing Setswana benchmarks due to the extensive attention given to using appropriate Setswana reading passages to assess fluency, setting appropriate comprehension questions and written reading comprehension tasks. As discussed in the technical report, multiple rounds of piloting of assessments supported the collection of high-quality data relevant for benchmarking in 2021.

METHOD: A TWO-STAGE APPROACH

Traditional approaches to benchmarking reading subskills often focus on identifying a single point or benchmark where decoding skills are sufficiently established to support comprehension (Abadzi, 2012). However, drawing on a 'threshold hypothesis' by Wang et al. (2019), reaching fluency levels as defined by a benchmark may only be attainable once a minimum threshold of proficiency in fluency has developed (Paris & Hamilton, 2011). Achieving a 'threshold' does not guarantee further development but not achieving a 'threshold' will certainly inhibit it. This is different from a benchmark, which reflects a more developed level of skill. In a two-stage process to establish minimum grade-specific fluency benchmarks, we first use empirical methods and multiple grades of reading data to identify a 'threshold' and 'benchmark' in a reading skill that is non-grade specific (stage-one). The second stage involves aligning the overall 'threshold' and 'benchmark' to grade levels by examining how attainable they are and how they align with curriculum requirements.

In stage-one, the 'threshold' and 'benchmark' are identified by examining the relationship between accuracy and speed in reading, and thereafter the relationship between fluency and reading comprehension.

- Accuracy in recognising letters and words has been shown to develop first, and once accuracy is established, reading rates increase as children's mastery of reading increases (Fuchs et al., 2001; Spear-Swerling, 2006, Deno et al., 2001). However, the nature of these relationships has been understudied in South African languages. We examine the relationship between accuracy and speed and then fluency and comprehension in Setswana reading, acknowledging that accuracy should develop quite quickly in transparent orthographies (such as African languages) and in a first or home language (Katz & Frost, 1992).

- Due to the paucity of literature on linguistic features of African languages – and particularly accuracy-speed or fluency-comprehension relationships - we are sensitive not to impose assumptions about what these relationships look like in Setswana. Therefore, we rely on a non-parametric analysis of empirical regularities to identify critical points in these relationships. We also examine reading trajectories to confirm the validity of these chosen points. For example, using longitudinal data, we establish the predictive validity of a fluency 'threshold' for meeting a fluency 'benchmark' (and higher levels of comprehension) in later grades.

[11] No fee schools cannot charge school fees. These are schools in quintiles 1 to 3, the system DBE used to rate schools according to the income, unemployment and literacy levels in a community. The system is used to determine public funding to schools.

STAGE-ONE: IDENTIFYING A CRITICAL FLUENCY 'THRESHOLD' AND BENCHMARK IN SETSWANA EARLY GRADE READING

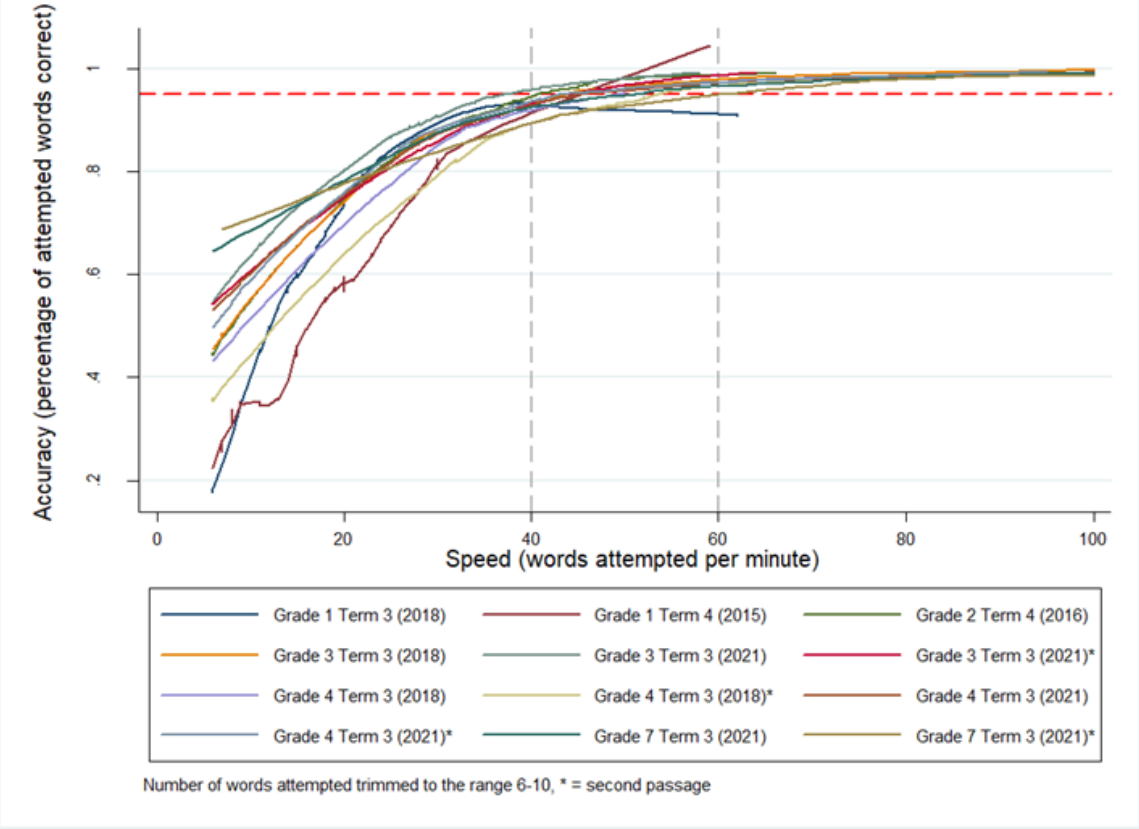
READING SPEED AND ACCURACY

Our exploratory analysis of empirical regularities across large-scale Setswana reading data reveals that across different grades and assessments, consistent patterns are identified in observing the relationships between speed (number of words from a passage attempted in a minute) and reading accuracy (the percentage of words from a passage read correctly out of those attempted). This is seen in Figure 2, which shows the relationship between reading speed and accuracy by grade and passage read.

As observed in Nguni language reading (Ardington et al., 2020, 2021), accuracy and speed initially increase rapidly together, but then this relationship flattens and levels off once learners achieve about 95% accuracy (i.e., learners read 95 of every 100 words attempted correctly). Specifically, below 40 words per minute, Setswana reading speeds are not only slow, but reading is highly inaccurate. Once learners start reading at speeds of around 40 words per minute, higher levels of accuracy (95% or more) are achieved.

As expected, when reading words in a connected text, the speed at which a flattening occurs in the accuracy-speed relationship is higher in Setswana than Nguni languages due to its disjunctive rather than conjunctive orthography.

Figure 2 Reading speed and accuracy (Setswana)



Source: EGRS I (waves 1-5), RSP (wave 1-2), own calculations. Note: The relationship between speed and accuracy is displayed using locally weighted polynomial regressions

We next investigate the distribution of reading speed among accurate readers and, by contrast, among inaccurate readers. This is depicted in box and whisker plots of the distribution of words attempted for the sub-sample of accurate readers (who read with at least 95% accuracy) shown in Figure 3 and inaccurate readers (who read at less than 95% accuracy) as shown in Figure 4. The lower and upper edge of the boxes represent the 25th and 75th percentile of the distribution respectively – i.e., 50% of each samples' learners have reading speeds in this band. The median is indicated by the horizontal line within the box. The figures include grey dashed reference lines at 40 and 60 words per minute.

Amongst accurate readers, learners in Grade 1 tend to read considerably slower than learners in higher grades which is consistent with a developmental cline. From the end of Grade 2, at the 25th percentile, reading speed tends to lie around or above 40 words attempted per minute. There are very few accurate readers who read slower than 40 words per minute. By contrast, in the analogous Figure 4, showing reading speeds for learners that do not achieve 95% accuracy, there are almost no readers in the Foundation Phase with poor accuracy who are managing to read at speeds over 40 words per minute. In fact, in the Intermediate Phase, by the end of Grade 4, inaccurate readers are almost all reading below 40 words per minute. By the end of primary schooling, there are very few inaccurate readers who are reading more than 60 words per minute.

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). In the evidence shown from this large Setswana data set, there are very few learners who read slowly but accurately and even fewer with poor accuracy but reasonable speed.

Figure 3 Speed distribution for learners reading with at least 95% accuracy in Setswana

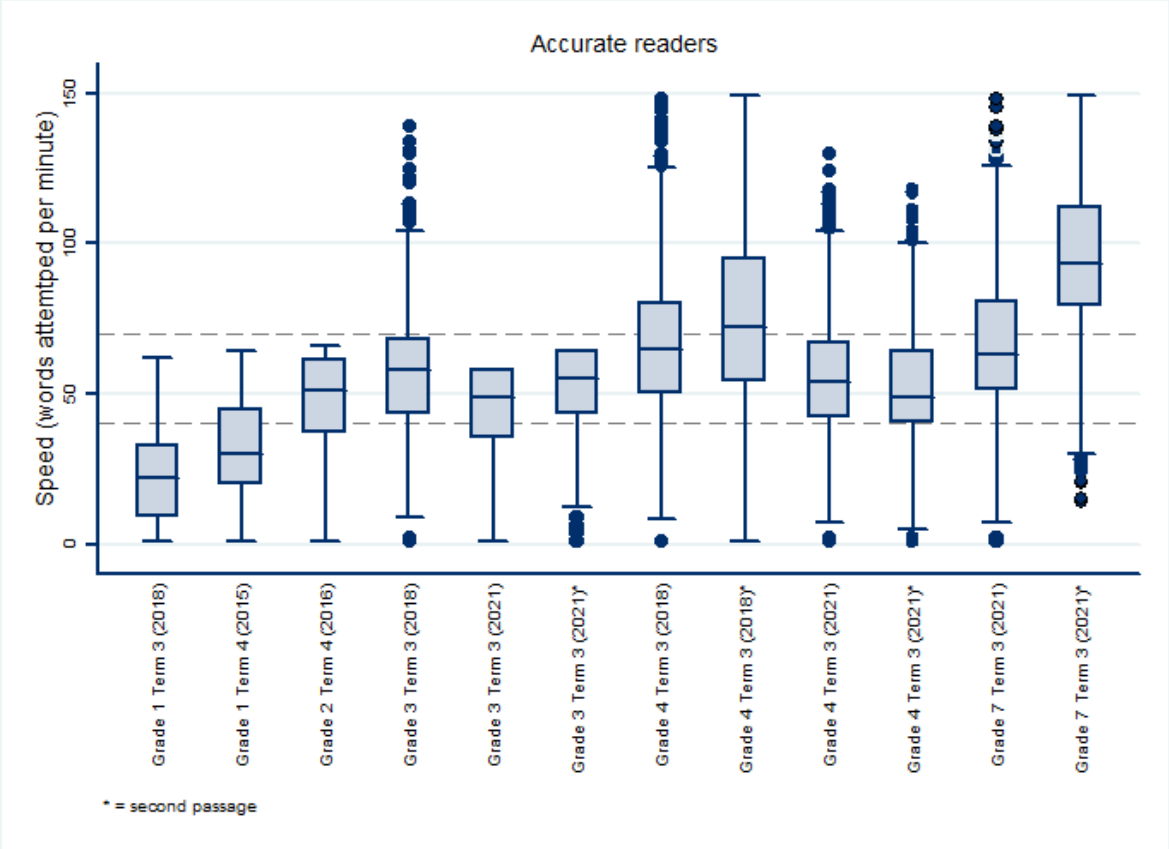
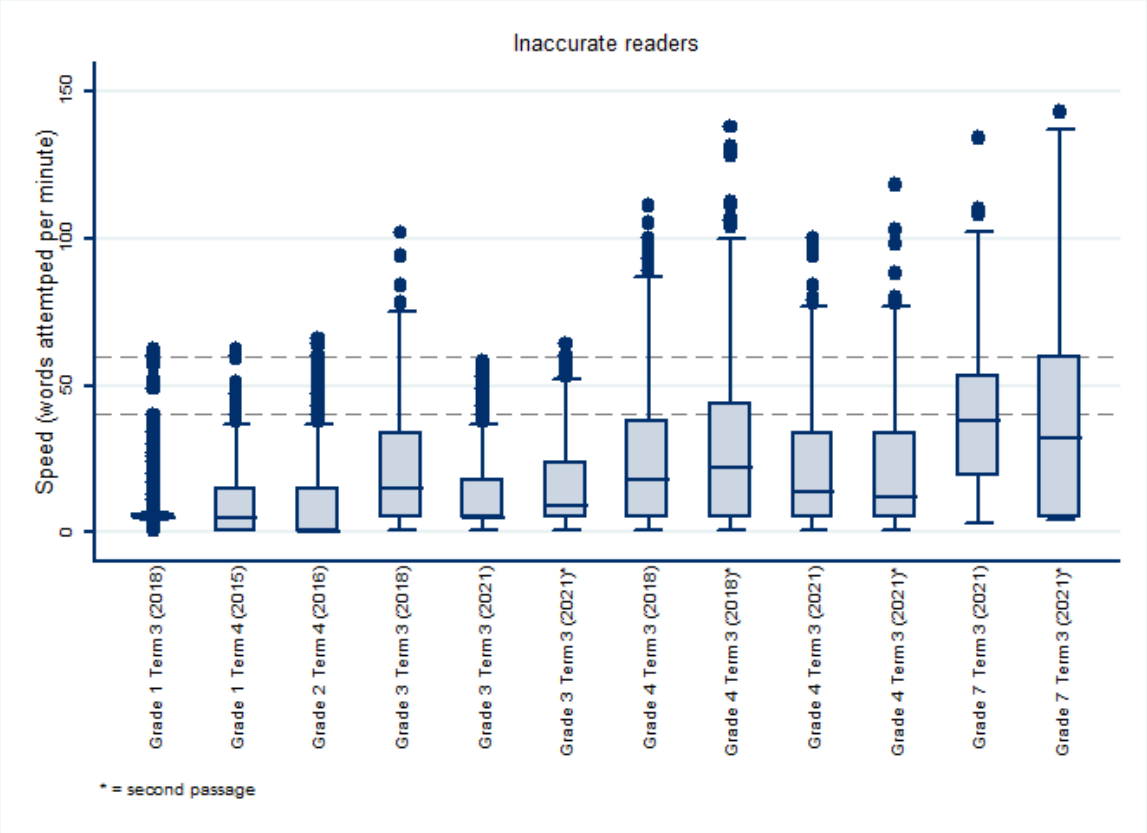


Figure 4 Speed distribution for learners reading with less than 95% accuracy in Setswana

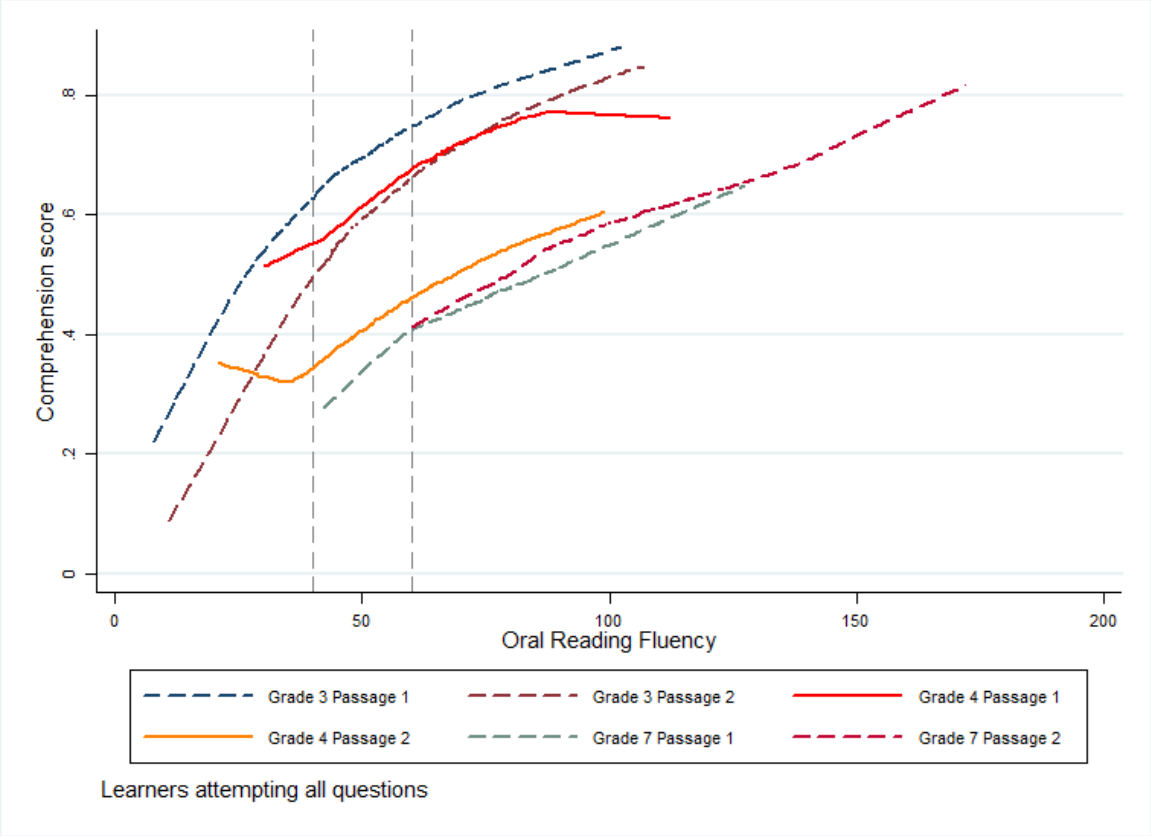


The previous two figures, in conjunction with showing the non-linear relationship between speed and accuracy, provide the first piece of evidence in support of a Setswana minimum fluency threshold of 40 cwpm. If learners are reading slower than 40 words per minute in Setswana, they have not yet reached accuracy levels supportive of automaticity in reading. These learners would benefit from instruction focused on improving their decoding skills and fluency. It is likely that the development of higher order skills will stagnate, including comprehension, until they reach this threshold.

FLUENCY AND COMPREHENSION

We also examine the relationship between fluency and comprehension in Figure 5. Among Grade 3s and 4s, tested across different ORF passages, this relationship is very steep below 40 correct words per minute (cwpm), yet 40 cwpm appears to be a threshold below which learners' comprehension skills have not sufficiently developed to understand what is being read. In a separate analysis that compares learners' fluency to their scores on written reading comprehension tests, those with ORF scores below 40 cwpm show little evidence that they can comprehend what they have read.

Figure 5 Relationship between fluency and comprehension for students attempting at least a subset of comprehension questions



Source: EGRS I /RSP 2021 data. Note: The relationship between accuracy and comprehension is displayed using locally weighted polynomial regressions

The comprehension-fluency gradient in Figure 5 then tends to flatten out at around 60 cwpm with diminishing returns to fluency above this point, suggesting that underdeveloped comprehension skills become the key hurdle for learners at or above this fluency level.

PREDICTIVE VALIDITY OF THE CRITICAL 'THRESHOLD' AND BENCHMARK FOR FUTURE READING AND COMPREHENSION SUCCESS

Typically, only learners that are reading at or above 60 cwpm by the end of the Foundation Phase develop strong comprehension skills as they advance into higher grades. This is seen in Figure 6 and Figure 7, which show the relationship between current fluency and future written reading comprehension. Learners' Setswana fluency in the first year of their Intermediate Phase (Grade 4) is highly related to how they perform in Setswana written reading comprehension by the end of primary school as seen in Figure 6. The majority of Grade 4 learners reading at or above the 40 cwpm mark (shown by the bottom dashed grey line) are getting more than half (6 of 11) of the written reading comprehension questions correct by the end of Grade 7, while those reading at or above the benchmark of 60 cwpm in Grade 4 are close to getting full marks for comprehension.

The importance of reading at 40 cwpm by the end of Grade 2 in equipping learners with the reading comprehension skills they need for secondary school success is then starkly displayed in Figure 7. It shows the relationship between Grade 2 fluency and end of primary written comprehension performance. Almost all learners reading below 40 cwpm at the end of Grade 2 are failing home language written reading comprehension by the end of primary school. By contrast the majority of those reading at or above 40 cwpm at the end of Grade 2, are scoring above 80% (9 of 11) for

written reading comprehension by the end of primary school. Learners transitioning into high school, that were meeting threshold in Grade 2, are then clearly equipped with the reading skills they need to be able to understand fully what they are reading later on. Reading at or above the 'threshold' at the end of Grade 2, is an important milestone to be able to read for meaning and to learn in later grades.

Figure 6 Relationship between Grade 4 oral reading fluency and written comprehension performance in Grade 7 in Setswana, EGRS I (2018 and 2021)

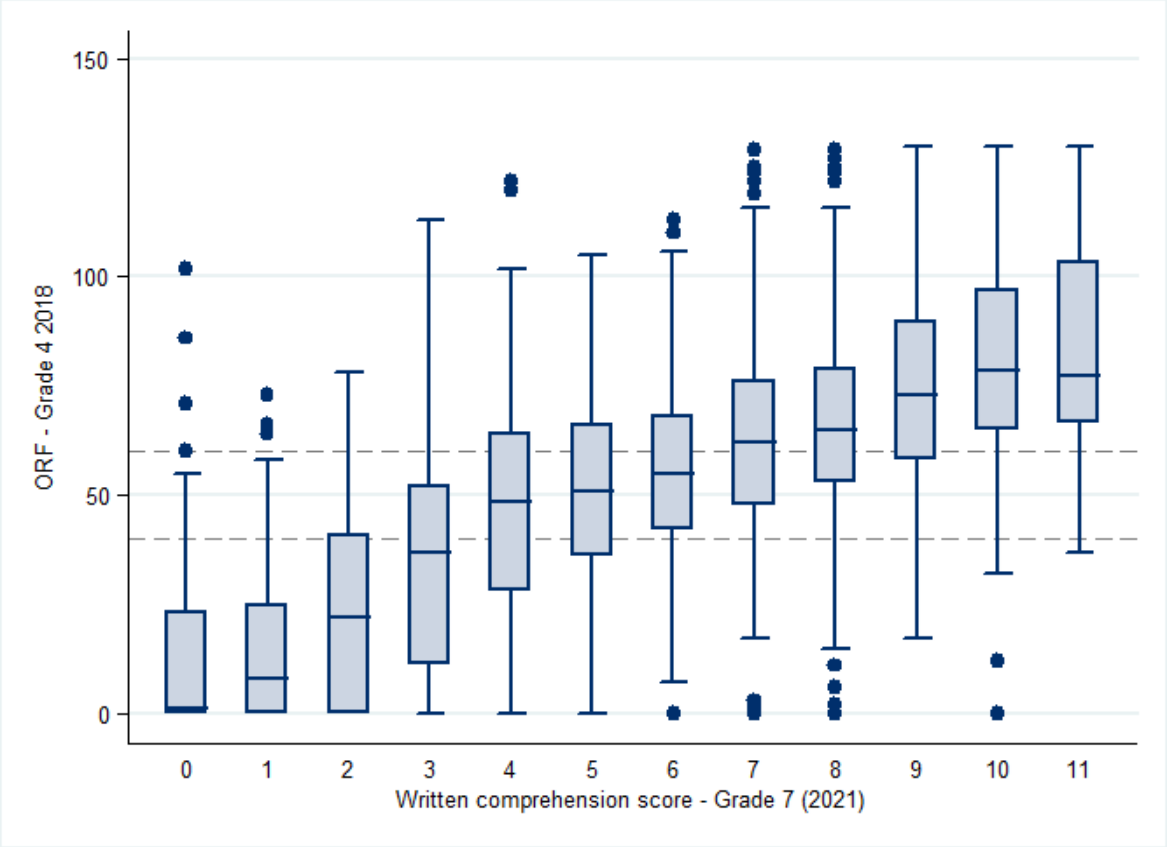
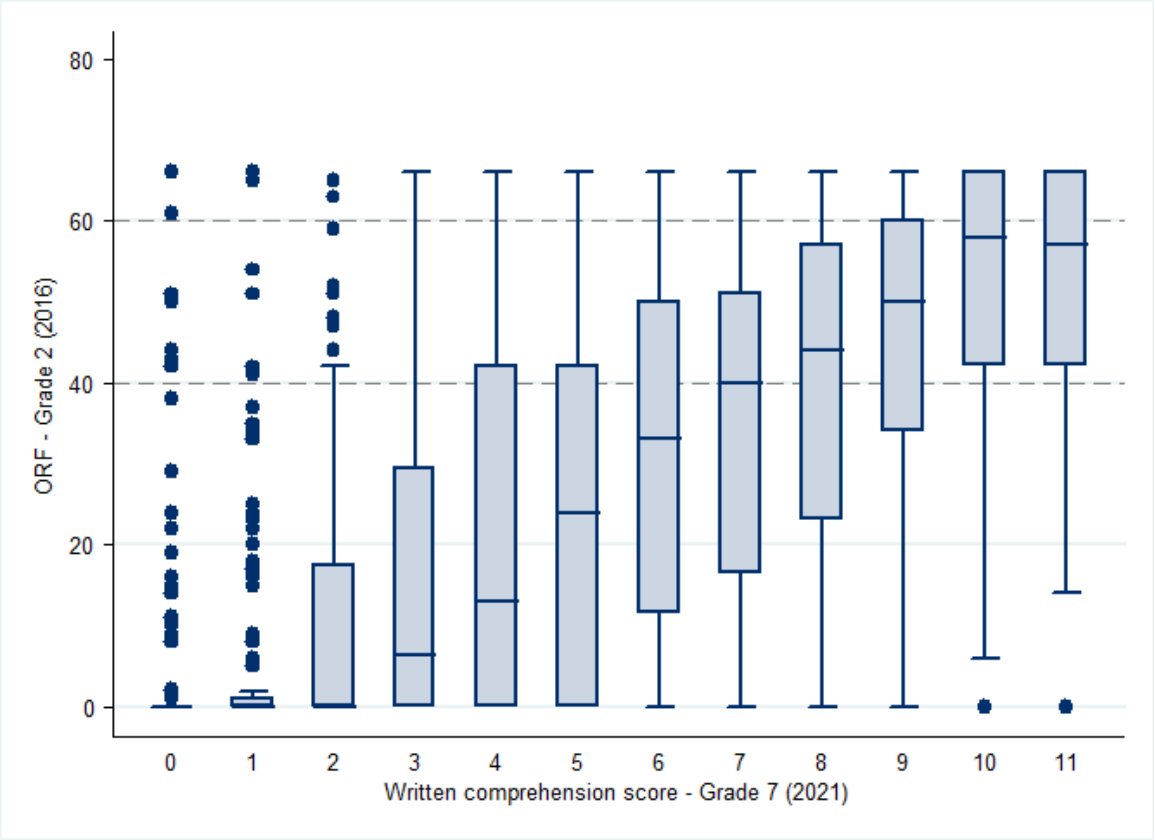


Figure 7 Relationship between Grade 2 oral reading fluency and written comprehension performance in Grade 7 in Setswana (EGRS I 2016 to 2021)



Reading at or above threshold of 40 cwpm is also highly predictive of whether learners meet the benchmark of 60 cwpm in later grades. We illustrate this in **Error! Reference source not found.** and **Error! Reference source not found.** by tracking the fluency profiles of EGRS I learners from Grade 2 (term 4) to Grade 4 (term 3), and then of Grade 4 (term 3) learners tracked to Grade 7 (term 3). In each figure, we distinguish learners into initial fluency categories: non-readers (0 cwpm), reading below the threshold (1-39 cwpm), and meeting the threshold (40-59 cwpm). Learners who were already reaching the benchmark at the initial point are excluded from the figures. By initial fluency category, we then identify their fluency category in a later grade assessment. Three clear patterns emerge when we consider the Grade 2-4 and Grade 4-7 transition patterns.

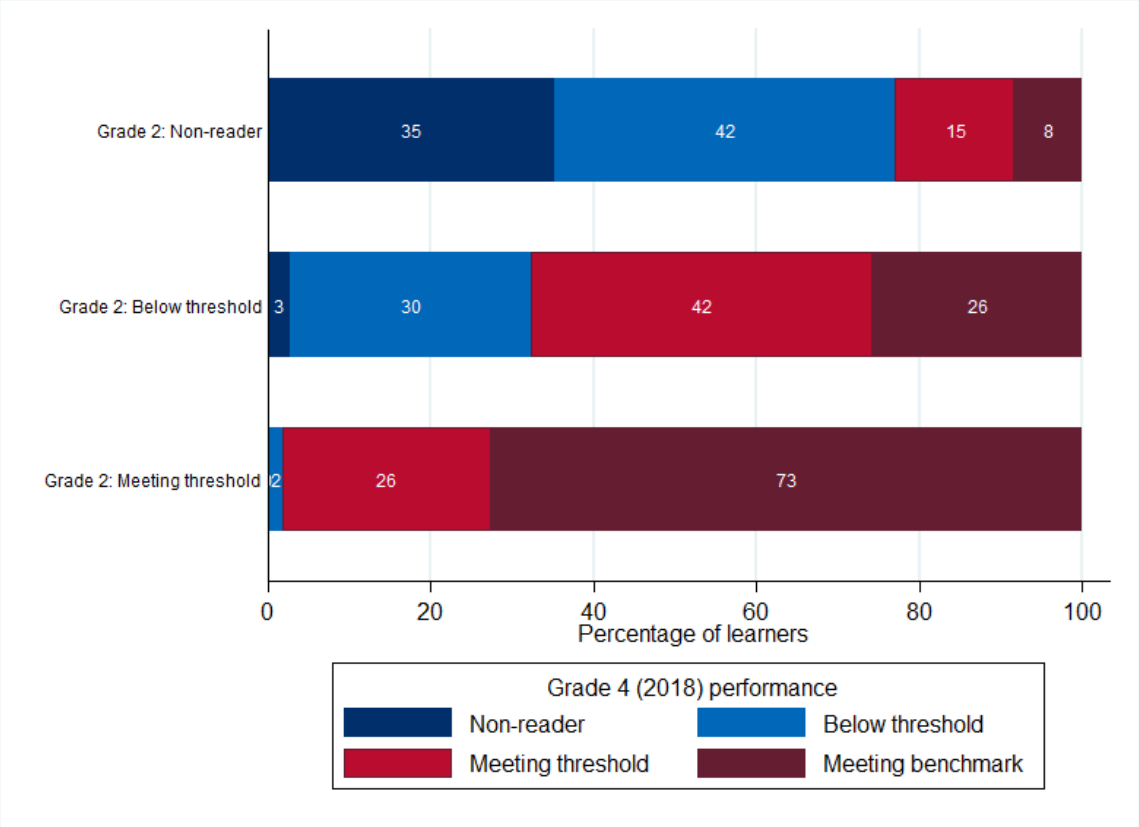
1. **Non-readers stagnate.** About 35% of Grade 2 learners who were non-readers were still unable to read one word by Grade 4. A sizeable portion of these Grade 2 non-readers begin to read slowly by Grade 4, but most are not yet reaching the threshold (of 40 cwpm). Only 23% percent of non-reading Grade 2s reach the threshold by Grade 4, and just 8% meet the benchmark by Grade 4. A similar picture holds in the Grade 4-7 transition. About 46% of Grade 4 learners who were non-readers were still unable to read one word by the end of primary school. However, a sizeable portion of these non-readers have begun to read slowly by Grade 7, but most are not yet reaching the threshold (of 40 cwpm). Only a small percentage (12%) meet the benchmark by the time they leave primary school.

2. **Slow readers can attain the threshold.** Among Grade 2 learners who were reading below the threshold (1-39 cwpm) in Grade 2, the majority (68%) had reached that threshold by Grade 4, with just over a quarter (26%) meeting the benchmark. Among

learners who were reading below the threshold (1-39 cwpm) in Grade 4, the majority (73%) had reached that threshold by Grade 7, and 45% meet the benchmark. However, such a slow pace of reading development is unlikely to support learning in primary school.

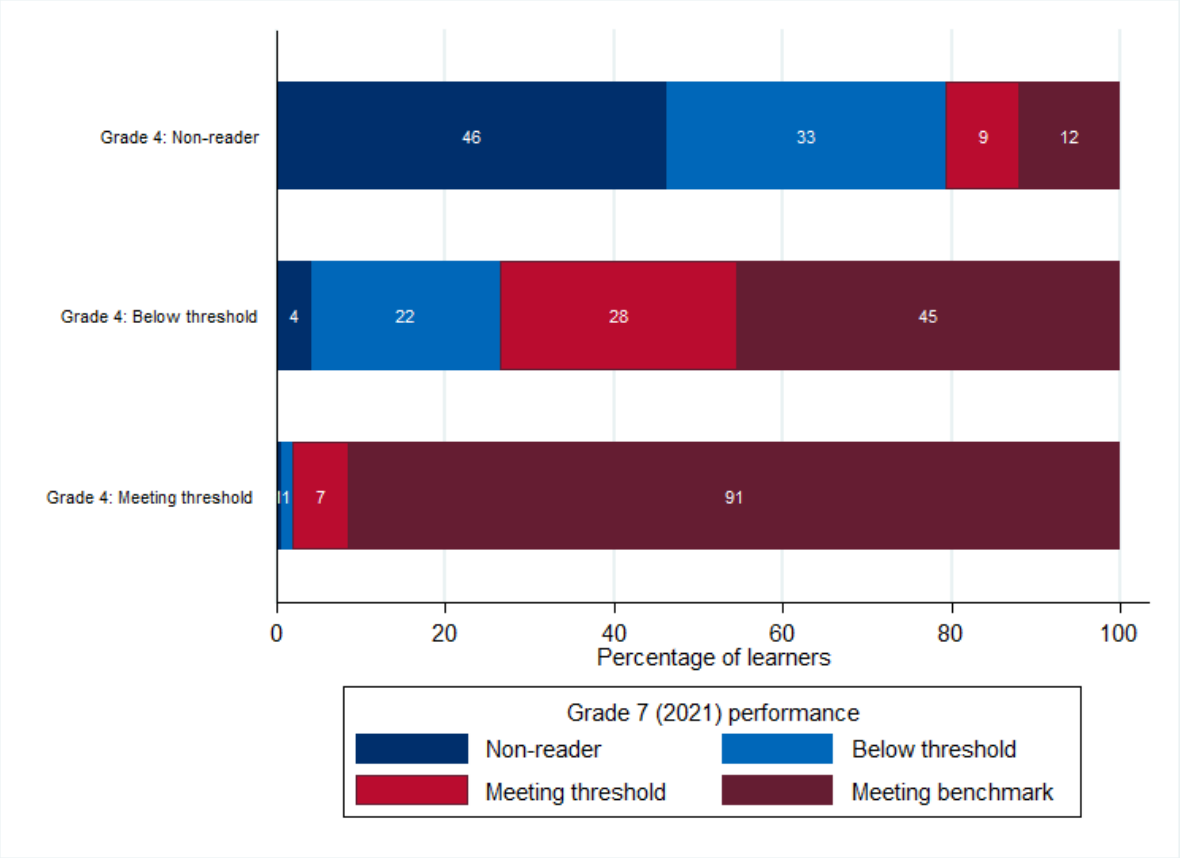
Meeting the threshold is highly predictive of meeting the benchmark. An encouraging picture emerges for those meeting the threshold by the end of Grade 2. By the time they reach Grade 4, 73% of this group are meeting the benchmark. At the Grade 4 level, of learners meeting the threshold, almost all (91%) meet the benchmark by the end of Grade 7. The threshold of 40 cwpm clearly signals a point at which reading development can take off and a key milestone in meeting the benchmark of 60 cwpm.

Figure 8 Fluency in Grade 4 by learners' fluency profile in Grade 2, Setswana



Source: EGRS I (longitudinal sample 2016 to 2018), own calculations.

Figure 9 Fluency in Grade 7 by learner's fluency profile in Grade 4, Setswana



Source: EGRS I (longitudinal sample 2018 to 2021), own calculations.

STAGE-TWO: ESTABLISHING GRADE-SPECIFIC FLUENCY BENCHMARKS BY ALIGNING CRITICAL READING POINTS TO A GRADE LEVEL

Although both a threshold and benchmark in early grade reading are identified through the above analytical process using data from multiple grades, they need to be translated into grade-specific benchmarks. In doing this, they should not be set to be out of reach of most learners, while at the same time they should encourage reading development to a level more appropriate for the demands of the Curriculum. We, therefore, examine their attainability, against the curriculum requirements, to inform the grade level at which they should be established.

Error! Reference source not found. shows the percentage of learners by grade and term falling into the following fluency categories:

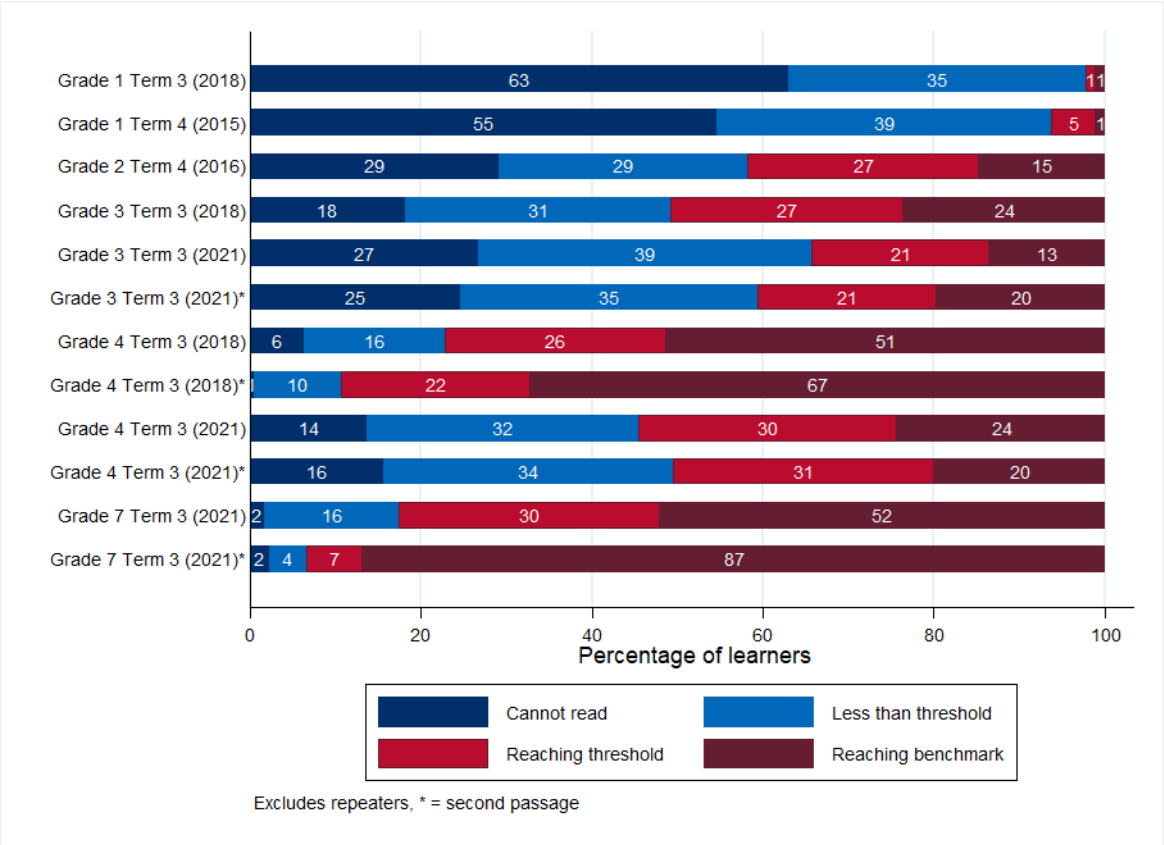
- Non-reader: unable to read one (1) word (shown in dark blue),
- Reading below the threshold: reading less than 40 cwpm (shown in light blue),
- Reading at or above the threshold but below the benchmark: 40 to 59 cwpm (shown in red) and
- Reading at or above the benchmark: at least 60 cwpm (shown in dark red).

We have excluded any repeaters, so that the assessment level matches the grade in which learners currently are. The general progression pre-COVID is clear:

- By the end of Grade 1, 55% of learners are unable to read a single word correctly (non-readers), an additional 39% are reading slower than the threshold of 40 cwpm.
- By the end of Grade 2, there are half as many non-readers at 29% compared to Grade 1. An additional 29% are reading below the threshold of 40 cwpm, while 42% (27% + 15%) reach the threshold. A very small percentage at 15% are meeting the benchmark.
- By the end of Grade 3 (measured pre-pandemic in 2018) the percentage of non-readers remains high at 18%, although almost a half of learners (51%) meet the threshold and almost a quarter (24%) of the sample meet the benchmark.
- By the end of Grade 4, there are very few non-readers at just 1-6%. The majority are meeting the threshold (77%), and 51-67% are reading at or above the benchmark of 60 cwpm.

Unfortunately, the Grade 3 and 4 reading profiles have been significantly worsened in a pandemic period as seen in the 2021 comparative profiles. At the Grade 4 level, just 20-24% were meeting the benchmark in 2021 compared to around a half meeting the benchmark pre-pandemic.[12]

Figure 10 Early grade fluency profiles, Setswana samples



Source: EGRS I, 2015-2021; RSP 2018-2021. Own calculations.

[12] By the end of primary school, the majority (82% or more) of Grade 7s are reading at or above 40 cwpm. Depending on passage difficulty, 52-87% of Grade 7s are reaching 60 cwpm even though the Grade 7s were assessed in a pandemic period. A possible reason for this better than expected result in a pandemic context is that the acquisition of their foundational early grade reading skills occurred before the pandemic.

Against these scenarios, it is not unrealistic to align 40 cwpm to the end of Grade 2 and 60 cwpm to the end of Grade 3. Since reading at 60 cwpm supports meaning-making, this should be a minimum fluency benchmark for Grade 3 as it aligns with the Curriculum that requires that children read for meaning by the end of the Foundation Phase. For this reason, 60 cwpm is referred to as a **Grade 3 minimum fluency benchmark**. Yet, on the road to reading at or above 60 cwpm by end of Grade 3, learners must reach 40 cwpm by the end of Grade 2 – we refer to this as the **Grade 2 minimum fluency benchmark.**

ESTABLISHING A LETTER-SOUND BENCHMARK

In the Nguni language report by Ardington et al. (2020), the authors work backwards along the development cline, to consider what letter-sound benchmark could support the acquisition of fluency skills. By examining the relationship between speed and accuracy in sounding letters and examining changes in letter-sound knowledge over time, they establish a Grade 1 letter-sound benchmark of 40 correct letter-sounds per minute (clspm). In the technical report, we aim to identify whether 40 clspm would also be a suitable benchmark in Setswana given that both Nguni languages and Setswana are alphabetic languages. We applied the same statistical analysis to the Setswana data as used in the Nguni languages benchmark report. Consistent with what is found for letter-sound reading in Nguni languages, the following patterns were found in Setswana:

- Learners with low speed in sounding letters tend to have low accuracy in sounding letters.
- Accuracy in sounding letters improves steadily with speed to a point (at around 40 clspm), but beyond this there are no further improvements in accuracy. The letter-sound speed-accuracy gradient tends to flatten around 40 letter-sounds per minute.
- Analysis of longitudinal data also provides support for the idea that beyond 40 clspm, Setswana speaking learners show little to no improvement in sounding letters.

For these reasons, 40 clspm is also a suitable letter-sound benchmark for Setswana.

ATTAINABILITY OF THE LETTER-SOUND BENCHMARK

But how many learners in early grades are able to meet the benchmark of 40 clspm? Is this at all attainable by the end of Grade 1?

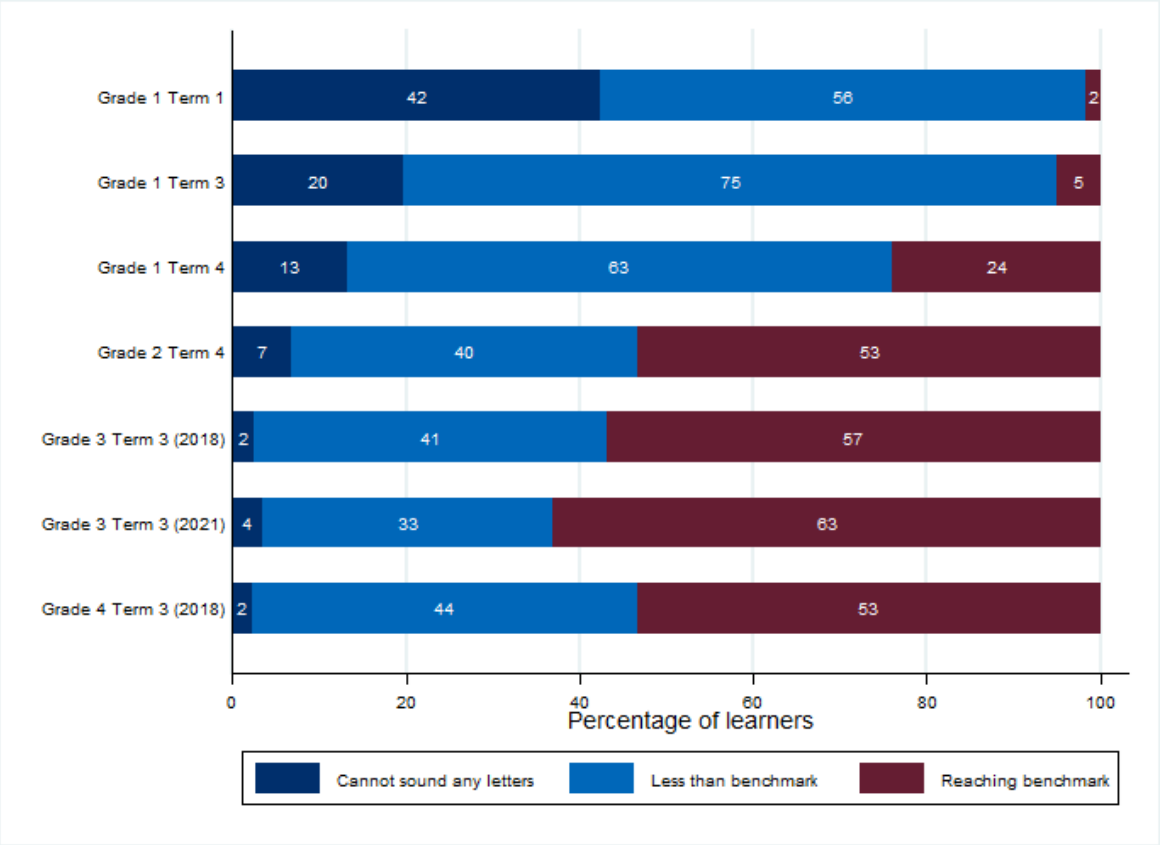
In **Error! Reference source not found.** we distinguish learners by grade samples into four categories: cannot read any letter correctly, sounding fewer letters correctly than the benchmark (1-39 clspm) and meeting the benchmark (40 clspm).

- By the end of Grade 1 (in a pre-COVID year), about a quarter (24%) of Grade 1s were meeting the letter-sound benchmark. The benchmark is not completely out of reach by the end of Grade 1. However, the majority of learners are acquiring letter-sound knowledge too slowly, with 13% unable to sound one letter correctly.
- By the end of Grade 2, over half (53%) of learners pre-COVID were reaching the 40 clspm benchmark.
- By the end of Grade 3 (and into Grade 4), the letter-sound distribution does not improve very much relative to the Grade 2 distribution, with 53-63% meeting the 40 clspm benchmark. Teachers are required by the Curriculum to move on towards teaching higher order skills with

each grade, yet this basic skill is not being mastered by learners with around 38-46% unable to meet the benchmark of 40 clspm by the end of Grade 3 (and Grade 4).

- It is also worth highlighting that while the 2021 letter-sound distributions appear to be better compared to pre-COVID assessments, the letter-sound assessment was much easier in 2021 relative to 2018 as it excluded complex consonants and diacritics (consistent with the pre-2018 EGRS I assessments).

Figure 11 Correct letter-sounds per minute distribution, Setswana

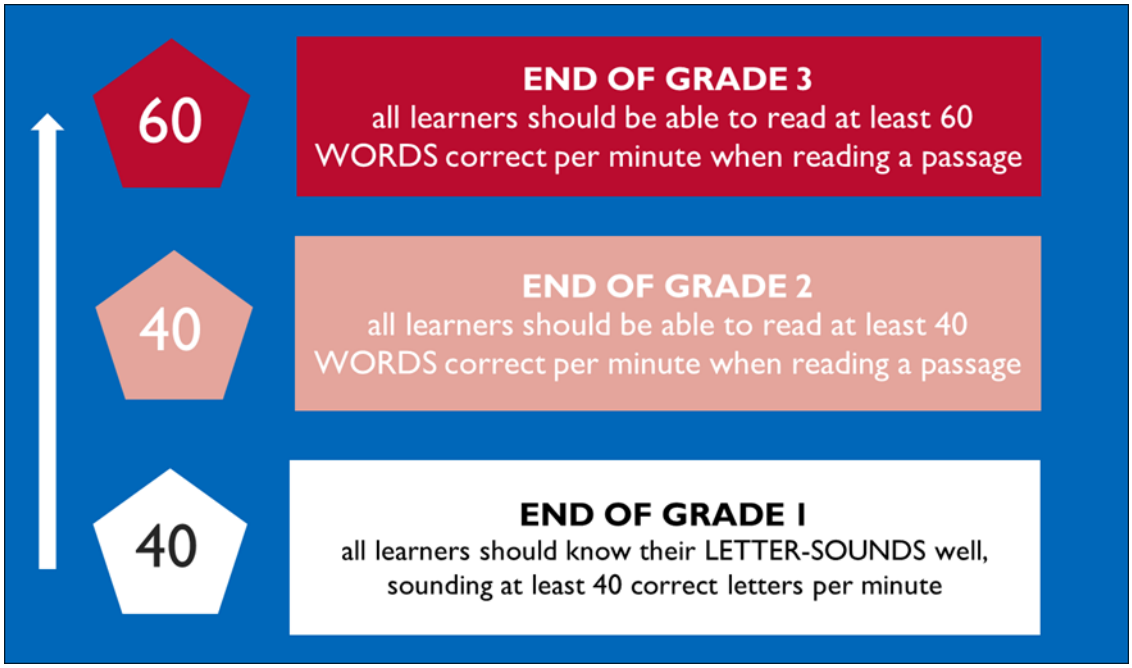


Source: EGRS I (2015-2021), RSP (2018-2021), own calculations. Notes: The letter-sound assessment was much easier in 2021 relative to 2018 as it excluded complex consonant clusters and diacritics

SUMMARY OF GRADE-SPECIFIC MINIMUM READING BENCHMARKS IN SETSWANA

All this analysis, together with expert opinion, allows us to identify the following Foundation Phase minimum reading benchmarks for Setswana as summarised in **Error! Reference source not found.**.

Figure 12 Grade-specific minimum reading benchmarks in Setswana home language



By the end of Grade 1, all learners taught in Setswana home language should be able to correctly sound 40 letters per minute.

- This is a minimum Grade 1 benchmark.
- Beyond reading 40 correct letter-sounds per minute, there are few benefits of improving letter-sound knowledge and speed.
- Although the blending of sounds is integral to phonics instruction, once learners have met this letter-sound knowledge benchmark, decoding instruction should focus on assisting learners in applying word attack strategies and developing fluency.

By the end of Grade 2, all learners taught in Setswana home language should be reading from a grade-appropriate passage at least 40 correct words per minute (cwpm).

- This is a *minimum* Grade 2 fluency benchmark. Higher order reading skills are very unlikely to develop if learners do not reach this fluency level. Reaching this fluency level by the end of Grade 2 is highly predictive of successful reading in higher grades.
- Pre-pandemic, approximately 42% of non-repeating learners in the EGRS I/RSP schools had reached the Grade 2 minimum fluency benchmark of 40 cwpm by the end of Grade 2.
- Below 40 words per minute, learners make a lot of mistakes when reading, and even if they don't make mistakes, they have very low oral and written reading comprehension scores.

Quite simply, they are reading too slowly and inaccurately to comprehend what they are reading.

- For learners reading below 40 cwpm, teaching instruction should focus on improving their decoding skills.

By the end of Grade 3, all learners taught in Setswana home language should be reading from a grade-appropriate passage at least 60 cwpm.

- This Grade 3 *minimum* fluency benchmark is indicative of the point at which reading comprehension becomes increasingly possible when learners read on their own.

- Reaching this milestone signals when teachers' focus should hone in on teaching learners the skills and strategies they need to tackle written reading comprehension while encouraging vocabulary and language development. At this point, data patterns indicate that underdeveloped comprehension skills become the main constraint to further literacy development.

- It is necessary that *all learners* meet this home language benchmark by the end of Grade 3, a critical transition point before the language of instruction shifts from home language to English. Fluency in home language reading strongly supports reading in English First Additional Language. As learners transition into higher grades, fluency skills in Setswana should continue to improve beyond this fluency benchmark.

- Pre-pandemic, just a quarter (24%) of non-repeating learners in the EGRS I/RSP schools had reached this minimum Grade 3 fluency benchmark by the end of Grade 3. It is concerning that not all learners meet this Grade 3 minimum fluency benchmark by the end of primary school: at the end of Grade 7 just 52-87% (depending on passage difficulty) of non-repeaters meet this benchmark.

The Setswana Grade 1 letter-sound benchmark, Grade 2 minimum fluency benchmark and Grade 3 minimum fluency benchmark are not to be viewed as aspirational goals. Rather, they reflect the minimum level where every learner should be at a particular stage in their schooling to read successfully with meaning.

CONCLUSION

This research significantly advances efforts to establish reading benchmarks in African languages. To our knowledge, this is the first study to provide benchmarks for reading in a disjunctive orthography in a Sesotho-Setswana language[13]. The body of research will need to be extended until reading skills are benchmarked in all official South African languages. This will require ongoing reading assessment initiatives to expand the available set of data to establish new language benchmarks while validating and testing existing benchmarks with different learner samples and different reading passages.

In contributing to furthering benchmarking initiatives, new early grade reading data collection initiatives should be preceded by rigorous instrument design and piloting processes to ensure appropriate EGRA-type instruments are administered. As described in the technical report, this Setswana benchmarking exercise established best practices to follow in setting appropriate

[13] Although Spaull et al. (2020) provide some tentative benchmarks for Sepedi using a small dataset.

benchmarks through highly collaborative and iterative processes of instrument development. Furthermore, following from the Nguni languages early grade reading benchmark research (Ardington et al., 2020, 2021), the exploratory statistical methods applied to establish Nguni language benchmarks along a reading development cline are shown here to be applicable to a Sesotho-Setswana language.

Moving forward, the value of early grade reading benchmarks in supporting improvements in policy and practice will be further realised once they are linked to a national programme to assess and monitor early grade reading skills (Ardington et al., 2021:14). Early grade reading assessments (EGRA) should form a critical part of formative assessments in primary schools. The progressive roll-out of EGRA training for teachers by the Department of Basic Education in 2015 should be leveraged to promote EGRA testing in all schools (Maboya, 2020). As teachers conduct EGRAs, guided by grade-specific benchmarks, this will help them to identify early-on whether learners are on track, and align their instructional practice with each learner's level of reading development.

Furthermore, if national EGRA-type assessments were introduced, for example through linking this to Systemic Evaluation Programme plans at the Grade 3 and 6 level (Department of Basic Education, 2020), grade-specific minimum benchmarks could be used to monitor sector progress in reading in the early grades. Yet merely measuring reading skills will be insufficient for progressive improvements. Addressing very slow reading or the non-development of decoding skills among learners will require significant action and changes in practice at various levels.

REFERENCES

Abadzi, H., 2012. Developing Cross-Language Metrics for Reading Fluency Measurement, Developing Cross-Language Metrics for Reading Fluency Measurement. https://doi.org/10.1596/26819

Ardington, C., Wills, G., Pretorius, E., Deghaye, N., Menendez, A., Mohohlwane, N., Mtsatse, N. & Van der Berg, S. 2020. Technical Report: Benchmarking early grade reading skills in Nguni languages. Stellenbosch: ReSEP, Stellenbosch University. Cape Town: SALDRU, University of Cape Town. Chicago: NORC at the University of Chicago. Pretoria: Department of Basic Education.

Ardington, C., Wills, G., Pretorius, E., Deghaye, A., Mohohlwane, & N., Menendez. 2021. Benchmarking oral reading fluency in the early grades in Nguni languages. International Journal of Educational Development, 81, 102433. DOI: 10.1016/j.ijedudev.2021.102433

Deno, SL, Fuchs, LS, Marston, D & Shin, J. 2001. Using curriculum-based measurement to establish growth standards for students with learning disabilities. School Psychology Review, 30(4), 507–524.

Department of Basic Education, 2020. Action Plan to 2024. Towards the realisation of Schooling 2030. August 2020. Department of Basic Education. Pretoria, South Africa.

Department of Education and Training. 1988. Setswana. Terminology and orthography, no. 4. Government Printer Pretoria, South Africa.

Dowd, A.J. & Bartlett, L., 2019. The Need for Speed: Interrogating the Dominance of Oral Reading Fluency in International Reading Efforts. Comp. Educ. Rev. 63, 189–212. https://doi.org/10.1086/702612

Fuchs, LS, Fuchs, D, Hosp, MK & Jenkins, JR. 2001. Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. Scientific Studies of Reading, 5(3), 239–256.

Hasbrouck, J., & Tindal, G.A., 2006. Oral Reading Fluency Norms: A Valuable Assessment Tool for Reading Teachers. Read. Teach. 59, 636–644. https://doi.org/10.1598/RT.59.7.3

Hasbrouck, J. & Tindal, G., 2017. An update to compiled ORF norms (Technical Report No. 1702). Eugene, OR, Behavioral Research and Teaching, University of Oregon.

Howie, S., Combrinck, C., Roux, K., Tshele, M., Mokoena, G., & McLeod Palane, N. 2017. Progress in International Reading Literacy Study 2016 - South African Childrens' Reading Literacy Achievement. Centre for Evaluation and Assessment, Pretoria, South Africa.

Jukes, M., Pretorius, E. Schaefer, M. Tjasink, K. Roper, M. Bisgard, J. & Mabhena, N. 2020. Setting Reading Benchmarks in South Africa. Khulisa Management Services: Johannesburg. Department of Basic Education, Pretoria, South Africa.

Katz, J., 2020. Back to basics - comparing the orthographic, phonic and grammatical features of English and African languages to improve literacy teaching. Presentation at PrimTEd Literacy Working Group Seminar. Materials for literacy teacher programmes.

Katz, L. & Frost, R., 1992. The Reading Process is Different for Different Orthographies: The Orthographic Depth Hypothesis, in: Frost, R., Katz, L. (Eds.), Orthography, Phonology, Morphology,

and Meaning. Elsevier Science Publishers, Amsterdam, pp. 67–84. https://doi.org/10.1016/S0166-4115(08)62789-2

Land, S. 2015. Reading isiZulu: Reading processes in an agglutinative language with a transparent orthography. Unpublished doctoral thesis, University of KwaZulu-Natal, Pietermaritzburg, South Africa.

Maboya, M., 2020. Report on Foundational Skills of Literacy and Numeracy. Curriculum Policy, Support and Monitoring, Department of Basic Education, Pretoria, South Africa.

Paris, S.C. & Hamilton, E.E. 2011. The development of children's reading comprehension. In SE Israel & GG Duffy (Eds), Handbook of Research on Reading Comprehension. New York: Routledge, pp32-53.

Pretorius, EJ. 2014. Supporting transition or playing catch up in Grade 4? Implications for standards in education and training. Perspectives in Education 32(1): 51-76.

South African Government. 2019. "State of the Nation Address by Cyril Ramaphosa, 2019." June 20. https://www.gov.za/speeches/2SONA2019.

Spear-Swerling, L. 2006. Children's reading comprehension and oral reading fluency in easy text. Reading and Writing: An Interdisciplinary Journal, 19, 199-220.

Spaull, N., Pretorius, E. & Mohohlwane, N., 2020, 'Investigating the comprehension iceberg: Developing empirical benchmarks for early-grade reading in agglutinating African languages', South African Journal of Childhood Education 10(1), a773. https://doi.org/ 10.4102/sajce.v10i1.773

Wang, Z., Sabatini, J., O'Reilly, T. & Weeks, J., 2019. Decoding and Reading Comprehension: A Test of the Decoding Threshold Hypothesis. J. Educ. Psychol. 111, 387–401.

APPENDIX: SIMPLE AND COMPLEX CONSONANTS

Table A 1: Simple Consonants in Setswana

Simple Consonant	Sounds like			Example	
				Setswana	English translation
b	b	in	brother	baba	enemies
d	d	in	drain	dira	work
f	f	in	after	fêpa	feed
g	g	in	gate	gagaba	crawl
h	h	in	hoot	hutsa	curse
j	j	in	Johannes	ja	eat
k	k	in	Kampala	kala	branch
l	l	in	lap	lema	plough
m	m	in	madam	madi	blood/money
n	n	in	snare	nare	buffalo
p	p	in	pink	pina	song
r	r	in	drill	rata	love
s	s	in	sing	sila	grind
t	t	in	Afr. taal	tiro	job
w	w	in	wet	wela	fall into
y	y	in	yell	bolaya	kill

Notes: Previously, Setswana did not have consonants such as c, v, x and z. More recently the Setswana National Language Body has agreed to incorporate these consonants when writing and reading, for example: v as in vene and not bene (van in English), vote as in voutu and not boutu; x as in nxae instead of ntlae (pardon), nce-nce-nce (sound of clock or watch ticking) and z as in zama-zama (from Nguni meaning to try) and not 'sama-sama' in Setswana

Table A 2 Complex Consonants in Setswana

				Example	
Complex consonant	**Sounds like**			**Setswana**	**English translation**
ng	ng	in	ring	ngaka	doctor
kg	g	in	-	kgomo	cow
kh	k	in	king	khiba	apron
ph	p	in	path	phala	impala
šw	sh	in	shilling	mašwi	milke
th	t	in	term	thata	strong
tl	tl	in	butler	batla	seek
ts	ts	in	rats (Afrikaans)	tsela	path
ny	ny	in	canyon	nyatsa	despise/undermine
tš	tj	in	tjank (Afrikaans)	ntšwa	dog
tŝ				botŝarara	sourness
nn				monna	man
rr				rra/rre	my father
mp				mpa	stomach
tlh				tlhako	hoof
tsh	ts	in	rats (English)	tshaba	run away
tšh	ch	in	child	setšhaba	nation
tshw				tshwana	same as
mph				mpha	give me
ngw				ngwana	child