

# Exploring relationships between oral reading fluency and reading comprehension amongst English second language readers in South Africa

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**Abstract** Most analyses of oral reading fluency (ORF) are based on L1 reading, and the norms that have been developed in English are based on first language reading data. This is problematic for developing countries where many children are learning in English as a second language. The aim of the present study is to model the relationship between English reading fluency and comprehension among rural English-second-language learners (ESL) in South Africa. We use data collected in 2013 by the National Education and Evaluation Development Unit in South Africa. This survey tested 4697 Grade 5 students from 214 schools across rural areas in South Africa. A sub-sample—1772 students—were selected for an ORF test. For these students there exist data on both reading comprehension and reading fluency. Although a number of studies have analyzed the relationship between fluency and comprehension, none have been conducted on a large-scale for ESL learners in a developing country such as South Africa. The present research contributes to the literature by analysing the size, significance and uniformity of this relationship for ESL learners in South Africa. Preliminary findings indicate a threshold at 70 words-read-correct-per-minute which is lower than the typically used threshold of 90 words-read-correct-per-minute of English first language readers.

**Keywords** Decoding · Oral reading fluency · Reading comprehension · English second language readers · Grade 5 readers

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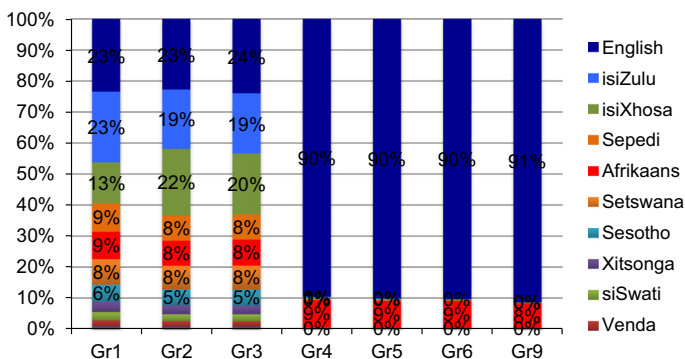
## Introduction

In South Africa approximately 15 % of total government expenditure is spent on education, making it the largest single line-item in the budget. Yet despite the country's generous investment in education, it is by now well documented that South Africa is producing learners with very low literacy and numeracy levels (Fleish, 2008; Howie, Van Staden, Tshele, Dowse, & Zimmerman 2012; Spaull, 2013). Learner performance in numeracy and literacy, specifically reading literacy, is typically used as an index of how well an education system is performing. Yet South African learners perform abysmally poorly regardless of whether reading is assessed in African home languages, English or Afrikaans.

Results from large scale national systemic literacy assessments in the first decade of this century first alerted the public to the literacy crisis in South African schools (Department of Education, 2005). Further converging international and national large scale evidence of poor literacy performance comes from South Africa's participation in the Progress in International Reading Literacy Study (PIRLS) which assesses reading comprehension at Grade 4/5 level (2006 and 2011), the Southern and East African Consortium for Monitoring Educational Quality (SACMEQ) which assessed numeracy and literacy at Grade 6 in 2000 and 2007, and the National School Effectiveness Study (NSES), which looked at Grades 3–5 from 2007 to 2009.

South Africa has 11 official languages. The majority of learners do the first 3 years of schooling (the Foundation Phase) in the first or home language (L1) as language of learning and teaching (LoLT). Besides English and Afrikaans, there are nine African languages that serve as LoLT in the Foundation Phase. In these schools, English is introduced as a First Additional Language (or L2) in Grade 1 and the transition to English as LoLT occurs in Grade 4. This is shown graphically in Fig. 1 below which uses national assessment data to show the language of learning, teaching and assessment and how this changes over the grades in South Africa.

For the majority of black learners, their African home language continues to be taught as a school subject until the end of schooling, Grade 12, while English serves



**Fig. 1** Breakdown of the language of learning, teaching and assessment by grade—Annual National Assessment (ANA) 2013 various grades ( $n = 7,630,240$ )

as the LoLT. Despite having an early-exit model, South Africa at least uses an African home language as LoLT for the first 3 years of school. Even so, the promised benefits of home language schooling are not fully realised, since literacy levels remain low in whatever language literacy is tested. For example, Spaul (2015) found that in a matched sample of 3402 Grade 3 learners from the Systemic and the National School Effectiveness Study assessments administered a month apart in 2007, the learners achieved a mean score of 23 % in Grade 3 English reading, and 34 % in their African home language on the same test. The PIRLS assessments in both 2006 and 2011 show extremely low reading levels in Grade 4, especially in the African languages (Venter, van Staden, & Du Toit 2008; Howie et al., 2012). In 2011 Grade 4 learners ( $n = 15,744$ ) participated across all the provinces. This time the prePIRLS assessment was used in all 11 languages, where shorter, easier texts are used. One out of three South African learners (29 %) could not reach the Low International benchmark; the majority (58 %) could not reach the Intermediate International Benchmark. Those tested in the African languages performed very poorly, with a high percentage of learners not able to read at the most basic level (e.g., 57 % in Northern Sotho and 53 % in Venda, Howie et al., 2012: 27–29).

The large scale evidence of poor literacy performance in South Africa from PIRLS naturally evoked no small measure of national self reflection, and an acknowledgement of the glaring fact that comprehension is a much neglected area. There is plenty of anecdotal evidence of teachers focusing primarily on code-based reading activities in the classroom and neglecting meaningful literacy practices. A few small studies of teachers in Grade 1–3 classrooms (e.g., Gains, 2010; Verbeek, 2010) showed links between the early literacy experiences of teachers, their conceptualisations of literacy and their consequent practices of literacy as a narrowly constrained code-based activity with little attention to meaning. The tendency of teachers to rely on whole class oral choring of reading, the lack of reading resources, especially in African languages, the lack of reading homework, lack of individual reading assessment, and minimal reading of extended texts in the early grades have also been identified as instructional practices that contribute to poor reading development (Pretorius & Mokhwesana, 2009; Zimmerman & Smit, 2014; Pretorius, 2015).

While local research has identified numerous contributory variables to our poorly functioning educational system at the macro level (e.g., the deleterious historical legacy of apartheid education, socioeconomic factors, poorly qualified teachers) and at school level (e.g., poorly resourced and poorly managed schools, teacher absenteeism, inadequate time on task, inadequate lesson planning), there has not been a great deal of research on early reading instruction in South African classrooms, and how literacy is enacted in such spaces. Many education stakeholders in South Africa might argue that “too much time” is spent on decoding and “too little time” is spent on meaning and comprehension. However, time spent on an activity in the classroom does not necessarily equate with effective instruction. The relationship between the development of decoding and comprehension abilities of children in a bilingual education system needs to be more closely investigated, especially when most of the children do their schooling after

Grade 4 in a language which is not their L1. The large scale PIRLS results certainly reveal poor comprehension abilities in both L1 and L2 readers, but at the same time, poor comprehension inevitably also raises questions about basic reading abilities. If children struggle even with literal comprehension in the L1 or L2, then maybe it is because they can barely decode the texts that they are expected to read.

There is a need to better understand L2 reading in developing country multilingual education contexts, especially when the larger socioeconomic, community and school milieus differ substantially from those of more affluent and highly literate educational contexts of the North. This paper examines the relationship between oral reading fluency and comprehension abilities of English second language (ESL) Grade 5 rural learners in South Africa. Since fluency is regarded as the bridge between decoding and comprehension, it can potentially shed light on the what, where and how aspects of ESL reading development within our education system.

## Literature overview

Fluency in general refers to the ability to read texts “with freedom from word identification problems that might hinder comprehension” (Harris & Hodges 1985, in Chard, Pikulski, & McDonough 2006, p. 40). It applies to both oral and silent reading and is a marker of skilled reading-with-comprehension. Fluency is typically measured by asking a reader to read a selected passage for comprehension and noting how many words are read within a specified time. Although fluency is a fairly stable trait in skilled readers, reading rate can be affected by factors such as topic familiarity, text coherence and the density or abstract nature of the information in the text.

Much of the focus of fluency research has been on oral reading fluency (ORF), specifically during the primary school years. ORF refers to the ability to read aloud with accuracy and speed and with meaningful oral expression, with the reader’s voice reflecting the prosody and intonation of spoken language. In contrast, nonfluent readers read slowly and laboriously, in a stilted and monotonous tone, often stopping to stare at words or sound them out (Fuchs, Fuchs, Hosp, & Jenkins 2001; Spear-Swerling, 2006; Rasinski & Mraz, 2008). They have difficulty chunking the stream of written text into appropriate syntactic phrases. Some nonfluent readers may read words correctly, but do so slowly and without much expression.

ORF is measured in different ways, for example, (1) timed reading of a list of words of increasing length and complexity; (2) timed reading of a list of nonwords (to assess decoding without lexical access); and/or (3) timed reading of a text (i.e. reading in context). In each case, words erroneously read are noted and subtracted from the total number of words read in a minute. This gives a score of words correct per minute (WCPM), thereby reflecting both accuracy and speed. Although prosody is an integral part of ORF when reading a text, it is more difficult to assess and so ORF measures tend to reflect only speed and accuracy.

In the early stages of reading, young children in Grade 1 start off by reading text slowly and haltingly. Factors such as age, reading skill and text difficulty can affect ORF. The nature of a language (e.g., analytic or agglutinating) and its orthographic system (transparent or opaque spelling) can also affect reading rates.

The ORF norms referred to in this article refer to English ORF norms and are not transferrable to other languages. According to English L1 fluency norms, by the end of Grade 1 children at the 50th percentile read at about 53 WCPM, increasing to 89 WCPM at the end of Grade 2, 107 WCPM by the end of Grade 3, and 139 by the end of Grade 5 (Hasbrouck & Tindal, 2006). There is considerable variation, with ORF differing by 80-100 WCPM within a grade. Mathson, Allington, and Solic (2006) found that accuracy first emerges, then children read with increasing automaticity, and prosodic features of intonation, pitch, stress and observance of punctuation cues occur.

Many studies have investigated the precursors to early reading skills that in turn lead to fluency. Phonological awareness in general and phonemic awareness in particular, knowledge of letters and letter-sound relations, and word recognition skills are all subskills on which fluency is based. Preschool children with greater sensitivity to the sound structure of words learn to read more easily than children who lag behind in phonological awareness (Adams, 1990; Chiappe & Siegel, 1999; Bus & van Ijzendoorn, 1999; National Reading Panel, 2000; Silven, Poskiparta, & Niemi 2004). The link between phonological awareness and reading ability has been shown in languages such as English, Dutch, French, Finnish and German, and locally, too, in Northern Sotho (Wilsenach, 2015) as well as Zulu (Pretorius, 2015). Phonological awareness also seems to transfer across languages (Muter & Diethelm, 2001; Geva & Zadeh, 2006).

Oral language skills, including expressive vocabulary knowledge and understanding syntactic and morphological forms, have also been shown to predict early reading (Hart & Risley, 2003; Snow, Burns, & Griffin 1998; Wilsenach, 2015). However, fluency involves more than recognising words quickly and effortlessly; it also includes chunking units of words in text into meaningful phrases, taking note of morphology and punctuation while reading, as well as processing meaningful connections within and between sentences. Through exposure and repeated practice, readers learn to integrate intonational patterns that help to mark syntactic phrasing within and across sentence boundaries. This in turn further enables comprehension. It is for such reasons that fluency is considered to be the 'bridge' to reading comprehension. If the multiple components of reading are not well developed, then the overall efficiency of the reading process is compromised. While phonological awareness and knowledge of letter-sound relationships are important predictors of early reading development, by Grade 3 their influence diminishes as other skills at the lexical and text level exert greater influence.

Explanations of the way in which complex behaviour comprising different subcomponents is orchestrated efficiently and seamlessly rely on notions of automaticity and the extent to which cognitive processes demand attention (e.g., LaBerge & Samuels, 1974; Perfetti, 1988; Stanovich, 1986). When readers spend too much time and attention trying to figure out the lower levels of reading, then comprehension is compromised. The notion of 'freeing up resources' is a useful

metaphor for describing the rapid and effortless way that fluent readers read connected text, with little apparent conscious attention to the mechanics of reading.

### **Fluency and comprehension**

There is a strong empirical basis attesting to a relationship between fluency and reading comprehension. ORF in particular, defined in terms of accuracy and speed in reading connected text, has been found to be a reliable indicator of reading comprehension (e.g., Pinnel et al., 1995; Spear-Swerling, 2006). Fuchs et al. (2001) report high correlations between ORF and various kinds of reading comprehension measures such as high stakes state-mandated comprehension tests, as well as a variety of comprehension tests using different formats (e.g., multiple choice, open questions, cloze procedures or story recall protocols). The relationship obtains across schools serving children from different socioeconomic backgrounds or instructional programmes, and can be found in children without reading difficulties as well as those with learning disabilities (Deno, Fuchs, Marston, & Shin 2001; Wolf & Katzir-Cohen, 2001).

Developmentally, the greatest growth in ORF typically occurs in the early school years, between Grades 1–4. The strong correlation between ORF and reading comprehension levels off as children get older, with a “negatively accelerating curve” during the later primary school and early high school years (Fuchs et al., 2001; Spear-Swerling, 2006). The levelling-off effect in the later grades is attributed to the changing nature of reading development. Once basic reading skills have been automated and reading is relatively fast and accurate, other variables account for differences in reading comprehension. As they get older, learners are expected to read longer, more complex texts, and higher-order reading skills such as making inferences, integrating text information and breadth and depth of vocabulary knowledge become increasingly important in reading expertise. Fluency in reading connected text thus relies not only on decoding skills, but also on multi-level processes beyond decoding (Fuchs et al., 2001; Jeon, 2012).

### **Reading in a second language and ORF**

Much of the research on fluency in reading is based on L1 reading, and the norms that have been developed for English reading rates are based on L1 reading data. For example, Good, Simmons, Kame’enui, Kaminski, and Wallin (2002) found that English Grade 1 readers who, by the end of the grade year, read below 40 WCPM were at risk of reading failure, and children reading below 20 WCPM were at high risk of failure. Would such scores similarly signal L2 children in the same grade at risk of reading failure? What would an ORF developmental trajectory look like for L2 readers, especially those in developing countries where schooling is characterised by poverty (a risk factor for reading) and where the L2 is also typically the LoLT? Answers to such questions are vital for policy makers and teachers for determining what can ‘normally’ be expected and what constitutes a warning light and hence requiring intervention and remediation. Surprisingly, although there has

been an increase in L2 reading research focusing on fluency, this has yielded only a small body of empirical research to date, with varied and inconclusive findings.

As a starting point, the main difference between L1 and L2 children is that the former bring a lot of L1 knowledge with them when learning to read, whereas in L2 children the L2 knowledge is developing in parallel to their L2 reading development. It is common sense to assume that having lowered language proficiency will cause L2 students to read text less efficiently. However, there is a strong empirical base that shows that although L1 and L2 learners may differ in oral proficiency, they can perform at the same level of accuracy in basic reading skills such as word recognition and word attack skills (Lesaux & Siegal, 2003; Geva & Zadeh, 2006; Lipka & Siegel, 2007), provided that there is systematic instruction in reading. When the language in the text matches the language level of the learner, then L2 oral proficiency is found not to be a determining factor. When the language of the text is more demanding than the learner's oral proficiency, then the contribution of oral language proficiency might increase. We look now to research that has focussed specifically on L2 English ORF.

Two studies from Florida (United States)—a state with a large L2 Latino population—have provided some insight into the levels and growth of English ORF in the early years of schooling. Al Otaiba et al. (2009) examine the developmental trajectories of early reading fluency among 5004 Grade 2 Latino students from high poverty schools, all of which followed an explicit and systematic reading programme. ORF scores ranged from 53 WCPM (Grade 2) to 75 WCPM (Grade 3) for typical L2 Latino students, while ORF scores were lower for those with language delays (44 WCPM in Grade 2 and 64 at the start of Grade 3) and lowest for those with learning difficulties (24 WCPM at the start of Grade 2 and 35 WCPM in Grade 3). The authors conclude that ORF is a useful tool for screening and monitoring the progress of L2 readers, and for identifying learners who need reading support before they fall too far behind.

The second study from Florida is that of Jimerson, Hong, Stage, and Gerber (2013) who examined developmental trajectories in ORF from Grade 1 to Grade 4 amongst monolingual English students with low socioeconomic status (SES) and ESL Latino students with low SES. This was used to determine whether growth in ORF predicted achievement in the high stakes Stanford Achievement Test in Grade 4. For both groups of children, ORF in Grade 1 strongly predicted reading performance in Grade 4, while growth in ORF had a moderate effect on reading performance in Grade 4. What is of interest in this study is that the average ORF reading scores for the English L1:L2 children from Grade 1–4 were 64:40, 101:74, 90:63, 146:119 WCPM respectively (ORF averages were inexplicably higher in Grade 2 than Grade 3). The averages of the L1 and L2 English readers differed by about 25 WCPM at each grade level.

Coming closer to home, we turn to a Kenyan study. Like South Africa, Kenya also faces challenges in developing children's literacy skills. In Kenya only 32 % of Grade 3 children were found to be able to read Grade 2 level texts, irrespective of the language in which reading was assessed—English or Kiswahili (Uwezo, 2012, in Piper & Zuilkowski, 2015). In their assessment of reading fluency amongst Grade 2 learners in Kiswahili (L1) and English (L2) in Kenya, Piper and Zuilkowski

(2015) found that while reading comprehension levels were low in English L2, they were only marginally better (but not statistically significantly different) in Kiswahali, pointing to reading challenges within the Kenyan education system generally. The Grade 2 learners were averaging 30 WCPM in L2 English reading, indicating a very slow reading rate. The authors conclude that in Kenya and countries with similar language and learning contexts, ORF is a useful tool for literacy assessment. In their study of 1772 Grade 5 English L2 learners in South Africa, Draper and Spaull (2015)—using the same data employed in this study—found that 41 % of the sample were non-readers, reading slower than 40 WCPM.

All these studies show some variation within L2 fluency norms in the early grades, especially in schools in more developed as opposed to developing countries. In the Florida schools, reading instruction was explicit and systematic, and even though the school served low SES communities, such schools tend to be better resourced and more functional than schools in developing countries (Abadzi, 2006). In these richer contexts, the ESL learners seem to read about 25 WCPM slower than their L1 grade peers (Jimerson et al., 2013). However, at 30 WCPM, the Kenyan Grade 2 ESL students were reading more slowly than their Grade 1 Latino L2 counterparts in Florida who were averaging 40 WCPM (Jimerson et al., 2013) and where the typical Grade 2 L2 child was averaging 53 WCPM (Al Otaiba et al., 2009). The large number of Grade 5 ESL non-readers in Draper and Spaull's study (2015) reading at less than 40WCPM suggests that instructional and resource factors can play a significant role in ESL fluency rates.

## Present study

The preceding overview has shown that there is relatively scant quantitative research on oral reading fluency for L2 learners, especially learners in developing countries. The aim of the present study is to help ameliorate this lack by further analysing the results from the large oral reading fluency study in rural South Africa conducted in 2013. The two research questions animating our research are as follows:

1. How strong is the relationship between ORF and comprehension for rural South African Grade 5 ESL learners?
2. In relation to comprehension, are there differential returns to additional fluency at different points in the ORF continuum?

The research presented in this article can be considered as the second component of a two-tier research project focusing on oral reading fluency among ESL students in South Africa. Where the focus of the first paper was largely descriptive, the current paper extends that analysis by providing a multivariate perspective on the relationship between fluency and comprehension. While a full account of the instruments, sampling procedures and test administration processes is available in the first paper (Draper & Spaull, 2015), we include the most pertinent information for the present study below.



## Method and data collection

The data for this study was collected in 2013 by the National Education and Evaluation and Development Unit (NEEDU), an independent institution in South Africa similar in nature to OFSTED in the United Kingdom. In response to the findings emerging from the 2012 NEEDU evaluation cycle—which found very poor reading levels among Grade 2 learners with poor letter and word recognition in the home language of learners—it was decided that reading was a critical factor inhibiting improvement in the sector. It is for this reason that in the 2013 evaluation cycle NEEDU chose to assess Grade 5 learners' reading according to their ORF and reading comprehension.

The data used in this study comes from a non-random sample of 4667 Grade 5 learners in 213 rural schools across all nine provinces of South Africa who were tested for reading comprehension. Although 4667 students were included in the evaluation, only a sub-sample of 1772 students was selected for the ORF assessment. These latter students form the basis of the present analysis since this is the group for whom we have both ORF scores and comprehension scores.

Within each school one Grade 5 class was randomly selected. All learners in the class were tested on a 40-min written reading comprehension test. The test consisted of a narrative and an information text and included a combination of 13 literal and inferential questions. The overall Flesch readability ease of the comprehension test was 82.3, equivalent to 4.9 on the Flesch–Kincaid grade level.

Based on the results of the comprehension test, 10 learners from each class were selected (3 top, 4 middle and 3 bottom achievers in the reading comprehension test) to participate in an Oral Reading Fluency test administered a day later. This comprised two narrative texts of just over 200 words each, with a Flesch readability ease score of 84.7 and 83.3 respectively (equivalent to the Flesch–Kincaid levels of Grade 3.8 and 4.3). Further details about the measures and procedures can be found in Draper and Spaul (2015).

In schools with less than 15 learners in the Grade 5 class, all learners were selected for the ORF test so as not to make anyone feel excluded. The total sample for the ORF passage was 1772 learners and it is this data that we analyse here.

## Results

Table 1 below provides basic descriptive statistics on the two outcomes measures subsequently used in the multivariate analyses. The results clearly show that, overall, the 1772 students performed extremely poorly on the silent reading comprehension test, scoring an average of 23 % on the Reading comprehension assessment despite the fact that the text used in the comprehension test was equivalent to Grade 4 texts in terms of ease of readability (cf. Draper & Spaul, 2015). The learners performed equally poorly on the ORF assessment, reading at 46 words correct per minute (WCPM) on a narrative text appropriate for Grade 4 level. When considering differential performance by sub-group, girls performed statistically significantly better than boys on both the comprehension test and the ORF test, while the 346 students learning ESL in the Afrikaans-medium schools performed

**Table 1** Descriptive statistics for silent reading comprehension and oral reading fluency scores

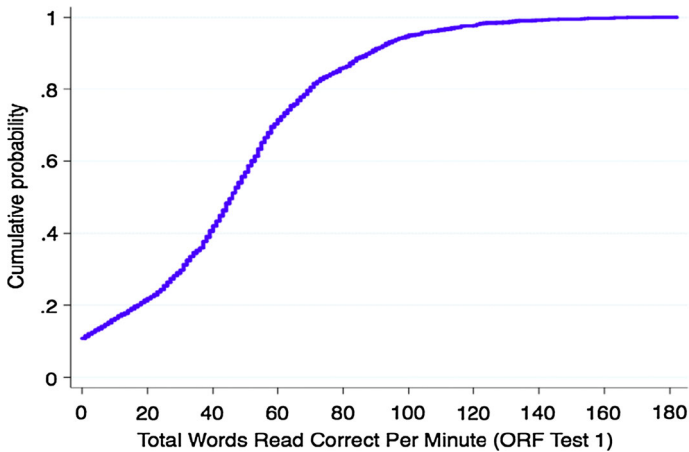
	Obs	Mean	SE mean	Min	Max	SD
Grade 5 silent reading comprehension scores (%)						
Girls	844	25.3	0.9	0	100	19.5
Boys	918	21.8	0.9	0	95	18.1
Afrikaans LOLT	346	30.8	2.6	0	100	23.1
English LOLT	1357	21.6	0.6	0	95	17.2
Monograde	964	24.0	1.1	0	95	19.9
Multigrade	808	22.7	1.1	0	100	17.5
National	1772	23.4	0.75	0	100	18.9
Grade 5 oral reading fluency scores (words read correct per minute)						
Girls	844	52.4	1.35	0	163	30.7
Boys	918	40.3	1.42	0	182	30.4
Afrikaans LOLT	346	56.5	3.48	0	182	36.0
English LOLT	1357	43.5	1.12	0	167	29.3
Monograde	964	46.3	1.67	0	167	32.8
Multigrade	808	45.9	1.64	0	182	28.9
National	1772	46.1	1.17	0	182	31.1

statistically significantly better in reading comprehension in English than their 1357 peers who were in English-medium schools. The reasons for this have been elaborated on in previous work (Draper & Spaull, 2015), and may relate to sociopolitical factors associated with South Africa's apartheid past, and to the fact that most students with Afrikaans as their LOLT were also home-language Afrikaans speakers, while those in English-LOLT schools typically do not speak English as a home-language. There was no statistically significant difference between multigrade and monograde schools in either reading comprehension scores or ORF scores.

### Benchmarking ORF scores for ESL students in South Africa

While not the explicit aim of this paper, it is helpful to place the achievement of South African rural Grade 5 ESL students in an international context, largely because the level of ORF achievement may influence the relationship between ORF and comprehension, as will be seen in the multivariate analysis. Figure 2 below shows the cumulative density function (CDF) of ORF scores for the 1772 students. One can see that approximately 40 % of the sample are reading at less than 40 WCPM. It is especially disconcerting that 11 % of the sample could not read a single word correctly in English, despite 5 years of formal full-time schooling.

A previous analysis (Draper & Spaull, 2015) showed that the ORF distribution of Grade 5 ESL students in rural schools in South Africa approximates the distribution of Grade 1 or Grade 2 American ESL students that have been earmarked for remedial instruction. Using ESL benchmarks developed by Broward County in

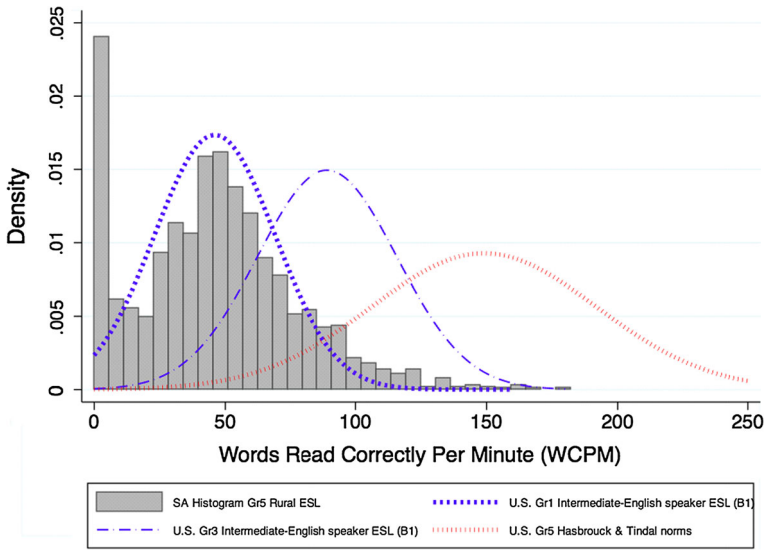


**Fig. 2** Cumulative distribution function (CDF) of oral reading fluency scores (in words correct per minute) ( $n = 1772$ )

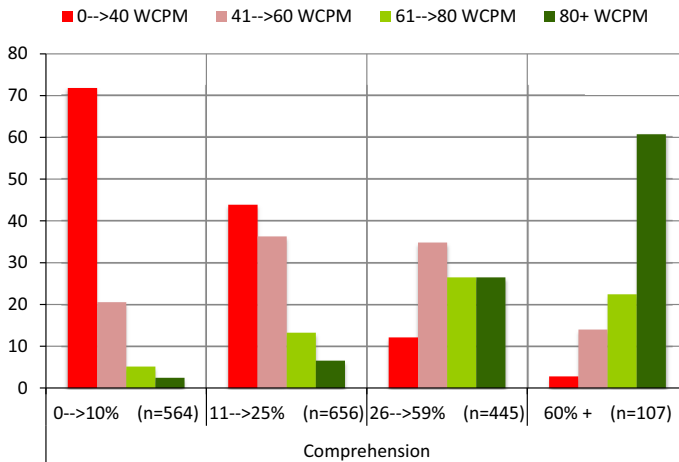
Florida, we showed that our South African rural Grade 5 sample fits the “Non-English speaker (A1)” Grade 2 classification, or alternatively the Intermediate English Speaker (B1) Grade 1 classification. That is to say that South African rural Grade 5 ESLs are achieving at the same level as the lowest performing (A1) Grade 2 ESLs in Broward County (Florida, U.S.). These students “cannot communicate meaning orally in English” and demonstrate very little understanding of English. They would be “unable to participate in regular classroom instruction” in America (Broward County, 2009: 1).

Further analysis showed that while the American Hasbrouck and Tindal (2006) norms were inappropriate for the South African context, there is a case to be made that the Broward County B1 ESL ORF schema could operate as a tentative benchmarking system for ESL students in Grades 1–5 in South Africa, at least until more data becomes available on ORF benchmarks in South Africa. This conclusion is based on the fact that the small number of South African Grade 5 ESL students with acceptable levels of comprehension (60 %+ on the comprehension test) have a very similar ORF distribution to Grade 3 B1 ESL students in Broward County (Draper & Spaul, 2015). This is shown visually in Fig. 3 below. The middle kernel density function approximates the Grade 3 B1 distribution as well as that of South African grade 5 learners with acceptable levels of comprehension.

In addition to a large body of literature attesting to the strong relationship between ORF and reading comprehension our preliminary descriptive analysis also suggests that there is a strong relationship between these two variables. Figure 4 below shows the distribution of ORF scores (WCPM) by categories of comprehension scores (0–10 %; 11–25 %; 26–59 %; 60 %+). One can clearly see that at the lowest level of comprehension the vast majority of students (70 %) are reading at less than 40 WCPM. This is in stark comparison to those at the highest level of comprehension where the majority of students (60 %) are reading at 80 WCPM or



**Fig. 3** Distribution of oral reading fluency scores (WCPM) for rural South African ESL learners relative to Broward County ESL learners, Florida (Broward County, 2012) (Source: Draper & Spaul, 2015)



**Fig. 4** Distribution of ORF scores by comprehension category

higher. As one might expect, there are almost no students in the highest comprehension category who are reading at 40 WCPM or less.

While these results are suggestive and confirm our a priori expectations about the relationship between ORF and comprehension, one cannot make causal claims about this relationship given the descriptive nature of the analysis. Consequently, we now turn to the multivariate analysis to determine whether this relationship holds

after controlling for school-level factors, as well as looking at the strength and uniformity of the relationship.

### Multivariate analysis

Table 2 below presents the results of the initial multivariate analysis in the form of five regressions. In all five regressions the outcome variable is the comprehension score of the child which has been standardised to have a mean of zero and a standard deviation (SD) of one. Similarly, the variables WCPM, 'Words read incorrectly', and 'Words skipped' have all been standardised to have a mean of zero and a SD of one. In each case the mean and SD of the original variable are included in square brackets for intuitive interpretation.

Before controlling for any variables, Regression 1 shows that a 1 SD increase in WCPM is associated with a 0.7 SD increase in reading comprehension score. Or alternatively that an increase of 31 WCPM (1 SD) is associated with a 14 % point increase in comprehension score ( $0.7347 \times 19 \% = 14$ ). This is an extremely strong association. However, given that this first regression has not controlled for

**Table 2** School fixed-effects regressions predicting standardised comprehension scores using standardised ORF variables (WCPM)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
WCPM (standardised)	0.7347***	0.6682***	0.6949***	0.6989***	0.6947***
[Mean: 46 WCPM; SD: 31 WCPM]	0.04	0.03	0.03	0.04	0.04
Words read incorrectly (standardised)			-0.215***	-0.212***	-0.211***
[Mean: 9WRI; SD: 6WRI]			0.03	0.03	0.03
Words skipped (standardised)			-0.0260	-0.0259	-0.0243
[Mean: 1WS; SD: 3WS]			0.02	0.02	0.02
Female (Ref: male)				-0.0400	-0.0464
				0.05	0.05
Age 12 or 13 (Ref <12)					-0.0680
					0.06
Age 14+					-0.0340
					0.10
School fixed effects	No	Yes	Yes	Yes	Yes
Constant	0.189	-0.550***	-0.593***	-0.584***	-0.575***
	0.03	0.05	0.06	0.05	0.05
N	1772	1772	1677	1677	1677
R <sup>2</sup>	0.3799	0.53769	0.56091	0.56115	0.56156

Outcome variable is reading comprehension score (standardised) with standard errors included below coefficients [mean: 23 %; SD: 19 %]

Significance levels \* 0.1; \*\* 0.05; \*\*\* 0.01

any individual or school level characteristics, it is possible that higher WCPM scores are simply proxies for school level factors such as quality of instruction, grade arrangement (multigrade or monograde) or resources at school. Consequently, for Regressions 2–5 we include school-level fixed effects to control for all school level factors. Thus, the coefficients in Regressions 2–5 reflect only intra-school variation in the variables. Regressions 3–5 systematically add additional individual control variables relating to the child’s ORF test (words read incorrectly and words skipped), as well as the age and gender of the child. After controlling for school-level factors, the coefficients on age, gender and words skipped are not statistically significantly different from zero; i.e. there is no observable relationship between these variables and comprehension.

The relationship between WCPM and comprehension is largely unaffected by adding school fixed-effects or child covariates, with the coefficient remaining approximately 0.7. This indicates that the impact of WCPM on comprehension is clearly not just proxying for school-level factors (or between-school variation) and that the impact of additional fluency is independent of school-level factors. This adds further weight to the argument that oral reading fluency is an effective predictor of reading comprehension, as has been found in a number of other studies (Pinnel et al., 1995; Fuchs et al., 2001; Spear-Swerling, 2006). The coefficient on ‘Words read incorrectly’ is stable at 0.21 and statistically significant at the 1 % level. This means that for a 1 SD increase in Words read incorrectly there is a 0.21 decrease in standardised comprehension score. Or, interpreted intuitively, for every 6 Words Read Incorrectly, a child’s comprehension score decreases by 4 % points ( $0.21 \times 19\%$ ).

The results presented here show that there is a strong relationship between ORF and comprehension for rural South African Grade 5 ESL learners. Raising oral reading fluency by 31 WCPM is associated with a 14 % point increase in comprehension score after controlling for all school-level and some individual level variables. The evidence presented here provides considerable empirical support to the arguments made by National Education Evaluation and Development Unit (2013) that improving the ORF of ESL students is likely to improve comprehension for these students, and furthermore that focusing on individual reading, and reading aloud in particular, is justified using local evidence. While we are not advocating a myopic focus on fluency, we do believe that this is an underdeveloped and under-appreciated sub-component of reading in the South African context and thus warrants additional time and attention.

### **Differential returns to additional oral reading fluency**

With reference to the second research question—to explore the possibility that the returns to additional ORF are different at different points of the fluency distribution—we employ a spline modelling regression technique which allows the slope coefficient on ORF to differ before and after a specified cut-point. By running a series of regressions, each with different cut-points we can compare the size of the coefficients before and after the cut-points and, using marginal effects, determine if these coefficients are statistically significantly different from each other. Table 3 below shows the results from this analysis.



**Table 3** continued

	Non-spline	40 WCPM	50 WCPM	60 WCPM	70 WCPM	80 WCPM	90 WCPM	100 WCPM	110 WCPM	120 WCPM
120+ WCPM										0.0658
Marginal effects	NA	-0.0163	-0.0370	-0.0732	-0.1097**	-0.1401**	-0.1756***	-0.2137***	-0.2503***	-0.2996***
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.3235	-0.3803	-0.3578	-0.2560	-0.1688	-0.2017	-0.3340	-0.6441	-0.9773	-1.1309
Observations	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000	1677.00000
R <sup>2</sup>	0.56156	0.56160	0.56179	0.56246	0.56332	0.56381	0.56418	0.56416	0.56382	0.56352

Significance levels \* 0.1; \*\* 0.05; \*\*\* 0.01



Where previously we used standardised ORF measures (Table 2), here we use the variables in their original format. This was because there is no intuitive explanation of ‘breaks’ in a standardised distribution. Knowing that a break occurs at 0.65 of the standardised distribution is not particularly useful, especially in comparison to specifying breaks in traditional WCPM measures. Table 3 reports the results of 10 regressions, nine of which employ spline modelling with different breaks. As in previous regressions we include school-level fixed effects in all regressions as well as age, gender, words read incorrectly and words skipped. Given the different functional form specification it is helpful to interpret the non-spline regression before proceeding to the interpretation of the spline modelling.

In the non-spline regression, the coefficient on WCPM of 0.35 can be interpreted as showing that for a one word increase in WCPM there is a 0.35 % point increase in comprehension score, holding all other factors constant. As earlier, this relationship is strong and statistically significant at the 1 % level. The spline regressions each report the slope coefficient on WCPM both before the “break” and after the “break”. Based on the distribution of WCPM we institute breaks at 40 WCPM and raise the break-point by 10 WCPM in each regression all the way up to 120 WCPM. The marginal effects coefficient shows the difference in the slope coefficient before and after the break, and whether the difference is statistically significantly different from zero. For the first spline regression (40 WCPM), the slope coefficient for additional WCPM up to 40 WCPM is 0.3648 and after 40 WCPM is 0.3485. This difference ( $-0.0163$ ) is reported in the marginal effects row but is not statistically significantly different from zero.

If one observes the regression outputs of all the spline regressions ranging from breaks at 40 WCPM all the way to 120 WCPM (in conjunction with the marginal effects coefficient for each regression), it becomes clear that the returns to additional fluency are relatively uniform and large up to 70 WCPM, but thereafter they decline. This is shown by the statistically significant marginal effect in the 70 WCPM spline. In this regression an additional 10 WCPM adds 3.876 % points to comprehension up to 70 WCPM, but after 70 WCPM an additional 10 WCPM only adds 2.779 % points to comprehension. This difference is statistically significant, as can be seen in the marginal effects row. Furthermore, the returns to additional fluency after 70 WCPM continue to decline as one moves to higher and higher levels of WCPM—as can be seen by the increasing difference in the marginal effects row. In fact, after 110 WCPM there do not appear to be additional comprehension benefits to increased fluency, at least none that are statistically significant for this sample. This may be because so few students in the sample actually scored at 110 WCPM or above (only 3 % of the sample).

What this analysis seems to suggest is that, unlike L1 English speakers where returns to additional fluency are highest up to 90 WCPM (Fuchs et al., 2001; Spear-Swerling, 2006), for L2/ESL speakers the returns to additional fluency are highest up to 70 WCPM, where after they are still positive but decline as WCPM increase.

## Discussion

While this study confirms at Grade 5 level the comprehension problems that PIRLS 2006 and 2011 identified amongst Grade 4 and 5 learners, it also identifies very poor reading fluency skills, which index basic reading skills. The low ORF and reading comprehension scores in this study point to what we believe are severe reading instructional deficiencies in our primary schools. Although anecdotally the common perception is that teachers spend too much time on the mechanical aspects of reading to the detriment of comprehension, these results suggest that whatever time is being spent on the mechanics of reading, it is ineffective and inadequate. McGuiness (2004) argues that “reading is a learned skill. Ignorance or incompetence in teaching this skill can produce a large number of children with severe reading problems” (2004, p. 217). The South African evidence would seem to support this.

It could be argued that ORF and reading comprehension measures in L2 reading may not correlate as strongly as in L1, because L2 learners with low proficiency in the L2 may learn to decode texts without necessarily understanding what they read. This is often referred to as ‘barking at print’ (Samuels, 2002). Two points can be made here: if 41 % of the sample of our 1772 learners is reading at less than 40 WCPM after five years of schooling, then they cannot even ‘bark at print’. They clearly have not yet developed even elementary word recognition or word attack skills. Furthermore, fluency is an outcome of learned skills. Exposure to print and practice in reading extended texts is critical for developing fast and accurate reading (Adams, 1990; Nathan & Stanovich, 1991; Blachowicz et al., 2006). The fact that the Grade 5 learners in this study were performing at ORF levels similar to remedial Grade 2 L2 learners in Florida State, USA, suggests that, unlike the Florida schools, systematic reading is not being taught in South African rural primary schools and there is little exposure and practice. Spear-Swerling (2006) argues that fluency in the early years only increases if children are familiar with letter-sound relationships, and have acquired fairly accurate decoding skills for common words.

Much of local qualitative literature stands in firm support of the above. There is evidence that much of the activity that passes for teaching and learning in South African classrooms involves whole class oral chorusing of information with little attention to meaning, with a strong emphasis on oral group teaching, to the detriment of reading and writing, especially the reading and writing of extended texts, individualised reading and individualised assessment of reading (Hoadley, 2012; Zimmerman & Smit, 2014; Pretorius, 2015). Lack of attention to reading and its assessment not only has detrimental consequences for the development of skilled reading but also for improvements in L2 proficiency. Given that English is also the LoLT, this lack of proficiency has dire consequences for learning across the curriculum and is arguably a binding constraint for progress in all subjects.

The research literature indicates that fluency develops most quickly in the early grades, with the growth curve tapering off as children move up through the grades. The fact that the Grade 5 children in this study still have exceptionally low ORF scores suggests, we believe, instructional deficiencies in the earlier grades with

regard to early reading as well as ESL development. The fluency growth that should have happened earlier under sound instructional practices in Grades 1–3 clearly never happened, and learners are lagging behind. The research by Mathson et al. (2006) shows that accuracy is an important first step in fluency development. The concomitant drop in comprehension with inaccurate reading found in this NEEDU study confirms the importance of accuracy in skilled reading. The fairly strong effects still found amongst the Grade 5 learners is also suggestive of their immature reading skills. Slow and inaccurate decoding is typical of the early stages of reading but by Grade 5 these effects should start tapering off. We would argue that South African teachers need to do individual reading assessments in the early grades in order to monitor reading trajectories and identify and remediate reading problems early.

The levelling-off effect between the higher ORF scores and comprehension in this data set is not unexpected. This is attributed to the changing nature of reading development and different constraints kicking in at different levels. As mentioned previously, once reading becomes faster and more accurate, other processes critical for reading comprehension come to the fore, including ESL knowledge. L2 readers develop language proficiency at the same time as their L2 reading develops. If learners have difficulty decoding new words or recognising familiar words in context, then the chances of learning their meanings and making sense of the text diminish. This also diminishes ESL learning in general. As they get older, learners are expected to read longer, more complex texts, and higher-order reading skills such as making inferences, integrating textual information and breadth and depth of vocabulary knowledge become increasingly important in reading expertise. The leveling-off trend among the Grade 5 learners in this study also points to the need for good reading interventions that target vocabulary development and the subskills of reading for ESL readers. As the literature suggests (e.g., Silven et al., 2004; Jimerson et al., 2013), the development of reading subskills may be better markers of reading development than ESL or low SES. ESL reading also promotes ESL development.

### **Practical implications**

In South Africa, as in most developing countries, there is a convergence of risk factors that impact on reading development. These include widespread low SES, limited access to print resources, and a lack of good reading instructional programmes in the early years for African languages and English. While education systems do not have control over parental SES, they can effect changes in schools with regard to classroom practices. The appallingly low literacy levels of South African learners across the grades strongly suggest that effective reading instruction is a serious challenge for teachers. As this Grade 5 study shows, by not acquiring basic reading skills in the Foundation Phase, learners who depend on ESL reading for their studies from Grade 4 onwards are ‘silently excluded’ from learning since they struggle to engage with the curriculum in higher grades and fall further and further behind.

Many of the students in this study battled with even basic reading skills, which raises questions about the type of reading instruction to which these learners have been exposed. In his research on initial teacher education, Taylor (2014) found that in six universities across South Africa, courses on literacy development and instruction only constitute about 6 % of the curriculum for teacher training and development. This suggests that teachers are not being taught much about reading or how best to teach it. We recommend that urgent attention be given to the type of literacy interventions that would best serve bilingual education systems in developing countries, especially in contexts where teachers are faced with large classes and large numbers of children from high poverty, print poor communities, and where literacy is often perceived in narrow and mainly functional terms. This is especially important for Foundation Phase (Grade 1–3) teachers on whom the responsibility of establishing sound basic reading skills falls. A myopic view of fluency where instruction focuses mechanically on getting children to read faster is not what is being advocated here. What is called for instead is an approach that develops decoding and comprehension skills in tandem, builds learners' vocabulary, and provides them with plenty of opportunities to practice reading connected text in meaningful ways in both home language and ESL, thereby forming bridges between reading fluently in African languages and in English, in preparation for the transition to English in Grade 4 and the reading of more challenging English texts when reading to learn.

In addition, given the converging evidence, internationally and locally, that ORF scores reliably predict reading comprehension and reading ability in general in both L1 and L2, it is important to set up ORF benchmarks for ESL reading in the local context. Even if these norms are later adapted in the light of new L2 reading research evidence, benchmarks serve an important purpose in making teachers aware of fluency developmental trends, of what is possible in reading development, and of raising expectations of what children can achieve, even if they are L2 readers. Awareness of ORF scores can serve as a powerful preventative practice, with higher chances of early identification of reading problems and intervention rather than later attempts at remediation.

## Conclusion

Using a large sample of schools (213 schools) and students (1772 students) we have shown that the relationship between oral reading fluency and reading comprehension is large and robust for Grade 5 ESL students in rural South Africa. Our analysis showed that an additional 31 words correct per minute (1 SD) was associated with a 14 % point increase in comprehension score (0.7 SDs) after controlling for all school-level variables and certain student-level variables (age and gender).

Secondly we showed that the returns to additional fluency are not uniform across the ORF distribution. In a similar finding to the L1 research base, we found that comprehension returns to additional fluency are higher at lower levels of fluency, and decrease once a certain threshold is reached. However, unlike the L1 research base, our data suggests that for rural ESL students in South Africa, this threshold is

at approximately 70 WCPM, rather than the 90 WCPM found in the L1 literature. Both of these findings further our current understanding of ESL reading in a developing country context, as well as add empirical evidence where it has been sorely lacking.

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