

# NEEDU GRADE 5 READING STUDY

## PILOT REPORT

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### **INTRODUCTION**

In 2013, NEEDU will assess Grade 5 learners' reading in terms of their oral reading fluency and reading comprehension. The sample for the reading comprehension test will be all learners in one Grade 5 class at each of the Primary schools evaluated by NEEDU in 2013. The class will be randomly selected from all the possible Grade 5 classes. All of these learners will write a 40 minute written comprehension test to assess reading comprehension at the level of Grade 5. In addition to the written test, 10 learners will be selected (top, middle and bottom achievers) to participate in the Oral Reading Fluency test. In the ORF, the learners will read two passages to determine their oral reading fluency measured as a rate of words read correctly in one minute. Their understanding of the passage will be tested by asking the learners 5 questions related to the passage read. The study will examine, among other things, the relationship between a learner's written comprehension and oral fluency at Grade 5. In 2013, the reading study will only be conducted in English but will be expanded to include Afrikaans at a later stage. The initial part of the study involved the development and piloting of the tests to ensure that valid and reliable data are being collected for further analysis. This report discusses that pilot component of the study.

### **NEEDU GRADE 5 READING STUDY PILOT**

Grade 4 and Grade 5 textbooks were used to select two passages appropriate to Grade 5 to assess oral reading fluency with 5 accompanying oral comprehension questions. In addition, an appropriate Grade 5 level passage was selected to assess reading comprehension in the written mode, using a range of literal and inferential questions in a mixed question format.

#### **Readability**

Readability refers, broadly, to the ease or difficulty with which texts are read. Since the 1940s various readability formulae have been used to quantify aspects of texts that are deemed to play a role in determining the ease with which texts are read. These readability formulae invariably incorporate word length and sentence length in relation to overall text length, the assumption being that short words and short sentences are easier to read than longer words and sentences. Examples of readability formulae include the Flesch Reading Ease (RE), the Dale-Chall and the Grammatik formulae. Although the assumptions underlying the readability formulae have been criticised for oversimplifying the reading process, since there are several text-based and reader-based that affect reading ease, they continue to enjoy popularity as predictors of text difficulty.

The Flesch Reading Ease formula has been used in this analysis, primarily because it is easily available and in the educational context, serves as a useful guideline for establishing consistency across texts at specific grade levels. According to Hubbard (2005: 56), the Flesch readability formula uses two factors, namely syllables per 100 words and words per sentence, fitting these into the formula:

$$RE = 206,835 - (0,846 \times \text{syllables per 100 words}) - (1,015 \times \text{words per sentence})$$

The analysis also determines the number of passive constructions used in a text. Passives are considered slightly more difficult to read than actives. The higher the number obtained from the computation, the easier the text is regarded as being while the lower the number, the more difficult the text. The scores have been measured in terms of readability categories, as shown in Table 1 below.

**Table 1: Reading Ease categories (based on the Flesch reading ease formula)**

RE score	Age/Level	For average adult reader
90-100	10 years	very easy
80-89	11 years	easy
70-79	12 years	fairly easy
60-69	13-14 years	standard
50-59	15-17 years	fairly difficult
30-49	18-21 years (undergraduate)	difficult
0-29	Graduate	very difficult

Most academic/scientific texts and research articles fall into the last two categories of RE. One would expect Grade 4 and 5 textbooks to fall within the 90-70 range of scores.

Using American textbooks as the data base, the Flesch-Kincaid formula was used to determine the reading ease of texts written for the different grades. These scores reflect the actual grade level, e.g. a score of 6 would indicate a text appropriate for Grade 6.

This readability score does not reflect aspects such as the persuasiveness or credibility of a text or its interest level. It is to be expected that the RE score drops the more abstract and complex a topic is. The use of technical terms (e.g. *pollution, precipitation*) as well as general academic terms (e.g. *operates, features*) also affect RE.

A selection of Grade 4 and 5 textbooks across various subjects was obtained from primary schools in Atteridgeville and Mamelodi respectively. From each textbook, 4 passages were selected, one from the beginning, two from the middle and one from the end. These passages were scanned and converted into MS Word text files; all the pictures and diagrams were removed and only running text used for the readability analysis. The results are given in Table 2 and Table 3 below.

**Table 2: Flesch RE in Grade 4 textbooks**

	English AL	Maths	Life Skills	Social Science	Science <sup>†</sup>
Words in sample texts	1,057	1,060	777	963	918
sentences	105	101	58	74	76
words per sentence	8.5	8.7	10.1	12.3	11.5
characters per word	4	4.1	4.2	4.3	4.3
passives	1%	2%	5%	9%	10%
RE	82,8	75.2	83	72.9	76.1
Flesh-Kincaid grade level	3.8	4.8	4	6.1	5.5

<sup>†</sup> This textbook was entitled *Our World* (a Vivlia book), with no further indication of the content subject. It dealt with both physical geography and history topics.

The RE range of the Grade 4 textbooks was between 82 – 72, falling within the ‘easy’ to ‘fairly easy’ categories, while that of the Grade 5 textbooks was between 84 – 68, falling between the ‘easy’ to ‘standard’ categories.

**Table 3: Flesch RE in Grade 5 textbooks**

	English FAL	Maths	Technology	Social Science	Physical science
words	977	1,987	836	881	894
sentences	30.3	165	64	63	71
words per sentence	10.4	9.9	12.5	13	11.8
characters per word	4	4.2	4.4	4.6	4.3
passives	3	7%	26%	12%	18%
RE	84.8	78	74.7	68.5	75.9
Flesh-Kincaid grade level	4	4.8	5.9	6.9	5.6

As to be expected, there was a gradual decrease in RE scores from Grade 4 to Grade 5, with concomitant increases in the use of passives and more words per sentence, particularly in the content subjects. The latter textbooks also carry an increase in the use of specialist technical words as well as general academic words. It is interesting to note that across both grades the RE scores were higher (i.e. hence easier) in the English and Maths texts than in the other content subject texts.

### **Selection of passages**

The outcome of the readability analysis conducted here served as a guideline for Steps 2 and 3, namely the selection of two passages appropriate to Grade 4 and 5 levels to assess oral reading fluency, and the selection of a passage appropriate to Grade 5 level to assess reading comprehension in the written mode.

### **Reading comprehension passage**

Two passages were selected as the base for written reading comprehension test. Eleven questions were asked, 5 based on the first passage, and 6 based on the second. The reliability scores of the combined comprehension passages, as well as the readability score of the questions are show in the table below.

**Table 4: Readability score of combined comprehension passages**

Words:	537	Flesch RE:	82.3
Words per sentence:	12.7	Flesch-Kincaid grade level:	4.9
Characters per word:	4.1		
Passives:	4%		

**Table 5: Readability score of questions**

Words:	344	Flesch RE:	92.2
Words per sentence:	11.9	Flesch-Kincaid grade level:	3.3
Characters per word:	3.8		
Passives:	4%		

**Table 6: Question types**

Information process	Questions	Total Questions	Total Marks
Retrieve explicitly stated (literal) information from a text	1, 9, 10b	3	3
Make (straightforward) inferences from information given in a text	2, 3, 4, 5, 6, 10a, 10c	7	9
Integrate ideas and information across the text	7, 8	2	5
Examine and evaluate the text	1	1	3
		13	20

### Reliability of Written comprehension test

Based on the learner results, a Cronbach's alpha analysis was done. Cronbach's alpha is 0.83 which indicates good reliability of the overall test. The results are shown below.

**Table 7: Cronbach's alpha of test**

Test scale = mean(unstandardized items)

Item	Obs	Sign	item-test correlation	item-rest correlation	average interitem covariance	alpha
q1	570	+	0.3431	0.2528	.1206987	0.8403
q2	570	+	0.6768	0.6154	.1091658	0.8212
q3	570	+	0.6550	0.5598	.1041384	0.8217
q4	570	+	0.7057	0.6103	.0996649	0.8174
q5	570	+	0.5132	0.4280	.1142388	0.8312
q6	570	+	0.5388	0.4701	.1152269	0.8299
q7	570	+	0.6713	0.5505	.0990097	0.8241
q8	570	+	0.6532	0.5780	.1078144	0.8218
q9	570	+	0.6706	0.6053	.1086828	0.8212
q10a	570	+	0.5083	0.4252	.1147178	0.8315
q10b	570	+	0.5477	0.4766	.1144835	0.8293
q10c	570	+	0.4382	0.3516	.1173817	0.8354
q11	570	+	0.7355	0.5994	.0901864	0.8259
Test scale					.1088777	0.8384

Based on the item results, a few adjustments were made to the original test where questions were reported as being somewhat ambiguous: the sequence of Q1 and 2 were changed around; Q1-5 were changed to follow the first passage and Q6-11 to follow the second passage; the phrasing in Q5 was changed to make it less ambiguous/narrow the options for a correct answer; additional acceptable correct options were included in the memorandum for the 'give-reason' types of questions.

### Oral Reading Fluency Passages

Two passages were chosen to test oral reading fluency. The first passage was 205 words long (including the title), had a Flesch Readability Ease score of 84.7, making it suitable for testing learners at the end of Grade 3. The second passage had 269 words (including the title) and a Flesch Readability Ease of 83.3, making it suitable for testing learners in the middle of their Grade 4 year.

**Table 8: Readability score of passage (ORF 1): A traditional story - How Leopard got his spots**

Words:	205	Flesch RE:	84.7
Words per sentence:	9.8	Flesch-Kincaid grade level:	3.8
Characters per word:	4.1		

**Table 9: Readability score of passage (ORF 2): A traditional story from Africa: How Hare got his long ears**

Words:	269	Flesch RE:	83.3
Words per sentence:	10.8	Flesch-Kincaid grade level:	4.3
Characters per word:	4.1		
Passives:	4%		

These two passages were selected as suitable for testing learners at the start of their Grade 5 year.

### PILOT TEST

The written comprehension test was administered to 570 Grade 5 learners in 16 schools across all nine provinces. The learners were given 40 minutes in which to complete the test. All scripts were marked by NEEDU evaluators using a memorandum provided by the test developers. The test consisted of a total of 11 questions with one of those questions divided into three sub-questions. The maximum possible score was 20.

### Learner Results

An analysis of each item was done, giving the percentage of learners who obtained 0, 1, 2 or 3 for each question asked. These results are shown below.

**Table 10: Percentage learners scoring minimum and maximum scores for each question**

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10a	Q10b	Q10c	Q11
Total possible score	1	1	2	2	1	1	3	2	1	1	1	1	3
scored 3							5.6						11.6
scored 2			10.5	15.6			19.6	4.4					26.8
scored 1	29.8	35.3	34.2	24.0	49.3	76.8	43.9	21.8	53.3	38.1	73.7	33.2	20.0
scored 0	70.2	64.7	55.3	60.4	50.7	23.2	30.9	73.9	46.7	61.9	26.3	66.8	41.6

The highest score was 18 (1 learner), the lowest was 0 (25 learners) and the average score was 7 out of 20. The frequencies of achieved scores are shown on the table below. Just over a third (36%) of learners scored 10 or more (50% or higher) on the written comprehension test.

**Table 11: Analysis of test results**

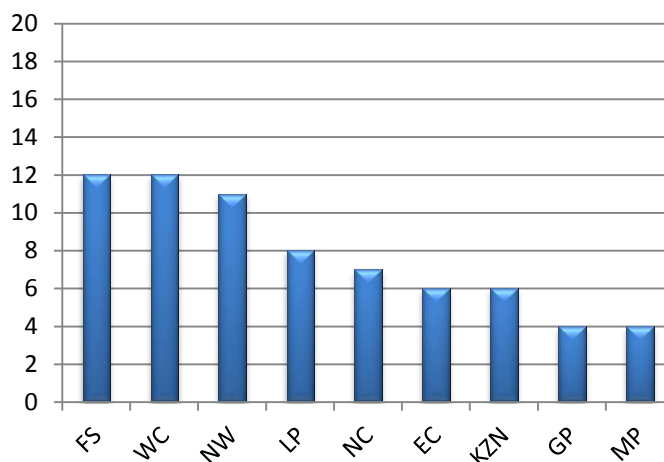
Test Score (out of possible 20)	Frequency (n)	%
0	25	4
1	37	6
2	39	7
3	37	6
4	54	9
5	46	8
6	41	7
7	32	6
8	27	5
9	30	5
10	30	5
11	32	6
12	40	7
13	22	4
14	35	6
15	23	4
16	10	2
17	9	2
18	1	0
19	0	0
20	0	0

**Analysis of results per province**

The written test results were analysed per province for the 570 written scripts. It is important to bear in mind that the pilot was a small sample and scores for each province may not necessarily represent the learner achievement of the entire province. Comment on that can only be made once the full study has yielded data. Nonetheless, the results give some insight into what we may expect.

**Table 12: Average scores per Province**

Province	Average Score
EC	6
FS	12
GP	4
KZN	6
LP	8
MP	4
NC	7
NW	11
WC	12



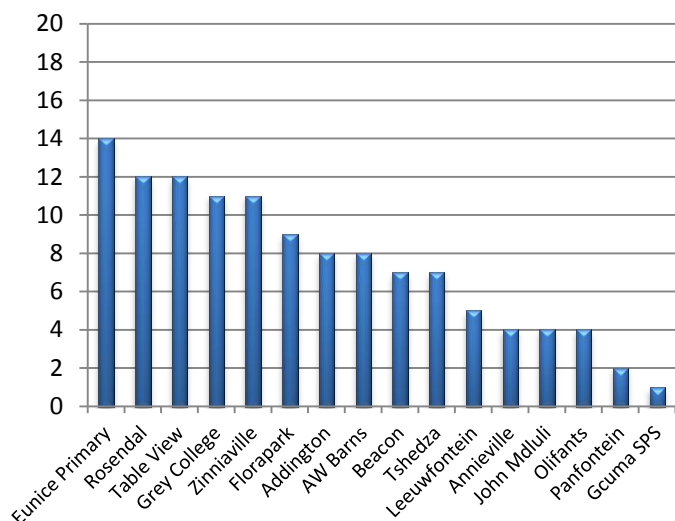
Learners from both FS and WC schools achieved the highest average scores (12 out of 20) of the nine provinces in the sample while learners from schools in MP and GP achieved very low average results of 4 out of 20.

### Analysis of results per school

Again, the sample of schools was small, and the sample of learners in each school was not the same. One class of Grade 5 learners was taken from each school but some school had as many as 45 learners in a class, and others as few as 20 learners. The results are shown graphically below.

Table 13: Average scores per school

School	Average Score
Addington	8
Annieville	4
AW Barns	8
Beacon PS	7
Eunice Primary	14
Florapark Comp P	9
Gcuma SPS	1
Grey College PS	11
John Mdluli	4
Leeuwfontein PS	5
Olifants	4
Panfontein	2
Rosendal	12
Table View Primary	12
TshedzaPS	7
Zinniaville Secondary	11



Learners at the highest scoring school, Eunice Primary, scored an average of 14 out of 20, while learners at the lowest scoring school, Gcuma Primary score a very low average of 1 out of 20. Seven of the 20 learners tested at this school scored zero on the written comprehension test.

### ORAL READING FLUENCY TESTS

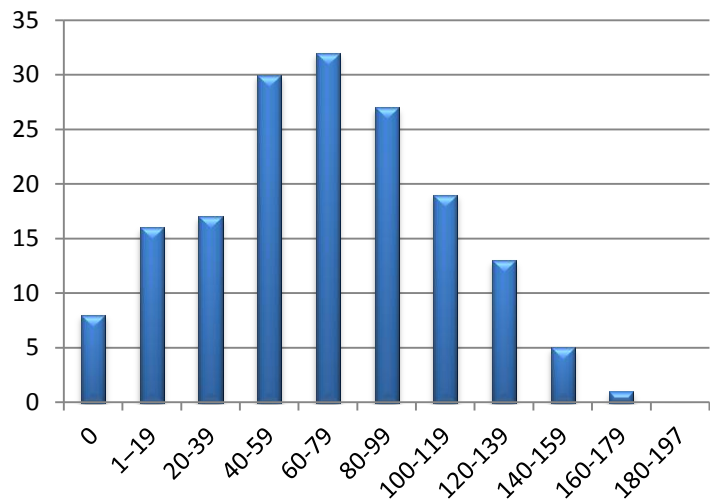
The written comprehension tests were marked and based on the score out of 20, 10 learners were selected to participate in the ORF test. The top three, middle four and bottom 3 learners were selected, given a total of 10 learners from each grade 5 class. The learners were given a time of 1 minute to read the text and the number of words read correctly in that time recorded.

#### Learner Results for ORF 1 and ORF 2

A total of 168 learners participated in the first ORF test. Only those learners who were able to complete the first paragraph of the ORF test, more than 56 words were asked to continue with the second ORF test. This resulted in 124 learners participating in the second ORF test. For the 168 learners who participated in the ORF 1, the average Total Words Read Correctly (TWRC) was 68 in one minute.

**Table 14: ORF 1**

TWRC	Frequency
0	8
1-19	16
20-39	17
40-59	30
60-79	32
80-99	27
100-119	19
120-139	13
140-159	5
160-179	1
180-197	0
Total	168



For the 124 Learners who continued with the second ORF test, they achieved an average of 86 TWRC in one minute. The majority of learners read with a fluency of between 40 and 100 correct words per minute. Eight learners could not read any of the words in the first ORF passage, and nine could not read any words from the second ORF passage. The highest reading fluency was 175 WPM for the first passage and 196 WPM for the second, both scores from the same learner.

**Table 15: ORF 2**

TWRC	Frequency
0	9
1-19	3
20-39	3
40-59	5
60-79	34
80-99	30
100-119	20
120-139	7
140-159	9
160-179	3
180-199	1
200-219	0
220-239	0
240-243	0
Total	124

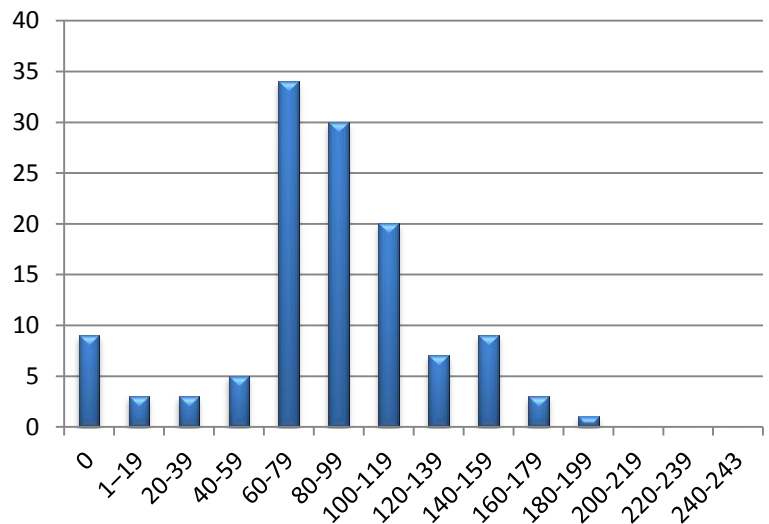




Table 16: Average results per school (ORF 1)

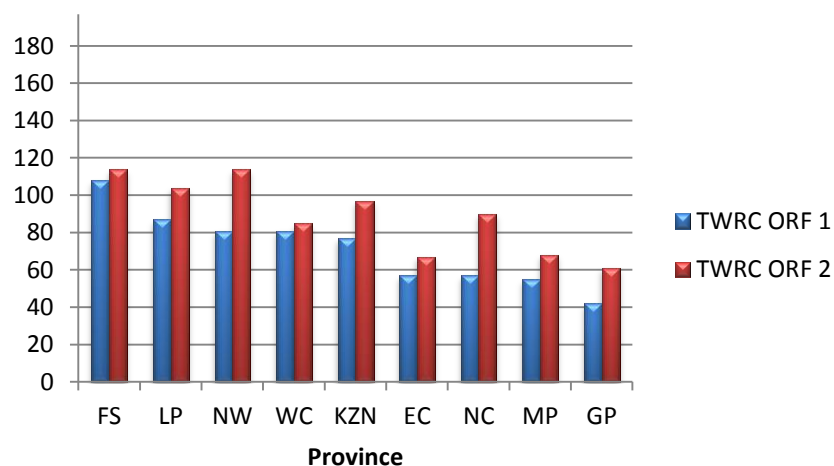
Province	School	Words Skipped	Words read incorrectly	Lines skipped	Time	TWRC	Comp Qs	Words Skipped	Words read incorrectly	Lines skipped	TWRC	Comp Qs
		ORAL READING FLUENCY 1						ORAL READING FLUENCY 2				
KZN	Addington	1	6	0	60	90	4	1	2	0	97	3
KZN	Annieville	0	8	0	60	51	2	Did not test ORF 2				
EC	AWB	2	4	0	60	63	4	1	4	0	84	2
NC	Beacon PS	3	3	0	60	57	3	1	2	0	92	4
FS	Eunice Primary	1	2	0	60	116	5	2	2	1	125	4
LP	Forapark PS	1	7	0	60	76	3	1	Did not capture	0	91	3
EC	Gcuma SPS	1	5	0	48	14	0	1	5	0	18	0
FS	Grey College PS	2	1	0	60	101	4	3	1	0	102	3
MP	John Mdluli	5	11	0	60	55	2	1	6	0	68	2
GP	Leeuwfontein PS	0	14	0	60	39	1	0	6	0	69	2
GP	Olifant	1	2	0	60	42	2	0	2	0	118	3
GP	Panfontein	4	9	0	60	46	2	2	3	0	42	1
WC	Rosendal	0	4	0	60	81	4	0	3	0	85	4
EC	Table View PS	3	3	0	60	88	4	2	2	0	99	4
LP	TshedzaPS	0	5	0	60	97	3	0	4	0	116	3
NW	Zinniaville Sec	1	4	0	60	81	4	1	Did not capture	0	114	4

## ORF per Province

An analysis of the ORF scores for each learner was done for each of the nine provinces that participated in the pilot study. The average scores are shown in the table below, and represented in Figure 1.

**Table 17: ORF 1 Per Province (average scores)**

Province	Words Skipped	Words read incorrectly	Lines skipped	TWRC	Comp Qs	Words Skipped	Words read incorrectly	Lines skipped	TWRC	Comp Qs
EC	2	4	0	57	3	1	4	0	67	2
FS	2	2	0	108	4	2	2	0	114	4
GP	2	8	0	42	2	1	4	0	61	2
KZN	0	7	0	77	3	1	2	0	97	3
LP	1	6	0	87	3	1	4	0	104	3
MP	5	11	0	55	2	1	6	0	68	2
NC	3	3	0	57	3	1	2	0	90	4
NW	1	4	0	81	4	1	0	0	114	4
WC	0	4	0	81	4	0	3	0	85	4



**Figure 1: ORF 1 and 2 Scores per province**

Learners in Free State achieved an average Total Words Read Correctly of 108 wpm for the first reading passage, and a slightly higher average score of 114 wpm for the second passage. The learners who achieved the lowest scores were in Gauteng, with an average TWRC of only 42 wpm.

## Conclusion

All schools that participated in the pilot welcomed the NEEDU evaluators and were receptive to the testing of their grade 5 learners. Our evaluators tried to keep disruptions to schooling to a minimum but are well aware that in some cases, the school timetable was interrupted. We are extremely grateful to those schools who participated in the pilot and who make research such as this possible.

*It must be noted that the purpose of this pilot study was to test the reading instruments (both written and oral) for reliability and validity, rather than to get accurate achievement scores from those learners tested.* The results of the pilot study were used to inform changes to the tests to ensure maximum consistency in results moving forward with the main study. Based on the results, the written comprehension test was adjusted slightly to minimise ambiguity in some of the questions, and minor errors in the Oral Reading Fluency tests were corrected.

Despite this, the results obtained are still interesting and worth noting. The low reading comprehension of the Grade 5 learners tested, while not unexpected, is cause for great concern, as is the low Oral Reading Fluency. Both of these deficits will have significant impact on a learner's ability to learn as they move through the intermediate phase of schooling. Of particular concern is those learners who achieved a zero score on the written comprehension and ORF tests, indicating that they are unable to read in English. At this stage, it remains the responsibility of the SMT at these schools to ensure that reading is carefully monitored in the school, especially in the foundation phase to ensure that no learner reaches the intermediate phase unable to read.