



Literacy, Language and Learning Initiative (L3)

RWANDA NATIONAL READING AND MATHEMATICS ASSESSMENT BASELINE REPORT

December, 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by Education Development Center, Inc. and do not necessarily reflect the views of USAID or the United States Government.

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)

Literacy, Language and Learning Initiative (L3)

RWANDA NATIONAL READING AND MATHEMATICS ASSESSMENT BASELINE REPORT

Cooperative Agreement AID-696-A-11-0006

EDUCATION DEVELOPMENT CENTER (EDC)

Date: December 2014

DISCLAIMER:

This report is made possible by the support of the American people through the United States Agency for International Development (USAID). The contents of this report are the sole responsibility of Education Development Center, Inc. and do not necessarily reflect the views of USAID or the United States Government.

EXECUTIVE SUMMARY

The Literacy, Language and Learning Initiative (L3), funded by the U.S. Agency for International Development (USAID) and implemented by a partnership led by the Education Development Center, Inc. (EDC), is designed to improve P1 to P4 students' reading and mathematics skills. L3 is assisting the Ministry of Education (MINEDUC) in the implementation of a comprehensive early literacy and mathematics program, including support for transition to English as a medium of instruction in the 4th grade (P4).

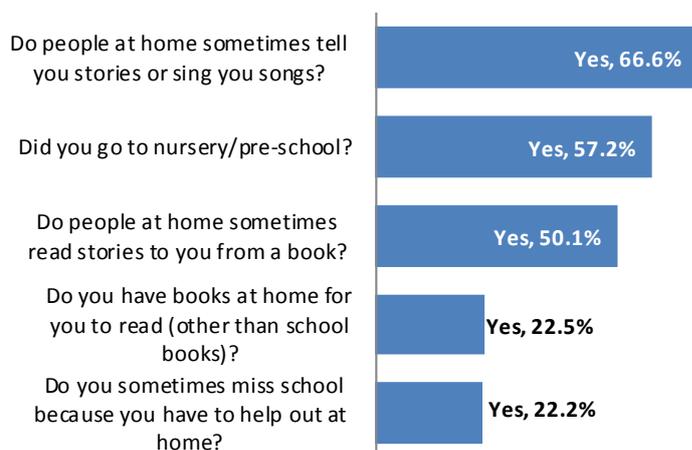
One of L3's major goals is to improve the quality of literacy teaching in Kinyarwanda and in English, and mathematics teaching in primary grades 1-4 (P1-P4). To gather information on student achievement, as well as to support Rwandan Education Board (REB) in establishing a system of regular national assessments, L3 conducts periodic assessments of student achievement in literacy and mathematics. The assessments include a test of oral reading fluency and comprehension, and a mathematics test. This report presents results of the national baseline reading and mathematics assessment, conducted in September of 2014 in collaboration with REB.



Study design. The assessment included Primary 1, 2 and 3 students (P1, P2 and P3). It aimed to collect nationally representative data on oral reading fluency and mathematics achievement among students in Primary 1, 2 and 3. Students from 60 schools in 30 districts in five provinces were selected randomly. One P1, one P2 and one P3 section in each school was selected at random for the study, and assessors were tasked with randomly selecting 5 boys and 5 girls students from the class registers

of each P1, P2 and P3 section, for a total of 30 students from each school. Altogether, 1,799 students took part in the assessment. Their results were weighted to provide population estimates.

Home background survey



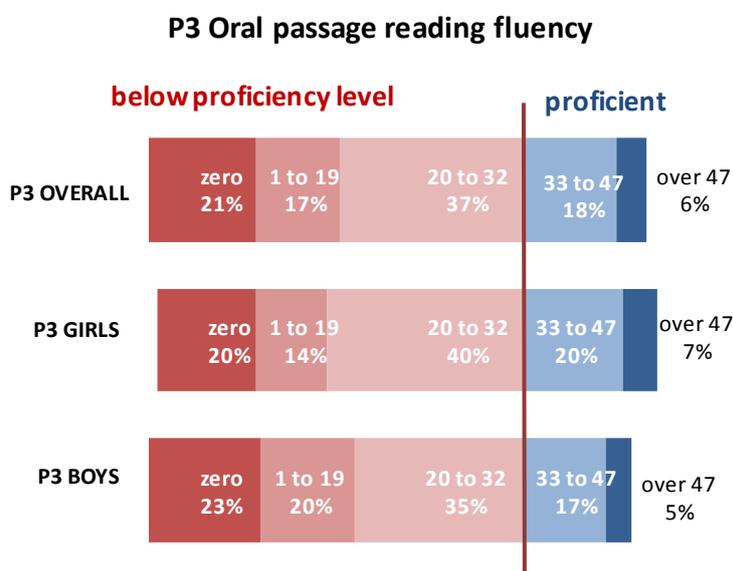
In addition to testing students, the assessment teams also gathered data on learner and school background characteristics and the availability of L3 materials. Student background survey collected data on student socio-economic

status, literacy practices at home, and teacher practices related to literacy.

Overall results of this baseline assessment showed that students in P1 and P3 did slightly better in math than in reading, and in P2 slightly better in reading. The data analysis found that girls did slightly better than boys in oral reading fluency, but slightly worse in math.

Oral Reading Fluency. Overall, the baseline assessment found that the majority of tested Primary 1 and Primary 2 students were just beginning to develop oral reading fluency skills. About 7 percent of P1 and 41 percent of P2 students could read a grade level text with some oral reading fluency (over 20 words per minute); 60 percent of P1 students and 33 percent of P2 students could not read a single word.

Students who had just finished P3 at the time of the assessment demonstrated developing oral reading fluency skills. About 25 percent of P3 students read a grade level text with the adequate speed for their grade level (33 words per minute or faster). About 37 percent of P3 students could read with a speed between 20 and 33 correct words per minute, and 17 percent were beginning readers, reading between one and 20 correct words per minute. About 21 percent of P3 students could not read a single word of the passage.



Since national standards for Primary 2 oral reading fluency have not been established yet, draft proficiency standards for Primary 3 proposed by L3 only were used in the analysis. According to these draft proficiency standards, Primary 3 students are considered proficient in reading if they read between 33 and 47 words of a grade level text in Kinyarwanda per minute. The side figure shows a distribution of grouped results for oral reading fluency

according to the P3 draft proficiency standards. The results are weighted to provide an estimate of the population of Rwanda P3 students.

An analysis of grouped results by school shows that U-pattern of student achievement in oral reading fluency is not just found on the national scale, but it also persists within schools, particularly in P1 and P2. This means that schools and classrooms have students who are able to read a grade-level passage, as well as students who are still mastering the basics of reading. This diversity of proficiency levels within classrooms undoubtedly presents a major challenge for teachers, who would need access

to teaching and learning materials for students of different levels to be able to differentiate instruction effectively.

Comprehension subtest results of the baseline assessment mirror the U-curve pattern of the percent of words read correctly in the text. Since a true measure of comprehension can only be taken when a student reads the text about which the questions are asked, an analysis of comprehension results among students who read more than 80 percent of the text was conducted. The results showed that 58.5 percent of P2 and 17% of P3 students who actually read the text were able to answer four or five literal comprehension questions. P3 students who answered 4 or 5 comprehension questions read the text with the average speed of 44.1 wcpm. Only 5% of P3 students read with the grade-level speed of 33 wcpm or faster and answered 4 or 5 comprehension questions.

Gender comparisons did not show any statistically significant differences beyond the difference in the oral reading fluency of reading. Both boys and girls who managed to read the test passage were also able to answer comprehension questions, indicating appropriate vocabulary knowledge for their grade level. However, age was found to be a significant negative predictor of achievement, with older students performing significantly worse on the test.

Overall, oral reading fluency baseline assessment results show that only a small proportion of students are reading well enough for their grade level. Those students who were able to read the text were also able to answer comprehension questions. Since literacy instruction is conducted in the mother tongue of the vast majority of students, it is probable that the major obstacle to reading is decoding.



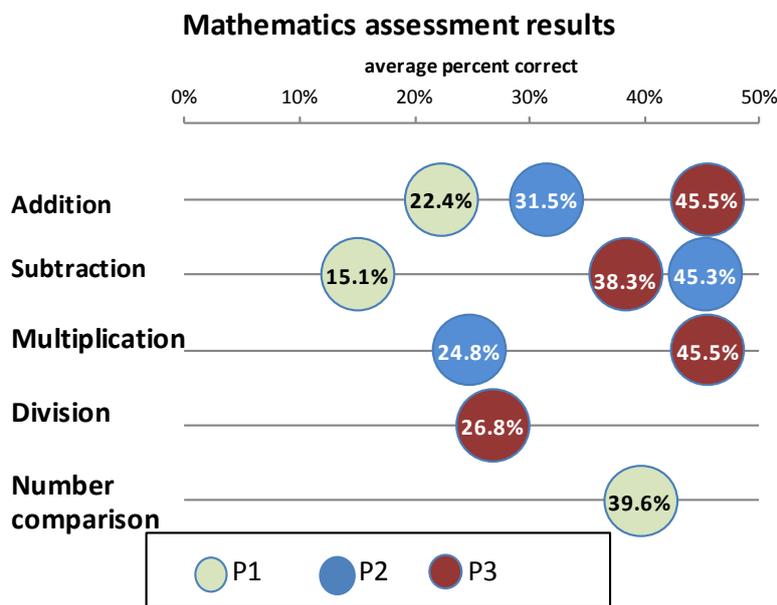
These results are corroborated by the findings of the EGRA assessment conducted in 42 out of 62 sampled schools in 2011 by RTI that found a large proportion of non-readers in P4 classrooms, and overall slow reading performance among tested students,¹ as well as by L3's pilot study in March of 2014. Those reports also found that decoding skills in Kinyarwanda were not well solidified by P3/P4, with the average rate of decoding words quite low. However, listening comprehension results were quite high, indicating that many students do possess grade-level vocabulary.

Mathematics. Baseline mathematics assessment included three timed subtests, with 10 grade-level tasks each. Findings from the mathematics assessment were somewhat similar to the oral reading fluency assessment in that a rather large proportion of students showed a lack of grade-level competency with number sense and number operations. P2 students did better adding numbers than

¹ 2011 Assessment by RTI showed that 13 percent of P4 students could not read a single word of P2/P3 level text, and another 13 percent were reading less than 15 correct words per minute. 27 percent could not answer a single comprehension question. *Task Order 7 Early Grade Reading and Mathematics in Rwanda: Final Report. February 2012. P. 3.*

subtracting numbers, while P3 students did better subtracting numbers than adding numbers. The majority of P3 students were able to complete the number comparison task correctly, while fewer than a third of P2 students were able to solve subtraction and addition problems with “10” in them.

Item-level analysis (Appendix C) shows that the majority of tested P2 and P3 students were able to work out some addition and subtraction problems correctly, but most were not able to complete all 10 problems because they ran out of time. Comparisons by gender showed that, in contrast oral reading fluency tests, where girls did better, on math tasks boys outperformed girls.



Overall, MARS results show that a large proportion of P2 and P3 students are developing procedural fluency, performing grade-level number operations with accuracy and speed. Procedural fluency is necessary for students to be able to advance to more complex mathematical problems in higher grades. However, a large proportion of P1 students could not solve any subtraction problems (59%), any addition problems

(41%) or any number comparison problems (19%). In P2, 28, 22 and 16% of students could not solve any addition, subtraction or multiplication problem, respectively. For P3 students, the hardest tasks were subtraction and division, with 18 and 26% of students failing to solve a single problem on those subtests. About 10% of P3 students had zero scores on addition and multiplication subtests. Finally, students did not demonstrate procedural fluency which they need to have to be able to advance to more complex mathematical problems.

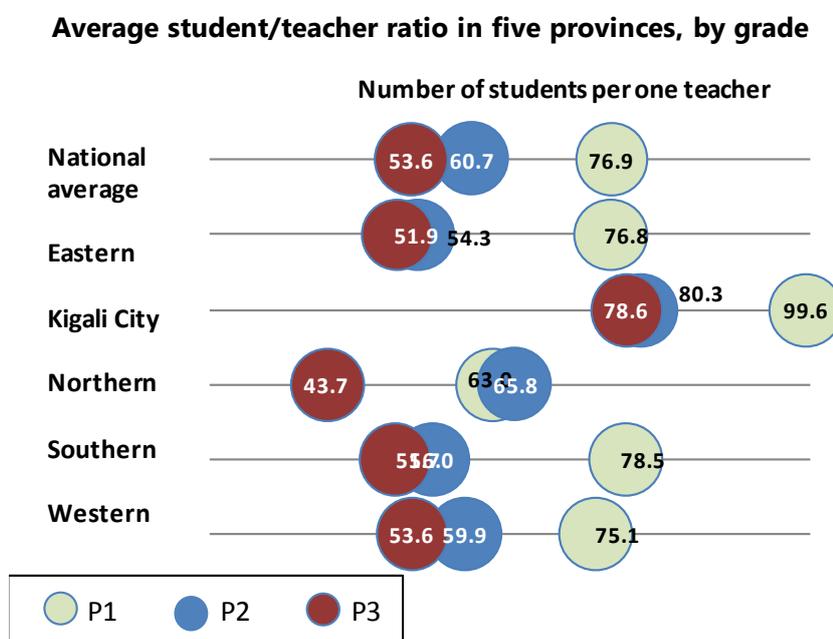
Summary. Baseline assessment results for both oral reading fluency and mathematics showed very diverse classrooms, with some students performing at grade level and a very substantial proportion of students falling significantly below grade level. To address this challenge, teachers need to regularly conduct formative assessments specific to the foundational skills being taught, and be equipped with strategies and materials to provide ongoing remediation to students who have not yet mastered those skills.

Comparisons of school-level average results on oral reading fluency and mathematics tasks found that students in the same schools do below average on both tests, and do above average on both tests. In other words, the same schools showed low average results among their P1, P2 and P3 students in both oral reading fluency and mathematics assessments. On the other end of the spectrum, in a handful of schools all tested students performed well above average. In the vast majority of schools,

however, the average student results varied greatly. Statistical comparisons of background characteristics of 20 percent of top performing and bottom performing schools did not reveal any differences in home environment, school/teacher characteristics, or socio-economic background of attending students. Furthermore, contrary to what might be expected, higher performing schools did not have lower student/teacher ratio or smaller number of students enrolled in general. The single differentiating variable was found to be distance to Kigali: higher performing schools were located either in Kigali City, or in closer proximity to Kigali. P2 and P3 students in urban school districts did significantly better than students in rural districts on both tests.

Data on school characteristics showed that, on average, schools have large P1 classrooms and a little smaller P2 and P3 classrooms. Near gender parity in enrollment was found for all three grades, with roughly equal numbers of male and female students enrolled. When analyzed by grade, the average number of enrolled students decreases as students transition into higher grades. On average, P3 has about 40% fewer students than P1. The decrease in enrollment is similar for both genders.

An analysis of student/teacher ratios showed that, on average, a P1 classroom can be expected to have 77 students per one teacher; a P2 classroom can be expected to have 61 students enrolled per one teacher; a P3 classroom can be expected to have 54 students per one teacher. Kigali City was found to have more students enrolled per teacher, compared to other provinces.



Finally, since the assessment was conducted shortly after the beginning of the L3 project rollout, teachers were asked their perceptions of the new materials and training they were receiving. Teachers who already received L3 training and materials reported that they began to successfully put them to use; the majority of teachers said they started using L3 technology two to four times a week. Teachers in all schools said they are using L3 materials, and that they found them helpful in their daily practice.

This report serves as the baseline for the L3 project. The midline assessment will be conducted in September of 2015, and the endline will be conducted in September of 2016. The results of the assessments will provide data on L3's contribution to USAID's 2011 Education Strategy Goal One of *improved reading skills for 100 million children in primary grades by 2015*.



TABLE OF CONTENTS

Executive Summary.....	i
Table of Contents.....	vii
Table of Figures.....	viii
Table of Tables.....	ix
Acronyms.....	x
Acknowledgments.....	xi
Introduction.....	1
Study Participants.....	2
Student Context Survey.....	6
Oral Reading Fluency Assessment of Rwandan Schools (FARS).....	12
Oral Reading Fluency.....	12
Comprehension.....	17
Relationship between Fluency and Comprehension.....	18
Impact of Contextual Factors on Reading.....	19
Age.....	19
Class Shift.....	20
Home Environment, School and Teacher, and Socio-Economic Status.....	21
School Location.....	22
Summary.....	23
Mathematics Assessment of Rwandan Schools (MARS).....	24
Impact of Contextual Factors on Math Achievement.....	28
Age and Other Factors.....	28
Class Shift.....	29
Summary.....	29
School-Level and Teacher-level Findings.....	30
Teachers and Students.....	30
L3 Materials and Technology.....	31
Parental and Community Involvement.....	33
L3 Training.....	34
Training by Mentors.....	35
Reading and math school-level results.....	35
Conclusion.....	38
Appendix A: Methodology.....	A-1

Appendix B: Data Collection Tools.....	A-12
Appendix C. Detailed results of statistical analyses of FARS and MARS	A-36
Appendix D. Detailed results on oral reading fluency by school	A-51

TABLE OF FIGURES

Figure 1. Demographic characteristics of sampled Students (n=1,799).....	5
Figure 2. Age by Grade.....	5
Figure 3. Home Environment Survey Results (n=1,799).....	7
Figure 4. How often do you see your mother (or main caregiver) reading books or newspapers? (n=1,799).....	8
Figure 5. School/teacher factors survey results (n = 1,799).....	9
Figure 6. Frequency of Kinyarwanda homework and reading in school.....	9
Figure 7. Socio-economic Status Survey Results (n = 1,799).....	10
Figure 8. P3 Oral Passage Reading (wcpm) According to P3 Draft Proficiency Standards.....	13
Figure 9. P1 and P2 Oral Passage Reading (wcpm), grouped.....	13
Figure 10. Percent of words read correctly, Grouped By Grade.....	14
Figure 11. Percent of words read correctly Grouped, By Gender and Grade.....	14
Figure 12. Average Percent Correct on FARS, by Grade and Province.....	15
Figure 13. P3 Oral Passage Reading (wcpm) According to P3 Draft Proficiency Standards.....	15
Figure 14. Average oral reading fluency, by urban/rural classification.....	16
Figure 15. FARS Comprehension results, by Grade.....	17
Figure 16. Comprehension results among students who read 80-100% of the text.....	18
Figure 17. Average oral reading fluency of students who answered Various Numbers of Comprehension Questions.....	19
Figure 18. Oral reading fluency and comprehension results, by shift.....	21
Figure 19. Average Percent Correct on Three Mars Tasks, by Grade.....	25
Figure 20. Percent of students with zero scores on all MARS tasks	25
Figure 21. Number of problems solved on math subtasks.....	26
Figure 22. Oral reading fluency in solving math problems, by Grade.....	27
Figure 23. Average Percent Correct on Three MARS Tasks, by Grade and Gender.....	27
Figure 24. Average Percent Correct on MARS, by Grade and Province.....	28
Figure 25. Average math results, by shift.....	29
Figure 26. Average student/teacher ratio in five provinces, by grade.....	31
Figure 27. Technology in the Classroom.....	32
Figure 28. How often do you use technology in teaching students in this subject? (n=390).....	32
Figure 29. PTA members trained by Concern Worldwide.....	33
Figure 30. Teachers received L3 training (n=560).....	34
Figure 31. Average student performance in classrooms of mentor-trained and no trained teachers, by Grade.....	35
Figure 32. Average percent correct among students on Oral reading fluency test in study schools, by grade.....	36

Figure 33. Average percent correct of on MARS tasks in study schools, by grade.....	36
Figure 34. Average distance to Kigali.....	37
Figure 35. Percent of schools within poverty quintiles, by highest and lowest performing schools.....	37

TABLE OF TABLES

Table 1. Sample of Schools and Teachers, by grade and province.....	3
Table 2. Number of sampled students by district, in 2 schools per district.....	3
Table 3. Number of sampled students by grade and gender.....	4
Table 4. Home Environment Survey Results, by Province.....	8
Table 5. School and Teacher Factors Results, by Province.....	10
Table 6. Socio-economic Factors Results, by Province.....	11
Table 7. Correlations between sections of survey results.....	11
Table 8. Oral reading fluency Levels.....	12
Table 9. Correlations between student's age and FARS results.....	20
Table 10. Correlations between sections of context survey and FARS results.....	21
Table 11. Correlations between distance to Kigali and FARS results.....	22
Table 12. Average percent correct on FARS, by locale and grade.....	23
Table 13. Mathematics competencies included in MARS.....	24
Table 14. Average Percent Correct on MARS, By locale and Grade.....	29
Table 15. School Enrollment and teacher statistics, by grade.....	30
Table 16. Average Number of L3 Materials, by Grade.....	31
Table 17. Average number of technology materials received from L3.....	32

ACRONYMS

WCPM	Words Correct per Minute
EDC	Education Development Center, Inc.
EGRA	Early Grade Reading Assessment
EGMA	Early Grade Math Assessment
ESSP	Education Sector Strategic Plan
FARS	Oral reading fluency Assessment of Rwandan Schools
MARS	Mathematics Assessment of Rwandan Schools
IIEP	International Institute for Educational Planning
L3	Literacy, Language, and Learning Initiative
LARS	Learning Achievement in Rwandan Schools
MINEDUC	Ministry of Education
M&E	Monitoring and Evaluation
REB	Rwanda Education Board
UNESCO	UN Education, Scientific, and Cultural Organization
USAID	U.S. Agency for International Development

ACKNOWLEDGMENTS

The L3 Monitoring and Evaluation Department wishes to acknowledge the important contributions of the numerous people who made this study possible. Many Ministry of Education officials provided key inputs into the development and implementation of the study, including aligning the reading assessment instruments and methodologies to the Rwandan context. In particular, Mr. Janvier Gasana, the REB Deputy Director General in charge of the Education Quality Standards Department, and his staff members provided critical support in these areas, two members of Dr. Joyce Musabe's CPMD department who were involved in developing oral reading fluency data collection tools: Bacumuwenda Nehemiah and Karera Straton. L3 Kinyarwanda team also contributed greatly to the study. Field data collection was only possible thanks to the Inspectors of Education and to the cooperation and contributions of the communities, principals, teachers, and students in the sample schools. We sincerely appreciate the help of all concerned.



INTRODUCTION

Rwanda Vision 2020 identifies transformation from an agrarian to a knowledge-based economy as the major objective of development. To achieve this objective, the Vision identifies improvements in education and health services to be used to build a productive and efficient workforce. Rwanda is committed to reaching universal education for all. Improving quality of education remains the country's priority.

The Literacy, Language and Learning Initiative (L3), funded by the U.S. Agency for International Development (USAID) and implemented by a partnership led by the Education Development Center, Inc. (EDC), is designed to help improve students' language and mathematics skills. L3 is assisting the Ministry of Education (MINEDUC) in the implementation of a comprehensive early literacy and mathematics program, including support for transition to English as a medium of instruction in the 4th grade (P4).

One of L3's major goals is to improve the quality of teaching reading in Kinyarwanda and in English, and teaching mathematics in primary grades 1-4 (P1-P4). To gather information on student achievement, as well as to support Rwandan Education Board (REB) in establishing a system of regular national assessments, L3 conducts periodic assessments of student achievement in literacy and mathematics. The assessments include a test of oral reading fluency and comprehension, and a mathematics test. Tests are administered to a random sample of learners drawn from a nationally representative sample of schools, in the language of instruction.



L3 Senior mentor training, January 2014

At the end of the first year of the roll out of the L3 program to all schools in Rwanda in September of 2014, L3 implemented a national baseline assessment of P1, P2 and P3 students. The following tests were included in the assessment:

1. Oral Reading Fluency Assessment of Rwandan Schools (FARS) includes a grade-level passage and five comprehension questions. Measures oral reading fluency (speed and accuracy of reading) and comprehension.
2. Mathematics Assessment of Rwandan Schools (MARS) includes three sections with ten grade-level problems each, focused on procedural fluency as well as number sense.

The assessments were developed by a team of experts from the REB and L3 and are based on a) international recommendations for testing and measuring students' oral reading fluency in the early grades, and b) on existing grade level standards in mathematics. In 2012, the REB and L3 created a reading assessment for the Primary Three (P3) and Primary Five (P5) grade levels. Concurrently, the REB and L3 worked on national reading performance standards for P3 and P5. A national assessment of P3 and P5 to validate those standards was conducted at the end of the 2012 school year. In 2014,

this work continues with establishing reading standards for Primary 2 (P2), and validating them through national sample-based testing.

In addition to testing students, data collectors also gathered background information on schools, including enrollment, number of teachers teaching primary level grades, and whether the school has a PTA. Information on L3-related activities was also included in the school form that heads were asked to complete. At a classroom level, data on using L3 teaching practices in P1 and P2 classrooms was collected as part of the assessment.

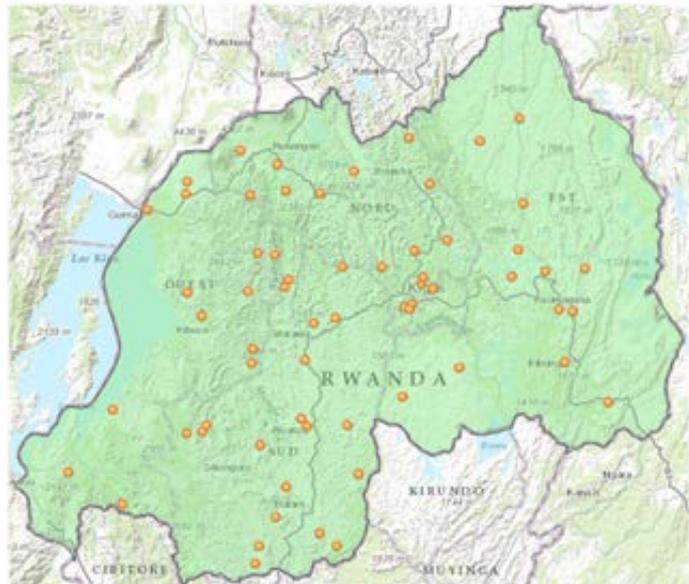
This report presents findings of this baseline assessment. The results of this assessment will be compared with results of similar assessments in September of 2015 (midline) and September of 2016 (endline).

STUDY PARTICIPANTS

The assessment collected nationally representative data on oral reading fluency and mathematics achievement among students in Primary 1, 2 and 3. The detailed sampling parameters are found in the Methodology section in Appendix A; this section presents a description of schools that were randomly selected to take part in the study, and demographic characteristics of learners and teachers who participated in the assessment. This section also presents findings from the context survey.

The sampling approach followed random clustered sampling method to obtain a nationally representative sample of non-private schools (public or government-aided schools only). The clustered sampling process involved randomly selecting 30 districts from five provinces, and then randomly selecting 2 schools within each district. The total number of schools in the sample was 60 non-private schools.

In each visited school, the Head Teacher was asked to complete the School Survey Form. In addition to a school form, a Grade Monitoring Form was completed by 569 teachers selected from P1, P2 and P3 classrooms. The table below shows the breakdown of teachers by grade and province. Roughly even numbers of teachers from each grade and subject (Kinyarwanda, English and Math) were selected for the sample. The majority (70.7%) of teachers sampled were female.



Study schools on a map, September 2014

TABLE 1. SAMPLE OF SCHOOLS AND TEACHERS, BY GRADE AND PROVINCE

Province	Number of schools	P1	P2	P3	TOTAL
Eastern	12	45	49	39	133
Kigali City	5	26	21	20	67
Northern	10	31	29	29	89
Southern	18	43	44	39	126
Western	15	59	49	46	154
TOTAL	60	204	192	173	569

One P1, one P2 and one P3 section in each school were selected at random for the study. Assessors were tasked with randomly selecting 5 boys and 5 girls from each sampled class using a bag of colored marbles, with 30 students from each school. The final sample was 1,799 students, just one student short of the planned 1,800 students. The sample by province and district is shown in Table 1 and Figure 1.

TABLE 2. NUMBER OF SAMPLED STUDENTS BY DISTRICT, IN 2 SCHOOLS PER DISTRICT

Province	District	Students			
		P1	P2	P3	TOTAL
Eastern	Bugesera	20	20	20	60
	Gatsibo	20	20	20	60
	Kayonza	20	20	20	60
	Kirehe	20	20	20	60
	Ngoma	20	20	20	60
	Nyagatare	20	20	20	60
	Rw amagana	20	20	20	60
Kigali City	Gasabo	20	20	20	60
	Kicukiro	20	20	20	60
	Nyarugenge	20	20	20	60
Northern	Burera	20	20	20	60
	Gakenke	20	20	20	60
	Gicumbi	20	20	20	60
	Musanze	20	20	20	60
	Rulindo	20	20	20	60
Southern	Gisagara	20	20	20	60
	Huye	20	20	20	60
	Kamonyi	20	20	20	60
	Muhanga	20	20	20	60
	Nyamagabe	20	20	20	60
	Nyanza	20	20	20	60

	Nyaruguru	20	20	20	60
	Ruhango	20	20	20	60
	Karongi	20	20	20	60
	Ngororero	20	20	20	60
	Nyabihu	20	20	20	60
Western	Nyamasheke	20	20	20	60
	Rubavu	19	20	20	59
	Rusizi	20	20	20	60
	Rutsiro	20	20	20	60
Total		599	600	600	1,799

The sample was constructed to be *nationally* representative for P1, P2 and P3. While it is stratified by province to ensure adequate representation of students from all regions of the country, the province-level or district-level sub-samples are not large enough to be treated as separate samples. These sub-samples will be large enough to detect very substantial changes or differences, but may not be sufficient to draw definitive province or district-level conclusions about the effects of the intervention. A much larger sample size would be required to enable such analyses.

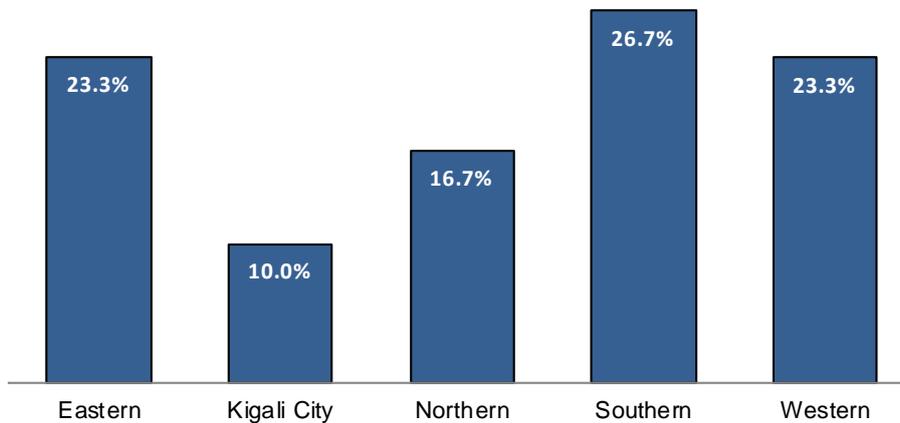
Gender Representation. The sample was designed to select an identical number of boys and girls in each grade, in each school. The final gender distribution was nearly perfect.

TABLE 3. NUMBER OF SAMPLED STUDENTS BY GRADE AND GENDER

Province	Grade Level	Girls		Boys	
		Number	%	Number	%
Eastern	P1	70	50.0	70	50.0
	P2	70	50.0	70	50.0
	P3	70	50.0	70	50.0
Kigali City	P1	29	48.3	31	51.7
	P2	31	51.7	29	48.3
	P3	30	50.0	30	50.0
Northern	P1	49	49.0	51	51.0
	P2	54	54.0	46	46.0
	P3	50	50.0	50	50.0
Southern	P1	80	50.0	80	50.0
	P2	80	50.0	80	50.0
	P3	80	50.0	80	50.0
Western	P1	66	47.5	73	52.5
	P2	70	50.0	70	50.0
	P3	70	50.0	70	50.0
Total		899	50.0	900	50.0

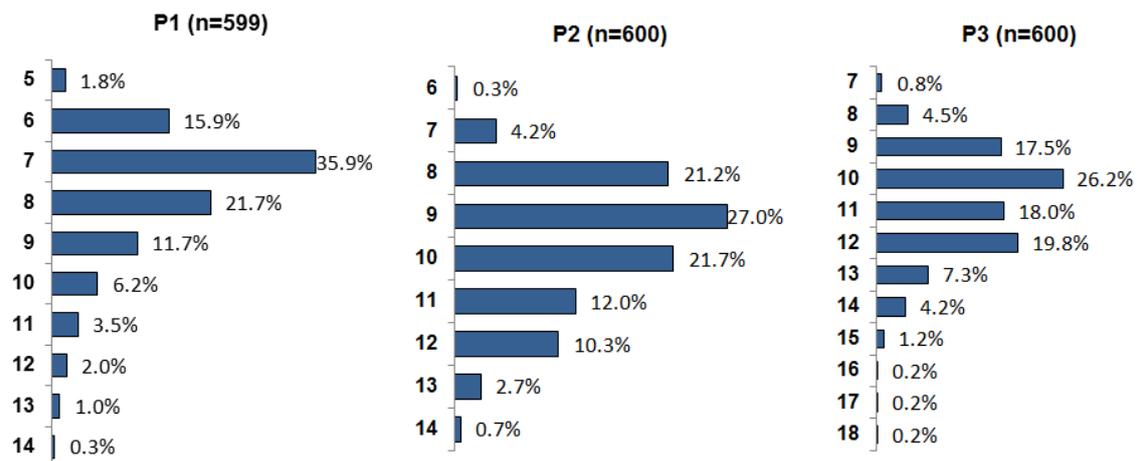
The following charts show provincial and gender representation of the sample.

FIGURE 1. DEMOGRAPHIC CHARACTERISTICS OF SAMPLED STUDENTS (N=1,799)



Age of Sampled Learners. Sampled students ranged in age from 5 to 18 years old. The median age of Primary 1 students was 7, for Primary 2 students was 9, and the median age of Primary 3 was 11. Figure 2 show the age distribution of the tested students.

FIGURE 2. AGE BY GRADE



District-level post-design weights were constructed to compensate for the disproportionate representation of students from some school districts within provinces, to ensure that the sample is nationally representative. Weights were used in all analyses of oral reading fluency and mathematics assessment data to enable extrapolations from the sample onto the population of Rwandan school children in Primary 1, 2 and 3.

STUDENT CONTEXT SURVEY

It is widely recognized in the field of education that such contextual factors as home environment that supports learning, adequate nutrition, and early exposure to literacy play a prominent role in helping children succeed academically. Additionally, such school factors as teachers assigning homework or teachers reading to children have also been found to be associated with improved performance. To better understand which of these potential moderators seems to be particularly influential in explaining variance in student performance in Rwanda, L3 assessment team developed 12-question interview questionnaire. The intent behind the questionnaire was to gather background information about the child's life and experiences that have direct relevance to his or her competencies in literacy and math. The following questions were included in the survey:

Home Environment

1. What language do you speak at home?
2. Did you go to nursery/pre-school?
3. Do you have books at home for you to read?
4. Do people at home sometimes read stories to you from a book?
5. Do people at home sometimes tell you stories or sing you songs?
6. How often do you see your mother (or main caregiver) reading books or newspapers? (scale)
7. Do you sometimes miss school because you have to help out at home?

School/Teacher

8. Does your math teacher usually give you homework to do at home?
9. Does your Kinyarwanda teacher usually give you homework to do at home?
10. (*if yes*) How often does your Kinyarwanda teacher give you homework to do at home? (scale)
11. Does your Kinyarwanda teacher usually read you stories in class?
12. How often do you get a chance to choose books to read? (scale)

Socio-Economic Factors

13. Did you have a meal today before you came to school?
14. Do you have radio at home?
15. Does anyone at your house have a bicycle, a motorbike or a car?
16. Do you have running water at home?
17. Do you have electricity at home?
18. How many rooms are in your house?

During the analysis, a composite variable was created for each subsection of the survey and used in multivariate analyses to help explain variations in student performance on literacy and mathematics tasks. Both the composites and the individual items were also used in the multivariate analyses in the relevant sections of the report.

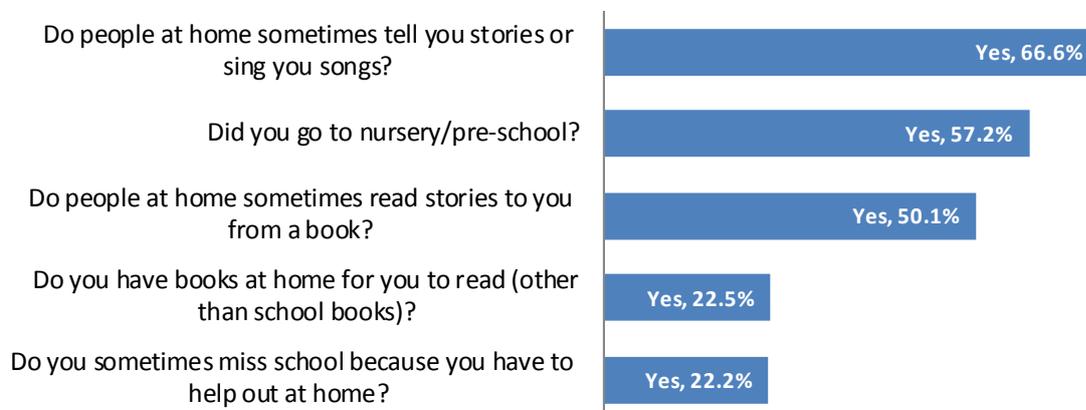
Home Environment. The majority of students reported that they speak only Kinyarwanda at home. Only a few students spoke French, English or Kiswahili at home. In some schools near the border with Burundi students spoke a mix of Kinyarwanda and Kirundi.

Nearly two thirds (64.3%) of sampled learners reported that their main caregiver reads at least once a week², and only about a half of learners said that a caregiver at home reads stories to them. More students reported that someone at home tells them stories and sings songs to them (66.6%) than reads to them (50.1%). A greater proportion of younger students in P1 and P2 said they were read to at home, in which 60.3% of P1 students and 52.5% of P2 students said someone at home reads to them, compared to only 37.5% of P3 students. Very few students (22.5%) reported that that they had books at home to read other than school books. A rate of attendance of nursery or pre-school was found to be rather high: over a half of interviewed children answered that they had attended nursery/pre-school. Results were consistent across genders. However, accuracy of this self-reported data could not be confirmed with parents since parent interview was not part of the study.

Finally, about one in five students said they miss school sometimes because they have to help out at home. No gender difference was found: both boys and girls said they missed school sometimes because they had to help out at home. However, age may be a contributory factor; slightly more P3 students (26.5%) indicated they missed school to help at home than P1 (19.5%) and P2 (20.5%).

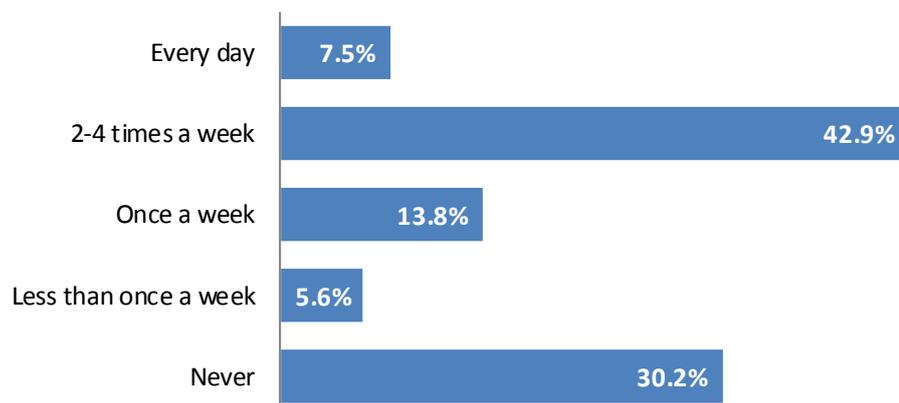


FIGURE 3. HOME ENVIRONMENT SURVEY RESULTS (N=1,799)



² From prior studies and home visit observations by L3 staff, it is known that many families own a Bible. A presence of other books is rarely observed.

FIGURE 4. HOW OFTEN DO YOU SEE YOUR MOTHER (OR MAIN CAREGIVER) READING BOOKS OR NEWSPAPERS? (N=1,799)



Comparing results across provinces, the lowest reported number of students having books to read at home was found in Western (13%) province. Similarly, children from Western province had the lowest reported rate of being read to at home - only 37% of students said their caregiver reads to them. Conversely, Western province had the highest rates of students who reported that people at home told them stories or sang to them (70.6%). Finally, the lowest proportion of students who said they miss school because they are needed at home was in Southern (17%) and Kigali City (19%), and the highest was in Western province (27%). These results should be interpreted with caution given small number of respondents in each province.

TABLE 4. HOME ENVIRONMENT SURVEY RESULTS, BY PROVINCE

Province	Number of learners	Attended pre-school	Had books at home to read	Was read to at home	Was told stories at home	Needed at home so missing school
Eastern	418	53.3%	22.0%	52.9%	68.2%	23.4%
Kigali	177	49.7%	23.2%	52.5%	60.5%	19.2%
Northern	300	68.3%	32.3%	58.7%	65.0%	24.0%
Southern	482	66.4%	24.7%	52.7%	65.1%	17.0%
Western	422	45.7%	13.0%	37.2%	70.6%	26.8%

School and Teacher. Students overwhelmingly reported that math and Kinyarwanda teachers give them homework, and that their Kinyarwanda teacher usually reads them stories in class. The study did not collect data on the content of the homework. Slightly more P2 and P3 students reported receiving math and Kinyarwanda homework than P1 students. These two factors have been found to associate with higher student achievement.

On average, students reported that their Kinyarwanda teacher gave them homework between one to four times a week. Only about half of students reported having a chance to choose books to read once a week or more; 47.8% reported that they never have a chance to choose books to read.

FIGURE 5. SCHOOL/TEACHER FACTORS SURVEY RESULTS (N = 1,799)

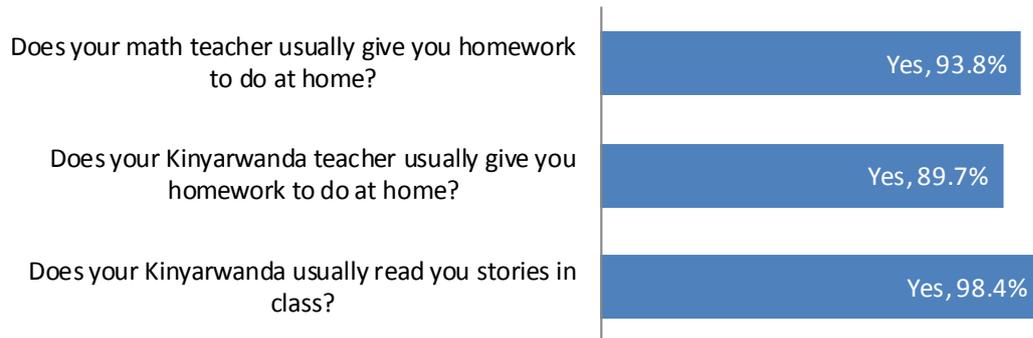
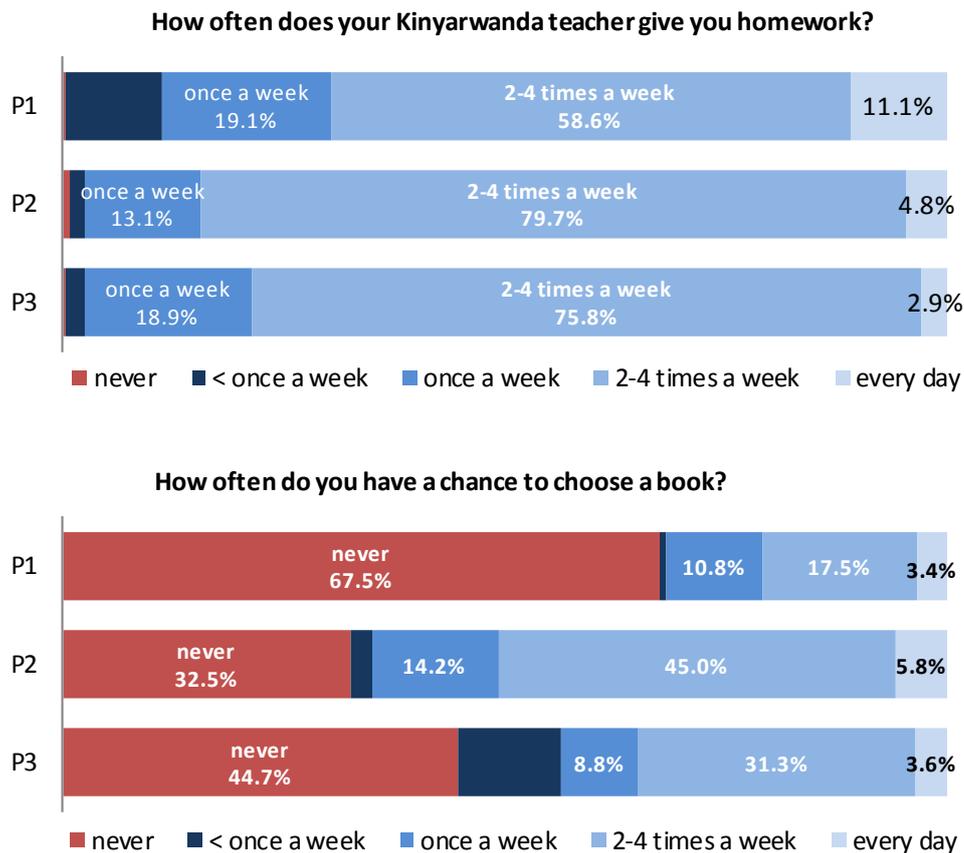


FIGURE 6. FREQUENCY OF KINYARWANDA HOMEWORK AND READING IN SCHOOL



Provincial comparisons presented in the table below show slightly lower reported rates of homework in the Southern and Western provinces, compared with others. In terms of Kinyarwanda homework, fewer students in Northern and Western provinces reported receiving Kinyarwanda homework. Results were consistent for whether Kinyarwanda teachers read stories to their class.

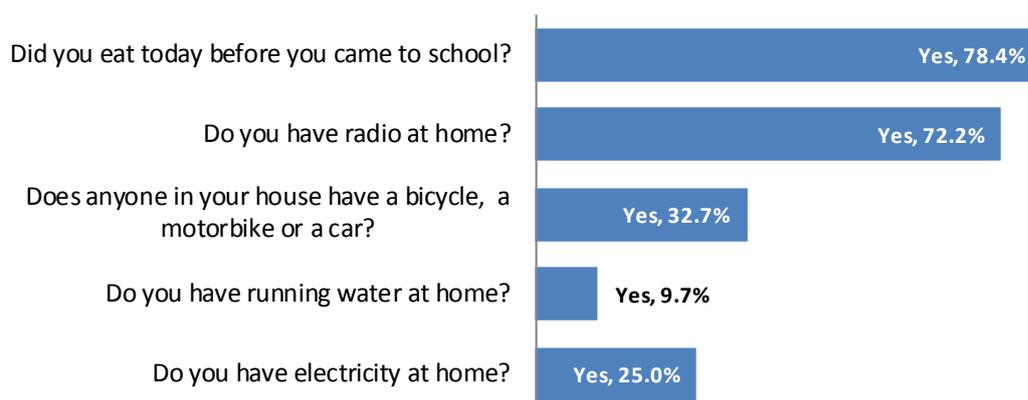
TABLE 5. SCHOOL AND TEACHER FACTORS RESULTS, BY PROVINCE

Province	Number of learners	Math homework	Kinyarwanda homework	Kinyarwanda teacher reading
Eastern	418	95.9%	93.3%	99.3%
Kigali	177	98.9%	96.0%	97.7%
Northern	300	95.0%	81.3%	96.7%
Southern	482	91.1%	91.7%	99.6%
Western	422	91.9%	87.0%	97.6%

Socio-Economic Status. To better understand the socio-economic context of learners, we asked five simple questions that together serve as a proxy for a students' family wealth. The majority of students (78%) reported having eaten before they came to school that day. Of concern, however, is the fact that a near quarter of all surveyed students came to school hungry. Additionally, in some districts schools are implementing "a glass of milk per child" program so some children who have gotten a glass of milk might have considered it as food. Poor nutrition is one of the key factors impeding learning, as international research shows.

Nearly three quarters (72%) of students reported having a radio at home, and only 33% said someone in their family owns a bike, a motorbike or car. Only 10% of surveyed students said they had running water at home. Similarly, only a quarter of students have electricity at home. On average, students responded that their home had 3 rooms.

FIGURE 7. SOCIO-ECONOMIC STATUS SURVEY RESULTS (N = 1,799)



Provincial comparisons of socio-economic factors show great variation across provinces. The self-reported rate of having eaten before coming to school was lowest in Northern province (72%) and highest in Kigali City (84%). The rate of having radio at home was highest in Northern province (84%) and lowest in Western province (63%). More than half of students in Eastern province said a member of their family owns a bike, motorbike or car, while in other provinces the rate was much lower, with the lowest reported bike ownership rate in Western province. While just over a third of all students from Kigali City reported having running water at home, the rate in other provinces was extremely low.

Finally, nearly three quarters of students from Kigali reported having electricity at home, in provinces such as Northern and Southern only 16% of students reported having electricity.

TABLE 6. SOCIO-ECONOMIC FACTORS RESULTS, BY PROVINCE

Province	Number of learners	Ate before school	Radio at home	Family owns bike, motorbike or	Running water at home	Electricity at home
Eastern	418	78.2%	74.4%	54.5%	10.8%	22.7%
Kigali	177	83.6%	75.7%	32.2%	35.0%	72.3%
Northern	300	71.7%	83.7%	31.7%	6.7%	16.3%
Southern	482	82.6%	69.9%	27.6%	3.3%	16.4%
Western	422	76.5%	62.8%	17.8%	7.3%	23.5%

*Actual numbers of interviewed students are reported here (unweighted)

Composites³ for the three sections of the context survey correlate⁴ with each other, although correlation coefficients are pretty small, as shown in Table 6. The higher inter-item correlation was found between math teacher giving homework, and Kinyarwanda teacher giving homework, possibly because in many schools this would be the same teacher and/or because it might be a school policy.

TABLE 7. CORRELATIONS BETWEEN SECTIONS OF SURVEY RESULTS

Context survey composite	Home environment	School and teacher	Socio-economic
Home environment	1		
School and teacher	.281**	1	
Socio-economic	.255**	.185**	1

** Correlations are significant at the .01 level (2-tailed)

The measures of from the context survey were included in bivariate and multivariate analyses in the relevant sections of this report to better understand variation in student scores.

³ "Composite" is a score created by adding data across multiple variables, when each of the variables is expressed in binary terms (e.g., "yes" = 1 and "no" = 0).

⁴ "Correlation" is a statistical term that describes a degree of relationship between two variables. Two variables are considered correlated when a change in one is associated with a change in another. Correlation does not presume causation since a change in both variables might be caused by the third variable. Correlation coefficient ranges between 0 and 1, with higher value denoting stronger relationship. Correlations in a range between .1 and .3 are considered rather weak, in a range between .4 and .6 are considered moderate, and above .6 are considered strong.

ORAL READING FLUENCY ASSESSMENT OF RWANDAN SCHOOLS (FARS)

ORAL READING FLUENCY

An assessment of oral reading fluency was conducted in Kinyarwanda, using grade level texts of appropriate length and complexity (see Methodology in Appendix A for details). Students were asked to read the reading passage, followed by five comprehension question about the text's meaning. The reading part of the assessment was timed at 60 seconds; the comprehension questions part of the assessment as not timed.

Overall, the assessment found that the majority of tested Primary 1 and Primary 2 students were just beginning to develop oral reading fluency skills. About 7 percent of P1 and 41 percent of P2 students could read a grade level text with some oral reading fluency (over 20 words per minute); 60% of P1 students and 33 percent of P2 students could not read a single word.

Students who had just finished P3 at the time of the assessment demonstrated developing oral reading fluency skills. About 25 percent of P3 students read a grade level text with the adequate speed for their grade level (33 words per minute or faster). About 37 percent of P3 students could read with speed between 20 and 33 correct words per minute, and 17 percent were beginning readers, reading between one and 20 correct words per minute. About 21 percent of P3 students could not read a single word of the passage.

TABLE 8. ORAL READING FLUENCY LEVELS

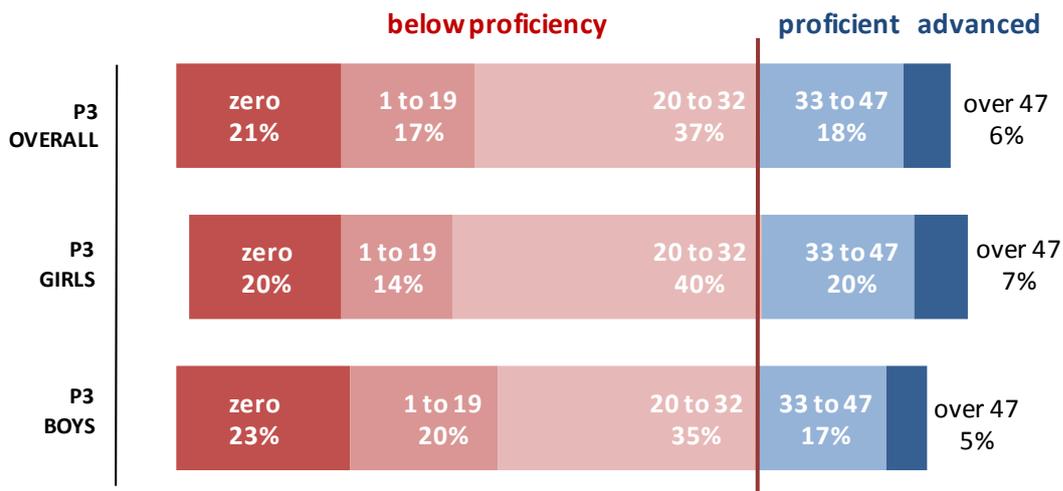
Oral reading fluency proficiency	Speed in wcpm
Beginning to develop	under 20 wcpm
Developing	20-32 wcpm
Emerging oral reading fluency	33-47 wcpm*
Fluent reader	over 48 wcpm

*Draft P3 oral reading fluency proficiency standard

Since national standards for Primary 2 oral reading fluency have not been established yet, draft proficiency standards for Primary 3 only were used in the analysis. According to the draft proficiency standards proposed by L3, Primary 3 students are considered proficient in reading if they read between 33 and 47 words of a grade level text in Kinyarwanda per minute.

The following figures show a distribution of grouped results for oral reading fluency according to the P3 draft proficiency standards. The results are weighted to provide an estimate of the population of Rwanda primary grade students.

FIGURE 8. P3 ORAL PASSAGE READING (WCPM) ACCORDING TO P3 DRAFT PROFICIENCY STANDARDS

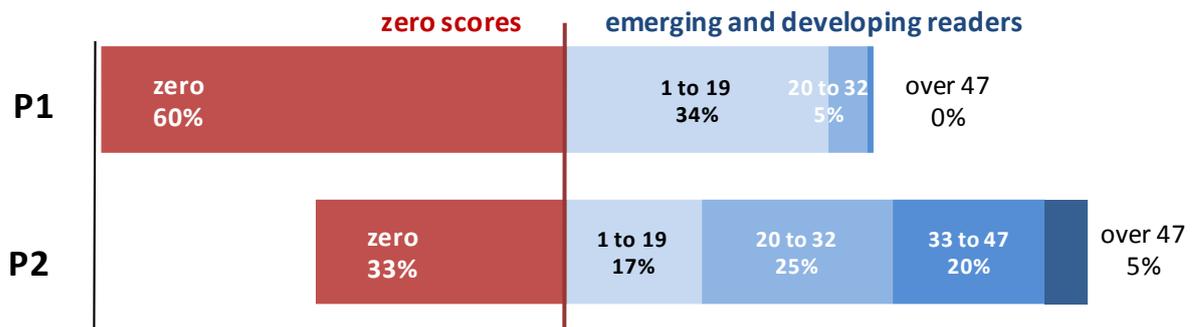


The assessment found that 60 percent of P1 students and 33 percent of P2 students could not read a single word. Comparing average oral reading fluency results across genders, the analysis did not show any significant difference between P1 boys and girls; however, the difference between P2 and P3 boys and girls was statistically significant at $p < .001$ level, with girls reading faster, on average.

Average P3 reading results, in words correct per minute:

- All P3 students 22.1 wcpm
- P3 boys: 20.7 wcpm;
- P3 girls: 23.5 wcpm

FIGURE 9. P1 AND P2 ORAL PASSAGE READING (WCPM), GROUPED



Average reading results, in words correct per minute:

P1 students:

- All: 4.8 wcpm
- P1 boys: 4.5 wcpm
- P1 girls: 5.0 wcpm

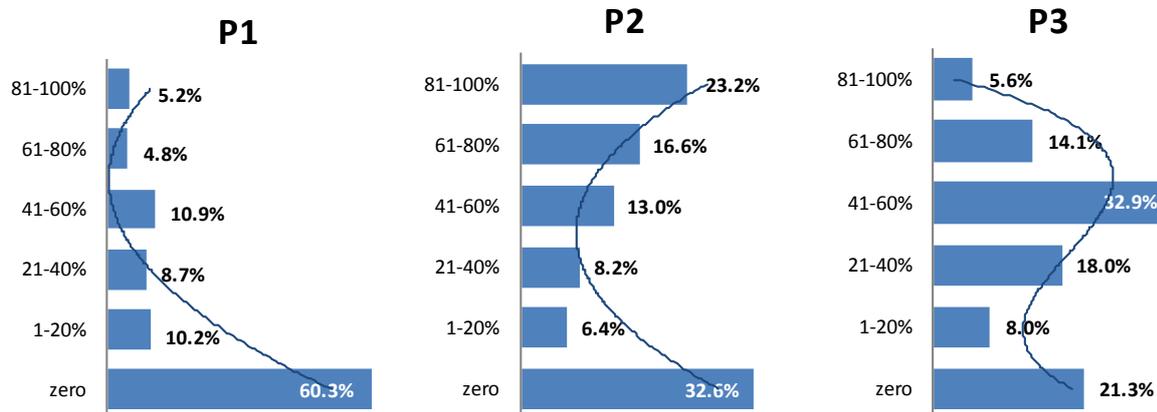
P2 students:

- All: 19.2 wcpm
- P2 boys: 16.1 wcpm
- P2 girls: 22.3 wcpm

An examination of the percentage of grade-level text students were able to read within an allocated minute showed a U-patterned distribution for P2, with a high proportion of students either reading the entire text or not reading a single word. P1 student results had a skewed distribution toward zero scores. P3 assessment results showed a high proportion of zero scores, with the remaining results normally distributed. Figure 10 presents these results, with a polynomial line emphasizing

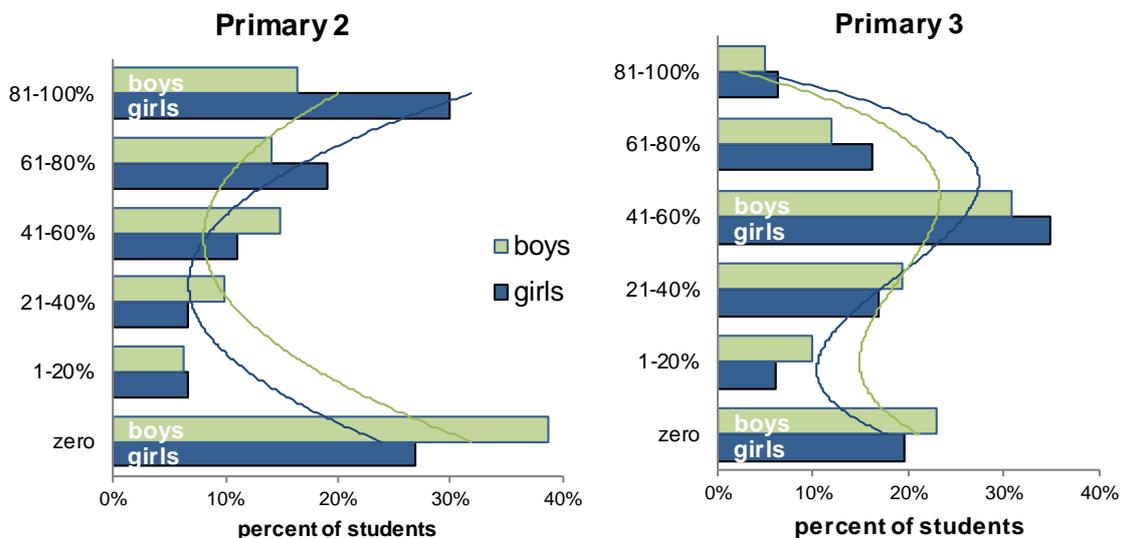
the shape of the distribution in each grade.

FIGURE 10. PERCENT OF WORDS READ CORRECTLY, GROUPED BY GRADE



An analysis of text reading by gender in P2 and P3 showed that girls were more likely to complete the reading of the passage than boys. The difference was statistically significant among P3 students, at $p < .001$. Figure 11 shows how much of the grade-level oral reading passage P2 and P3 boys and girls were able to read within the allocated one minute. (P1 results are not presented since only a small proportion of tested students were able to read the test passage.) The figure shows that girls' results are skewed toward higher results, comparing to boys.

FIGURE 11. PERCENT OF WORDS READ CORRECTLY GROUPED, BY GENDER AND GRADE

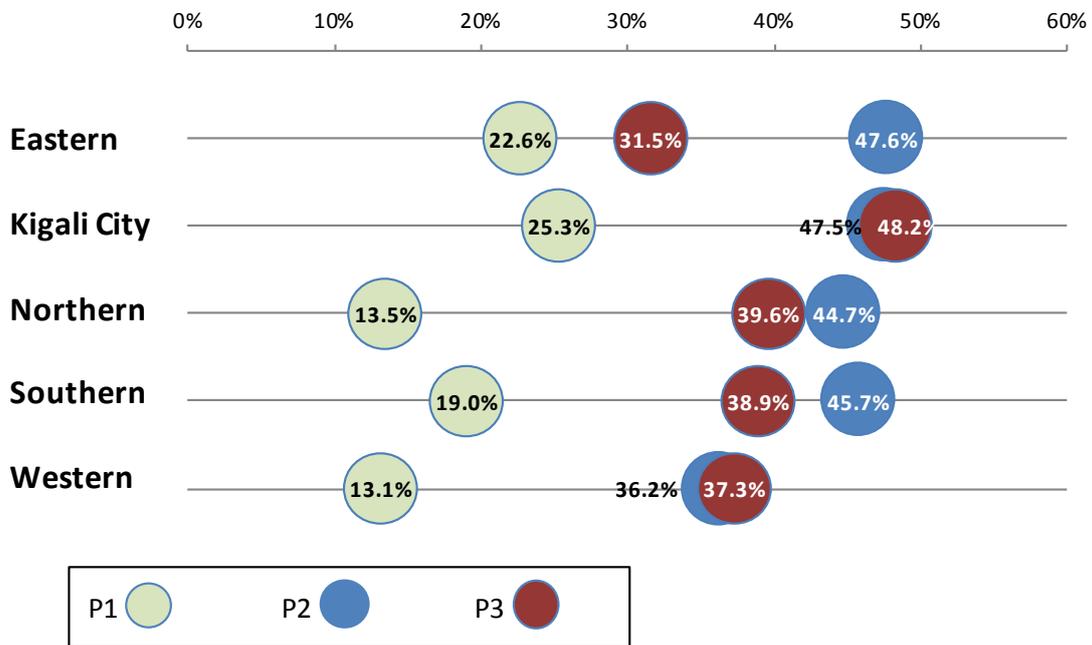


The sample size is not large enough for comparisons by province. Only simple descriptive analysis was conducted, and the results are reported here with the caution they may not adequately reflect the reality, since only a small number of schools were selected from each province.

The results in Figure 12 show that the difference across provinces is not very substantial; the most noticeable outlier is Kigali City, with significantly higher achievement of its students in both Primary 2

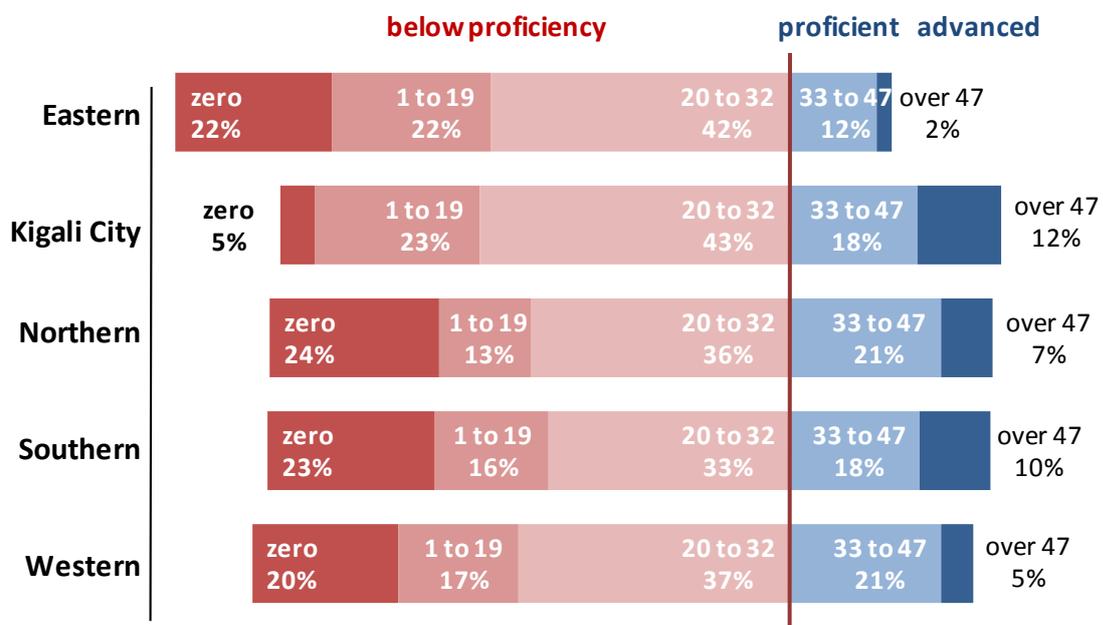
and Primary 3. The differences in student achievement across other provinces are not statistically significant and might be due to a chance variation with the sample.

FIGURE 12. AVERAGE PERCENT CORRECT ON FARS, BY GRADE AND PROVINCE



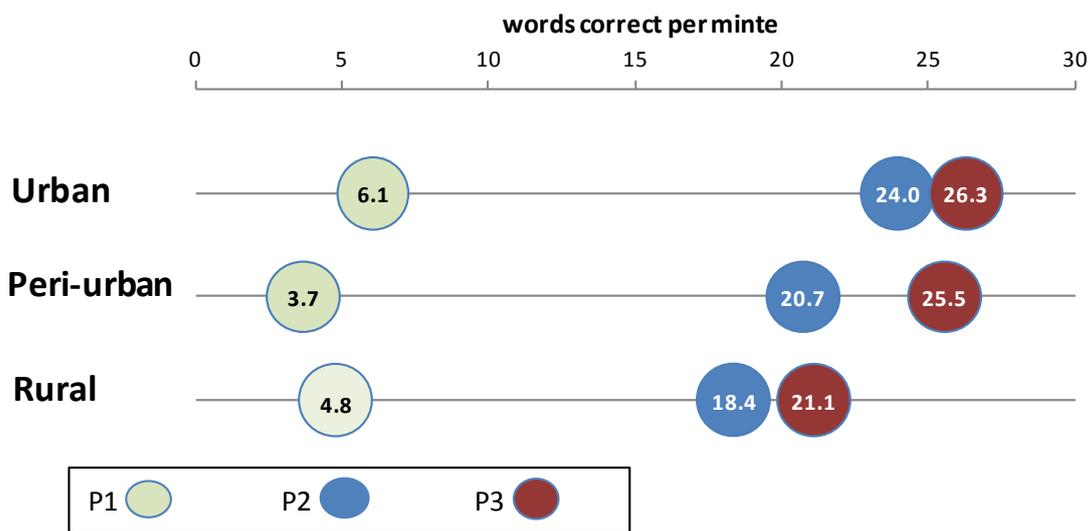
The following figure shows a distribution of P3 results by province, according to P3 draft proficiency standards.

FIGURE 13. P3 ORAL PASSAGE READING (WCPM) ACCORDING TO P3 DRAFT PROFICIENCY STANDARDS



Finally, comparisons by urban, peri-urban or rural classification of the school showed that P2 and P3 students in urban schools read statistically significantly faster than students in rural schools, at $p < .01$ level. The difference in performance between P1 students in urban, peri-urban and rural schools was not significant. P3 students in peri-urban did significantly better than their counterparts in rural schools. The difference in oral reading fluency between urban and peri-urban students was not statistically significant.

FIGURE 14. AVERAGE ORAL READING FLUENCY, BY URBAN/RURAL CLASSIFICATION



Oral Reading Fluency Results in Schools. An analysis of results showed a U-pattern within most schools in P2 and in P3 (Appendix D). This means that schools and classrooms have students who are able to read a grade-level passage, as well as students who are still mastering the basics of reading. This diversity of proficiency levels within classrooms undoubtedly presents a major challenge for teachers, who would need access to teaching and learning materials for students of different levels to be able to differentiate instruction effectively.

Teachers need to be able to diagnose quickly and effectively which students are reading at grade level, which are beginning readers, and which students still need help with the basics of decoding. Grade-level, component skill-based classroom formative assessments are instrumental in helping non-readers to catch up to their grade level.

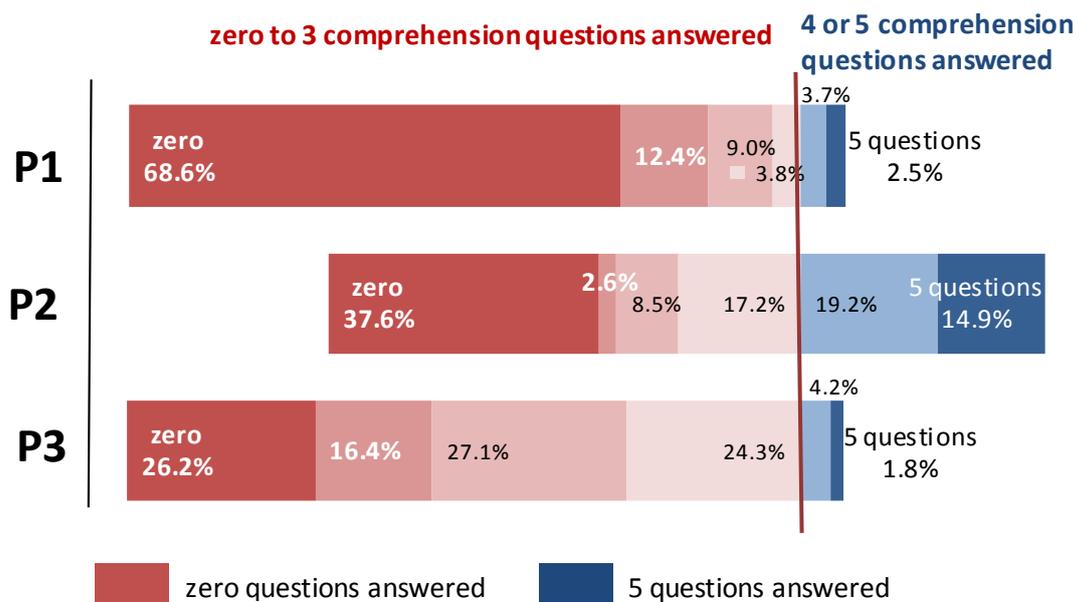
An analysis of oral reading fluency results by school shows a U-pattern distribution in P2 classrooms within many schools. This means that schools and classrooms have students who are able to read at grade-level, as well as students who are still mastering the basics of reading.

COMPREHENSION

During the assessment, sampled students were asked five locator⁵ questions about the text that they just read (see Methodology section for the description). The overall results are presented below in Figures 15 and 16; they show a significant proportion of zero scores which is consistent with a high proportion of students with zero scores on the reading test.

A student who “reads with comprehension” is supposed to be able to answer at least 4 out of 5 comprehension questions. Figures below show that a larger proportion of tested P2 than P3 students were able to achieve this benchmark.

FIGURE 15. FARS COMPREHENSION RESULTS, BY GRADE

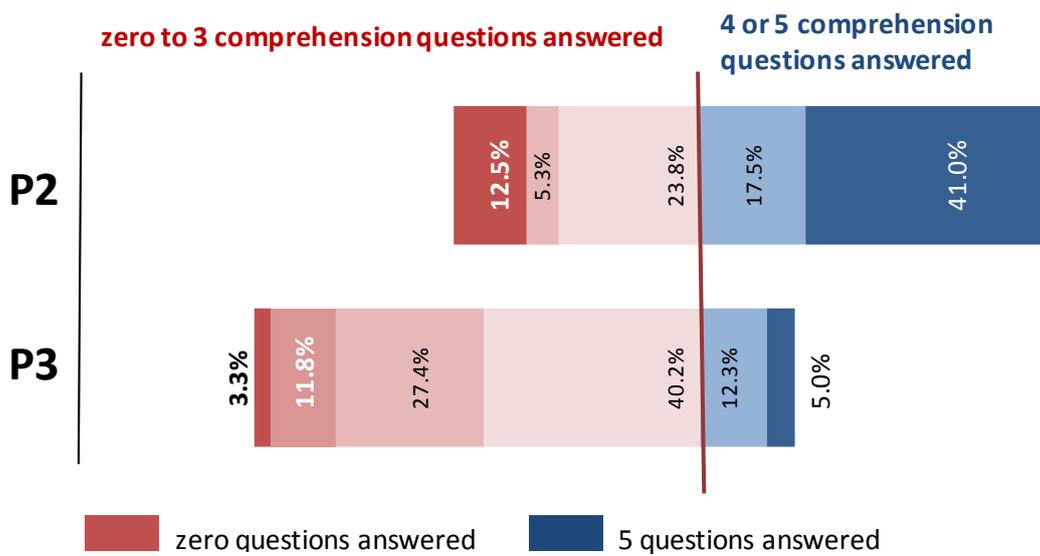


Since a true measure of comprehension can only be taken when a student reads the text about which the questions are asked, an analysis of comprehension results among students who read more than 80 percent of the text was conducted. The results showed that 58.5 percent of P2 and 17% of P3 students who actually read the text were able to answer four or five literal comprehension questions.

P3 students who answered 4 or 5 comprehension questions read the text with the average speed of 44.1 wcpm. Only 5% of P3 students read with the grade-level speed of 33 wcpm or faster *and* answered 4 or 5 comprehension questions.

⁵ A locator (also called literal) question is a type of comprehension question about the passage that invokes a specific reference to the text and not implied meaning or an inference. For example, a question about a name of a character or a place in a story that is specifically mentioned is a locator question.

FIGURE 16. COMPREHENSION RESULTS AMONG STUDENTS WHO READ 80-100% OF THE TEXT



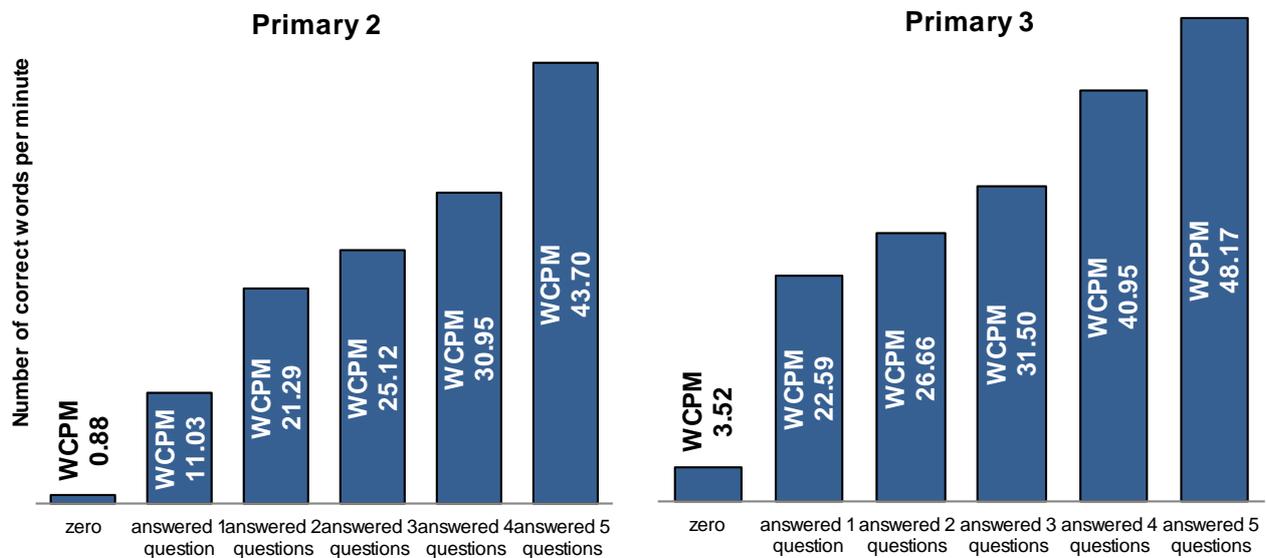
One of the reasons why P3 students did not perform as well on the comprehension task as P2 students is the complexity P3 assessment text. According to the curriculum P3 students were taught during 2014 school year, students should possess a rather complex vocabulary. Consequently, the test passage developed for testing P3 students had more complex words not found in everyday language that students are typically exposed to at home. Such vocabulary must be explicitly taught during literacy instruction. The assessment results demonstrate that predominant teaching practice does not have sufficient emphasis on teaching vocabulary.

Gender comparisons did not show significant differences beyond the difference in the comprehension of reading. Both boys and girls who managed to read the test passage, were also able to answer comprehension questions, indicating appropriate vocabulary knowledge for their grade level.

RELATIONSHIP BETWEEN FLUENCY AND COMPREHENSION

Additional analyses were conducted to establish a correspondence between oral reading fluency and comprehension. Figure 17 shows the speed of reading as corresponding to the number of correctly answered comprehension questions (out of 5).

FIGURE 17. AVERAGE ORAL READING FLUENCY OF STUDENTS WHO ANSWERED VARIOUS NUMBERS OF COMPREHENSION QUESTIONS



A highly significant correlation was also found between comprehension and oral reading fluency measure (words correct per minute), for all tested grades:

- P1: $r=.924$, $p<.001$ level
- P2: $r=.878$, $p<.001$ level
- P3: $r=.726$, $p<.001$ level

This means that students who read more words in the passage also were able to answer more questions correctly. This finding indicates that Rwandan students do not seem to experience problems with vocabulary, but rather with decoding words.



IMPACT OF CONTEXTUAL FACTORS ON READING

AGE

Students' age was found to negatively correlate with the reading achievement. The older the tested student was, the lower his/her reading results would be. This relationship between student's age and his/her reading results is stronger in higher grades. Many children, particularly in rural areas, do not start school on time, or do not attend regularly and are more likely to repeat grades. As The Education

Sector Strategic Plan⁶ emphasizes, delaying starting school past the correct age has implications for both the student and the school. Older students are less likely to succeed academically, and grade repetition puts a strain on school system resources.

One of the reasons for why some children do not start school at the correct age is that they are needed at home to help out. Some parents may not see the value of education in their specific circumstances or overall. Many parents in rural areas feel that attending school beyond Primary 2 has too high an opportunity cost to the family. While parents may recognize the value of education in general, they are aware that students must at the very least complete secondary school to qualify for a position at the government office, and many families feel they cannot afford to do without their children's contribution to family livelihoods for so many years. Since primary education is compulsory in Rwanda, local education authorities are pressuring those families to still send their children to school, but those children may have irregular attendance, a much higher risk of grade repetition⁷, and lack of support for education at home.

Table 9 shows correlations between students' age and literacy results. The negative correlation coefficients indicate that with increase in age the results of the test decrease.

TABLE 9. CORRELATIONS BETWEEN STUDENTS' AGE AND FARS RESULTS

Grade	Subtest	Student's age
P1	oral reading fluency	N/s
	reading percent correct	N/s
	comprehension	N/s
P2	oral reading fluency	-.117*
	reading percent correct	-.118*
	comprehension	N/s
P3	oral reading fluency	-.262**
	reading percent correct	-.256**
	comprehension	-.188**

"n/s" stands for not significant

**Correlations are significant at the >0.01 level (2-tailed)

* Correlations are significant at the >0.05 level (2-tailed)



Older students in P3 classroom

CLASS SHIFT

All study schools reported that they have both morning and afternoon shifts. Students alternate attending school in the morning and in the afternoon. For example, a class that attends school in the morning on Monday will attend school in the afternoon on Tuesday. Students who come to school in

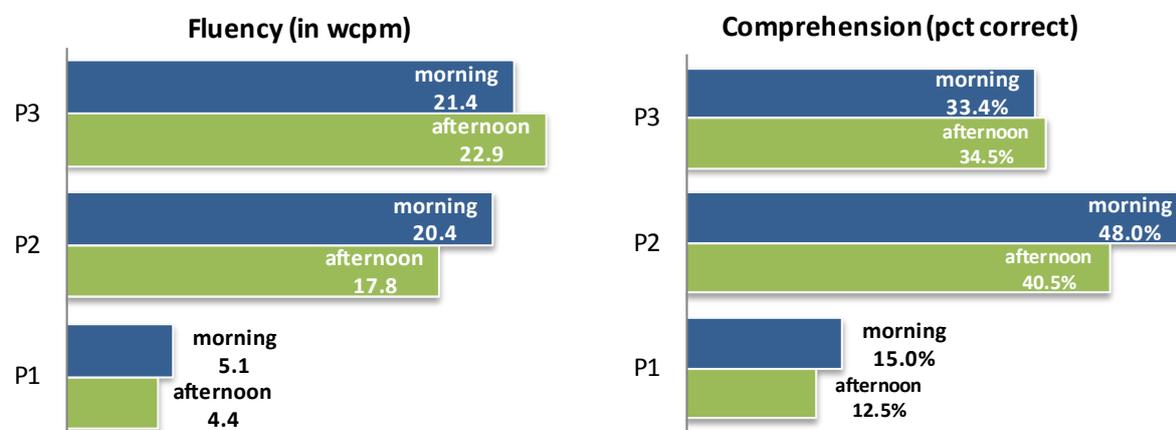
⁶⁶ Education Sector Strategic Plan 2010-2015, Rwanda Ministry of Education, July 2010.

⁷ The official rate of grade repetition in Rwanda was reported to be 12.5% in 2012 (*2013 Rwanda Education Statistical Yearbook*, September 2014)

the afternoon may be more tired or hungry, particularly in rural areas, where children are expected to attend to household chores, and in some cases have a significant distance to walk to school.

Statistical analysis of assessment results disaggregated by shift found that P1 and P2 students performed slightly better when tested in the morning. However, the difference was not statistically significant and could be due to a chance variation within the sample.

FIGURE 18. ORAL READING FLUENCY AND COMPREHENSION RESULTS, BY SHIFT



HOME ENVIRONMENT, SCHOOL AND TEACHER, AND SOCIO-ECONOMIC STATUS

Bivariate statistical analysis found small, but statistically significant correlations between student results in oral reading fluency and on comprehension tests, and context survey composites, as shown in Table 9. The largest correlations were found in P2 between oral reading fluency results and context survey composites⁸.

TABLE 10. CORRELATIONS BETWEEN SECTIONS OF CONTEXT SURVEY AND FARS RESULTS

Grade	Subtest	Home environment	School and teacher	Socio-economic
P1	oral reading fluency			
	reading percent correct		Not significant	
P2	comprehension			
	oral reading fluency	.266**	.144**	.135**
P3	reading percent correct	.272**	.187**	.160**
	comprehension	.247**	.157**	.142**
P3	oral reading fluency	.121**	.106**	.139**
	reading percent correct	.107**	.091*	.138**
	comprehension	N/s	N/s	.144**

"n/s" stands for not significant

**Correlations are significant at the >0.01 level (2-tailed)

⁸ In social science research correlations below .2 are not considered to be of high importance. Correlations between .2 and .4 are considered small, correlations between .4 and .6 are moderate, and above .6 they are large.

Significant differences were found between students who had zero scores in reading and those who had non-zero scores. Students with zero scores had lower composite values on all three composites. The difference was statistically significant at $p < .001$ level.

Multivariate linear regression analysis⁹ showed that the context survey composites do not explain a significant amount of variance in student achievement in any of the tests. Results of linear regression analysis showed that school/teacher composite explains two to three percent of variance in oral reading fluency results; all three composites combined explain about five percent. Detailed results of three models of regression analysis that were conducted are found in Appendix C.

The data analysis did not find stable patterns of difference between genders in achievement. Girls did slightly better than boys in oral reading fluency, but slightly worse in math. The differences were statistically significant for P2 and P3 in oral reading fluency, and in P1 in mathematics.

SCHOOL LOCATION

To help us better understand the variation in student scores, we looked at the differences in scores between students from different locales – urban, peri-urban, and rural, as well as the effect of distance to Kigali. Distance between Kigali and the school was found to be negatively correlated with student achievement in reading, with student doing better in schools closer to Kigali (Table 11).

TABLE 11. CORRELATIONS BETWEEN DISTANCE TO KIGALI AND FARS RESULTS

Grade	Subtest	Correlation with distance to Kigali
P1	oral reading fluency	-.098*
	reading percent correct	-.103*
	comprehension	N/s
P2	oral reading fluency	-.158**
	reading percent correct	-.123**
	comprehension	-.102*
P3	oral reading fluency	-.155**
	reading percent correct	-.164**
	comprehension	-.156**



Primary school in rural area

"n/s" stands for not significant

**Correlations are significant at the >0.01 level (2-tailed)

* Correlations are significant at the >0.05 level (2-tailed)

At the time of the writing of this report, the categorization of districts into urban/peri-urban/rural has not been completed. Therefore, the disaggregations were made using lists of districts with preliminary categorization. Data analysis found that P2 students in urban districts, on average, performed significantly better on oral reading fluency measures than students from rural areas. Urban P3

⁹ Linear regression is a statistical analysis procedure that allows computing how much of the change ("variance") in the variable of interest is explained by the change in other variable(s).

students also performed better than their rural counterparts, with peri-urban falling in the middle. The results of these comparisons must be interpreted with caution since the sampling plan was based on the overall population of schools and was not designed to provide detailed estimates of subgroups.

TABLE 12. AVERAGE PERCENT CORRECT ON FARS, BY LOCALE AND GRADE

Grade	Subtest	URBAN	PERI	RURAL
P1	oral reading fluency	6.1 wcpm	3.7 wcpm	4.8 wcpm
	reading percent correct	21.1%	17.6%	18.3%
	comprehension	14.6%	10.8%	13.9%
P2	oral reading fluency	24.0 wcpm	20.7 wcpm	18.4 wcpm
	reading percent correct	46.4%	47.5%	43.2%
	comprehension	49.6%	50.1%	43.0%
P3	oral reading fluency	26.3 wcpm	25.5 wcpm	21.1 wcpm
	reading percent correct	48.0%	42.2%	36.1%
	comprehension	42.0%	40.7%	31.7%

SUMMARY

Overall, oral reading fluency assessment results show that only a small proportion of students are reading well enough for their grade level. Most of those students who were able to read the text were also able to answer some or all comprehension questions. Since literacy instruction is conducted in the mother tongue of the vast majority of students, it is probable that the major obstacle to reading is decoding. These results are corroborated by the findings of EGRA assessment conducted in 42 out of 62 sampled schools in 2011 that found a large proportion of non-readers in P4 classrooms, and overall poor reading performance among many tested students.



MATHEMATICS ASSESSMENT OF RWANDAN SCHOOLS (MARS)

Mathematics assessment was developed by EDC math experts based on the review of the Rwandan mathematics curriculum in early grades and on the international standards of math instruction. The math test included three subtasks with 10 items each. Two of the three tasks were the same for both grades (addition and subtraction), and one task was different: the third task for P2 students involved adding and subtracting numbers with 10, and the third task for P3 students involved comparing numbers. Table 9 shows the description of tasks included in the test:

TABLE 13. MATHEMATICS COMPETENCIES INCLUDED IN MARS

GRADE LEVEL	SUBTEST	TASK
Primary 1	Subtest 1	Adding numbers within 10
	Subtest 2	Subtracting numbers within 10
	Subtest 3	Comparing magnitude of numbers (up to 2 digits)
Primary 2	Subtest 1	Adding numbers within 100
	Subtest 2	Subtracting numbers within 20
	Subtest 3	Multiplying numbers within 10
Primary 3	Subtest 1	Multiplying numbers within 10
	Subtest 2	Dividing numbers within 10
	Subtest 3	Adding numbers within 100
	Subtest 4	Subtracting numbers within 100

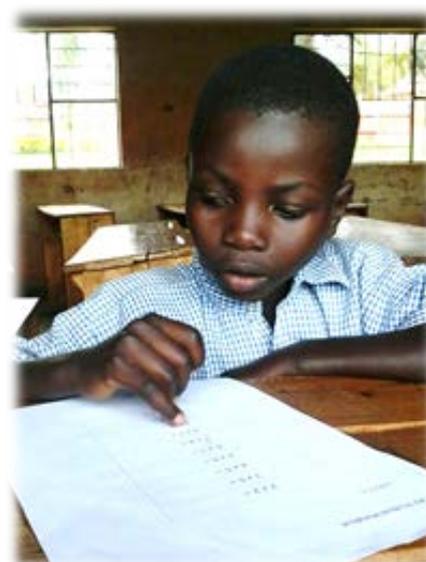


Figure 19 shows an average student achievement on the three subtests. The results are interesting in that P2 students did better adding numbers than subtracting numbers, while P3 students did better subtracting numbers than adding numbers. The majority of P3 students were able to complete the number comparison task correctly, while fewer than a third of P2 students were able to solve subtraction and addition problems with “10” in them.

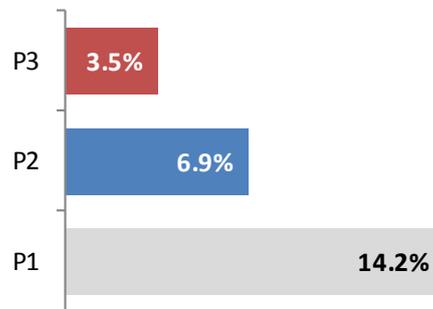
FIGURE 19. AVERAGE PERCENT CORRECT ON THREE MARS TASKS, BY GRADE



The tasks were developed to reflect grade-level competencies (see Methodology section Table 10 and MARS tasks in Appendix B), hence tasks for each grade were more difficult than tasks for the previous grade.

Item-level analysis shows that the majority of P2 and P3 students were able to work out many of adding and subtracting problems correctly, but most were not able to complete all 10 problems because they ran out of time. P1 students were able to compare numbers correctly, but did not do as well as with grade level addition and subtraction tasks. Complete results are found in Appendix C.

FIGURE 20. PERCENT OF STUDENTS WITH ZERO SCORES ON ALL MARS TASKS



Some students also had zero scores on the three subtasks. About 14 percent of P1 students and 7 percent of P2 students could not solve a single math problem.

Figure 21 shows the number of problems solved by P1, P2 and P3 students. A large proportion of P1 students could not solve any subtraction problems (59%), any addition problems (41%) and any number comparison problems (19%). In P2, 28, 22 and 16% of students could not solve any addition, subtraction and multiplication problem, respectively.

For P3 students, the hardest tasks were subtraction and division, with 18% and 26% of students failing to solve a single problem on those subtests, respectively. About 10% of P3 students had zero scores on addition and multiplication subtests.

FIGURE 21. NUMBER OF PROBLEMS SOLVED ON MATH SUBTASKS

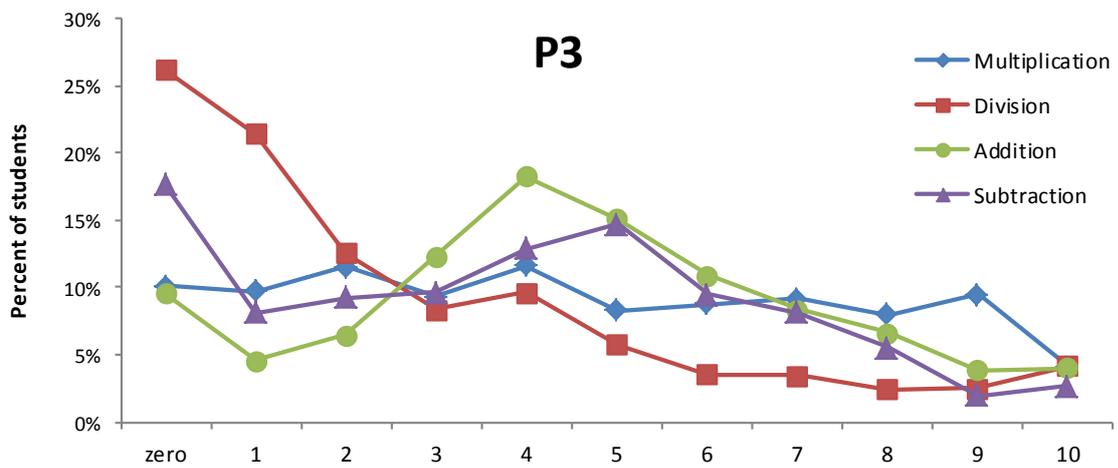
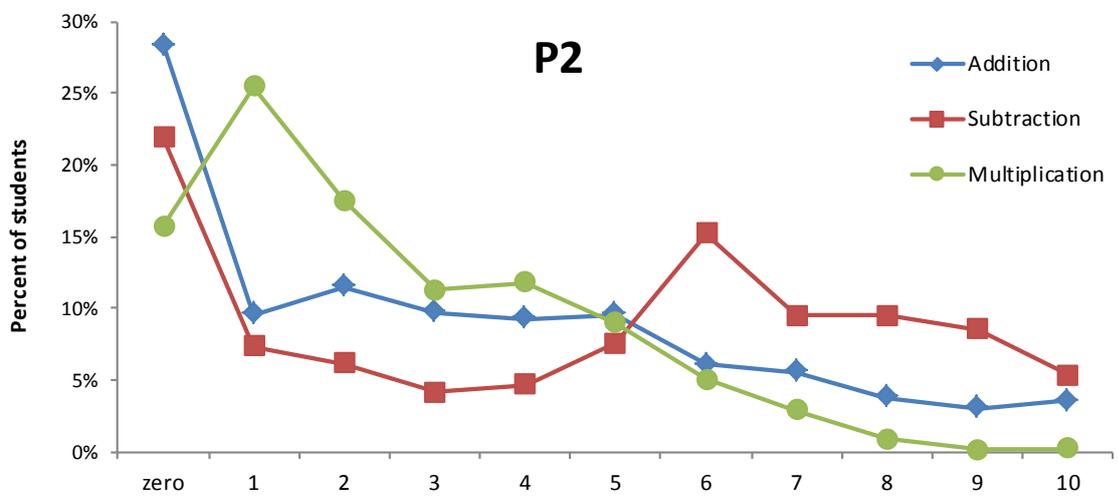
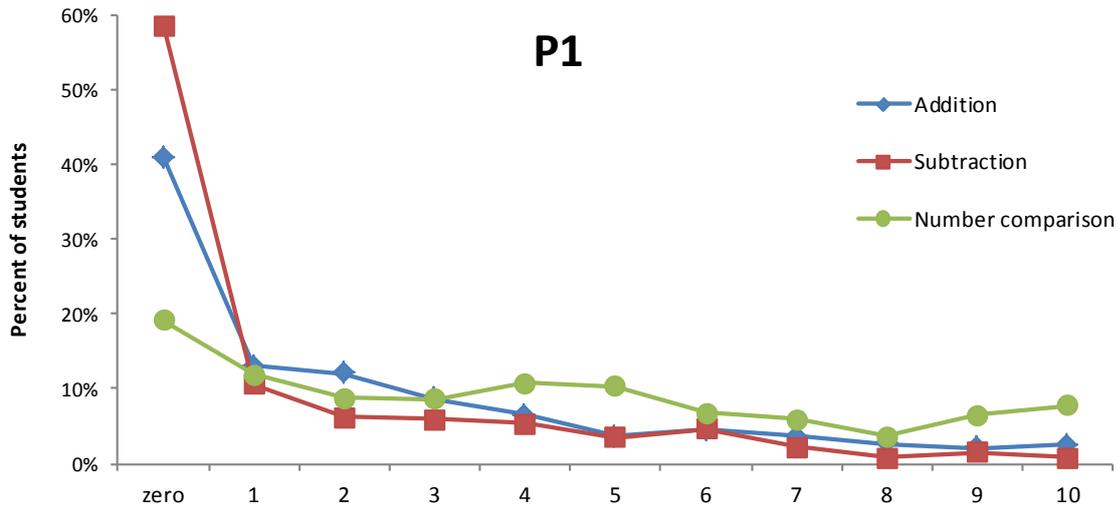
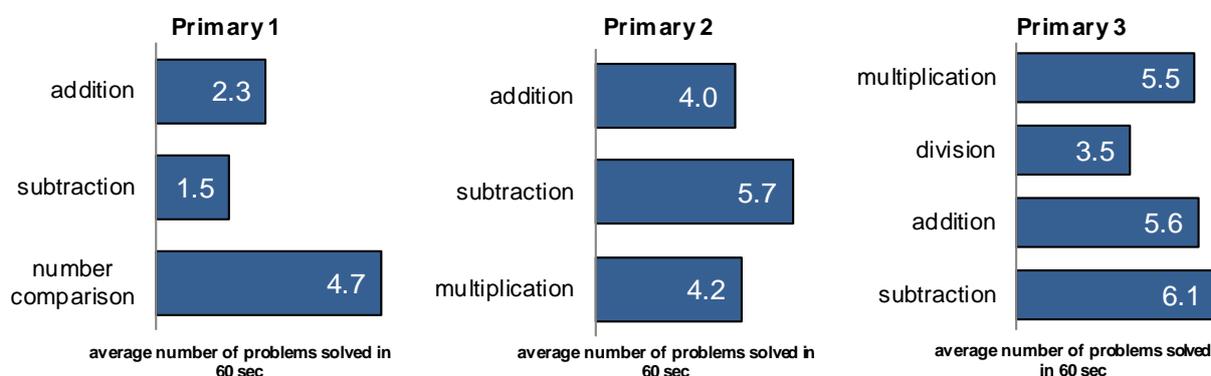


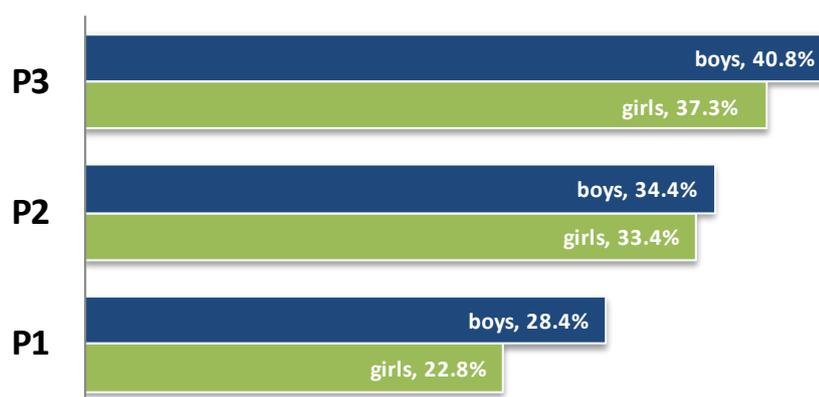
Figure 22 shows the average speed of math problem solving, by grade level and type of problem. P2 students demonstrated fastest problem solving with addition, and P3 students were able to compare numbers quickly.

FIGURE 22. ORAL READING FLUENCY IN SOLVING MATH PROBLEMS, BY GRADE



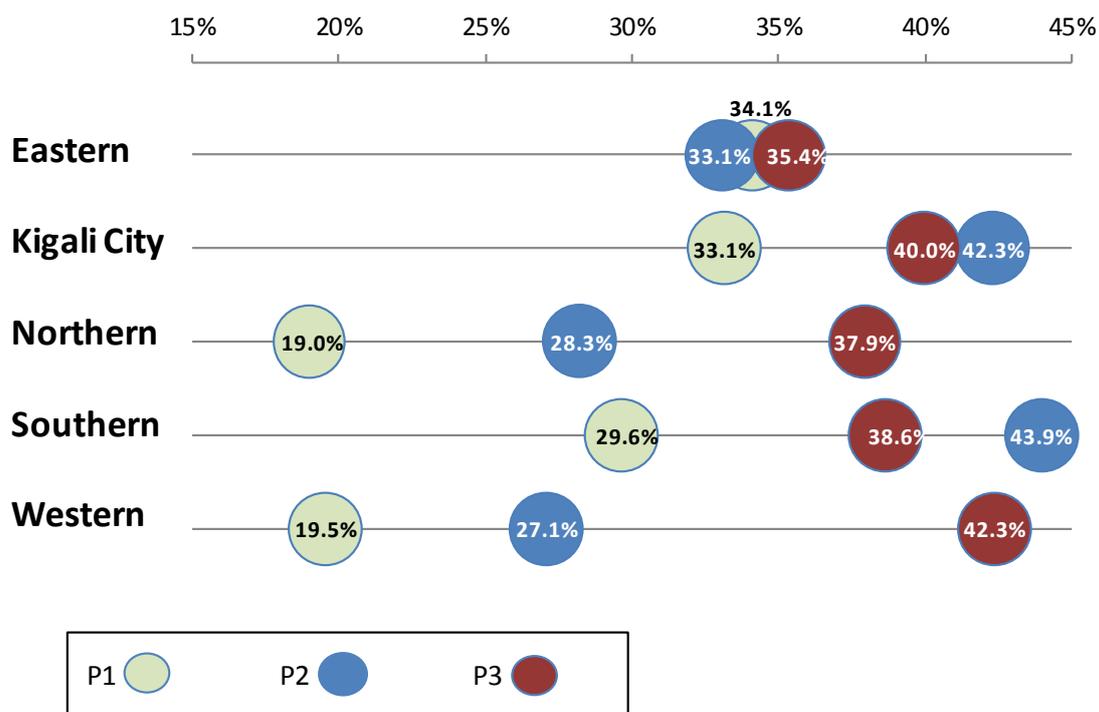
Comparisons by gender (Figure 23) showed that differently from oral reading fluency tests, where girls did better, on MARS tasks boys outperformed girls. The difference was statistically significant at $p < .01$ level in P1, but not in P2 or P3. There can be multiple explanations for this gender difference; one view is that is due to the practice of involving boys more than girls in market activities involving money, necessitating teaching them basic math skills.

FIGURE 23. AVERAGE PERCENT CORRECT ON THREE MARS TASKS, BY GRADE AND GENDER



Large differences were detected across provinces in P1 and P2 performance on MARS. In P1, average combined MARS scores ranged from 19% in Northern province schools to 34% in Eastern province schools. In P2, the scores ranged from average 27% correct in Western province to 44% correct in Southern province. Scores for P3 were much less dispersed, averaging between 35 and 42% correct in all five provinces. These results shown in Figure 24 should be interpreted with caution given small sample size within provinces.

FIGURE 24. AVERAGE PERCENT CORRECT ON MARS, BY GRADE AND PROVINCE



Data collectors reported that most students were solving multiplication and subtraction problems from memory, while with addition problems they were using their fingers and counted out loud, resulting in overall lower scores in addition than might have been expected.

IMPACT OF CONTEXTUAL FACTORS ON MATH ACHIEVEMENT

AGE AND OTHER FACTORS

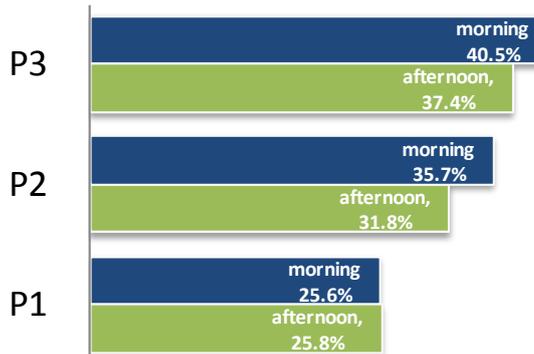
The impact of age was not as straightforward as with literacy: older students in P1 tended to have better math performance (Pearson's $r=.334$, statistically significant at $p<.001$ level), while at P3 level younger students performed better than older students (Pearson's $r=-.126$, statistically significant at $p<.001$ level). At P2 level the age was not found to impact results. This finding is likely due to the fact that P1 math tasks were simple math calculations that children, particularly boys, are expected to perform using money when sent to the market for family needs. P1 older students have the advantage of having practiced these tasks longer, so their performance on the test is higher. At P3 level, however, the tasks are much more complex, involving multiplication and division that are not practiced in everyday transactions.

Bivariate statistical analysis did not find significant correlations between student results in math achievement and context survey composites.

FIGURE 25. AVERAGE MATH RESULTS, BY SHIFT

CLASS SHIFT

Statistical analysis of assessment results disaggregated by shift found that P2 and P3 students performed better when tested in the morning. The difference was statistically significant in P2 but not in P3. No difference was found in P1.

**SCHOOL LOCATION**

To help us better understand the variation in student scores, we looked at the differences in scores between students from different locales – urban, peri-urban, and rural, as well as the effect of distance to Kigali. Differently from literacy results which were found to be negatively correlated with the distance to Kigali, no such relationship was found with math results. However, data analysis did find that P2 and P3 students in urban districts, on average, performed statistically significantly better (at $p < .05$ level). Urban P3 students performed better than their rural counterparts, with peri-urban falling in the middle. The results of these comparisons must be interpreted with caution since the sampling plan was based on the overall national estimates and not designed to provide estimates of subgroups.

TABLE 14. AVERAGE PERCENT CORRECT ON MARS, BY LOCALE AND GRADE

Grade	URBAN	PERI	RURAL
P1	25.7%	27.7%	26.8%
P2	40.2%	37.9%	33.5%
P3	44.1%	43.5%	37.3%

SUMMARY

Overall, mathematics assessment results show that a large proportion of P2 and P3 students are still developing basic math skills that would enable them to perform grade-level number operations with accuracy and speed. The majority of P2 and P3 students were able to work out some adding and subtracting problems correctly, but most were not able to complete all 10 problems within the allocated one minute for each task. This suggests that most students do not yet possess grade-level procedural math fluency which they need to have to be able to advance to more complex mathematical problems.



SCHOOL-LEVEL AND TEACHER-LEVEL FINDINGS

Concurrently with the student assessment, the data collection team gathered data on school context, grade-level resources and practices related to L3 activities. This information was used as covariates in oral reading fluency and mathematics assessment data analysis.

TEACHERS AND STUDENTS

On average, schools reported that they have between one to four P1 classrooms (although in some schools this number was as high as seven), and one to three P2 and P3 classrooms at their schools. The table below shows the average number of students enrolled by grade. Near gender parity can be seen in enrollment for all three grades, with roughly equal numbers of male and female students enrolled.

TABLE 15. SCHOOL ENROLLMENT AND TEACHER STATISTICS, BY GRADE

Grade	No of students range	Avg. No Students Enrolled			No of classes	No of teachers	Teacher/student ratio
		Male	Female	TOTAL			
P1	50-679	137	130	267	2.7	3.7	1 : 77
P2	34-559	95	97	192	2.3	3.3	1 : 61
P3	25-393	78	74	152	1.9	3.1	1 : 54

When analyzed by grade, the average number of enrolled students decreases as students transition into higher grades. As can be seen in the table below, on average, P3 has about 40% fewer students than P1. The decrease in enrollment is similar for both genders.

The majority of head teachers reported that their schools had between 2 and 10 teachers teaching P1, P2 and P3 students. Only 12% had more than 15 teachers. On average, nearly two thirds of the teachers in the sample (66.9%) of the teacher force is female. More male teachers were found to teach math than Kinyarwanda or English.

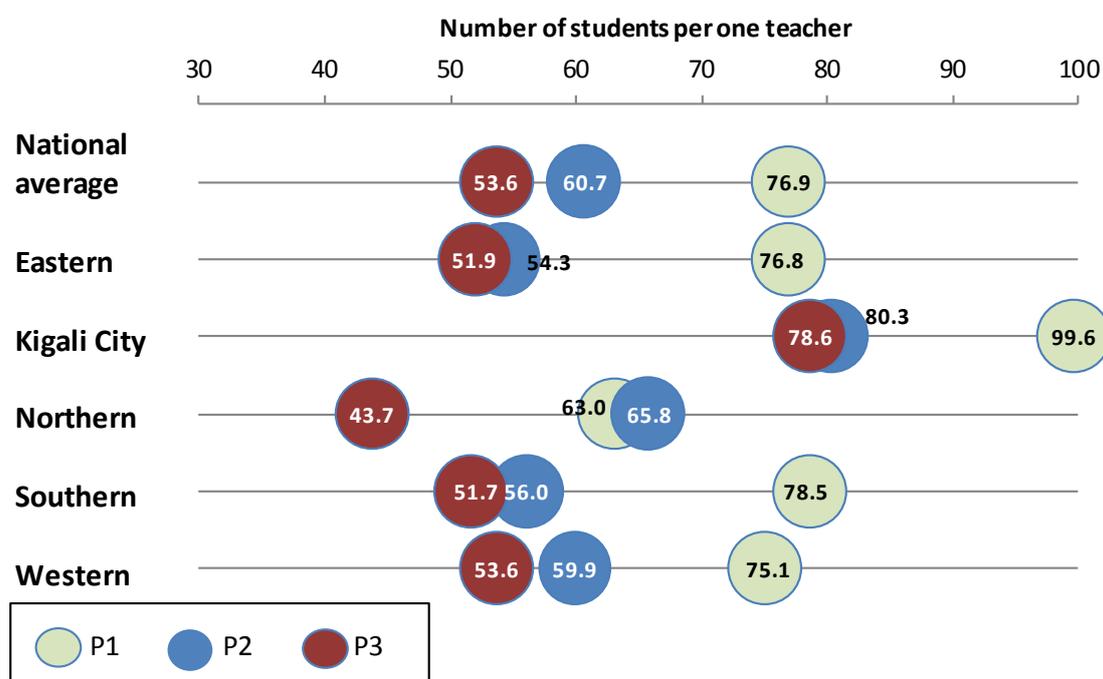
An analysis of student/teacher ration showed that, on average, a P1 classroom can be expected to have between 17 and 219 students per one teacher; a P2 classroom can be expected to have between 11 and 155 students enrolled per one



teacher; a P3 classroom can be expected to have between 8 and 149 students per one teacher, with respective averages of 77, 61 and 54 students per teacher.

Provincial comparisons found larger differences in student/teacher ratio at P1 level, than in P2 or P3. The average teacher/student ration is displayed in Figure 26; these results represent a snapshot of the sample in each province and should not be viewed as an estimate of teacher/student ration in each province since the provincial-level sample is not large enough.

FIGURE 26. AVERAGE STUDENT/TEACHER RATIO IN FIVE PROVINCES, BY GRADE



L3 MATERIALS AND TECHNOLOGY

Head teachers were asked the number of materials they received from L3 over the last three school terms. Table below shows the average number of materials received for both grades P1 and P2. Teachers reported that they received Kinyarwanda read aloud materials and teaching guides for the three subject areas – Kinyarwanda, English and Math.

TABLE 16. AVERAGE NUMBER OF L3 MATERIALS, BY GRADE

Material	Average range per school	Material	Average range per school
P1 Kinyarwanda guide	1-2	P2 Kinyarwanda guide	1-2
P1 Kinyarwanda read-alouds	1-2	P2 Kinyarwanda read-alouds	1-2
P1 English guide	1-2	P2 English guide	1-2
P1 Math guide	1-2	P2 Math guide	1-2
P1 Kinyarwanda reader term 1	58 to 780	P2 Kinyarwanda reader term 1	11 to 585
P1 Kinyarwanda reader term 2	58 to 855	P2 Kinyarwanda reader term 2	11 to 855

P1 Kinyarwanda reader term 3	58 to 723	P2 Kinyarwanda reader term 3	11 to 575
P1 English reader	0 to 855	P2 English reader	0 to 598

Head teachers were also asked the quantity of technological equipment received from L3, such as speakers, cell phones, SD cards, and solar panels. Over 98% of schools reported receiving at least one speaker, cell phone or SD card. On average schools received around five speakers, cell phones and SD cards from L3. Half of the schools (50.1%) in the sample received from L3 a solar panel for the school.

TABLE 17. AVERAGE NUMBER OF TECHNOLOGY MATERIALS RECEIVED FROM L3

Type of Materials	Range of number received	Avg. Number received
Speakers	3 to 14	6
Cell phones	1 to 14	6
SD cards	2 to 14	6

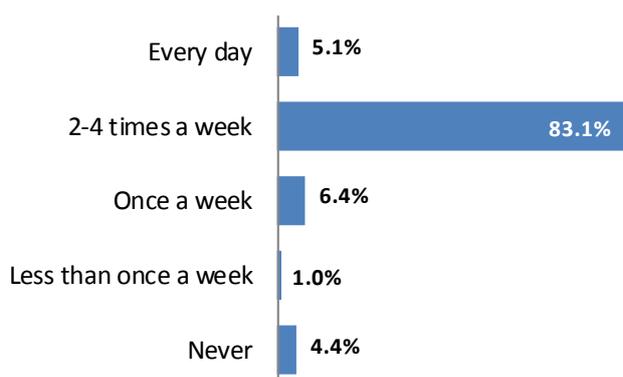
Nearly all P1 and P2 (98.5%) of teachers reported that they received technology from L3, primarily cell phones with SD cards. Very few respondents reported having received speakers.

FIGURE 27. TECHNOLOGY IN THE CLASSROOM



Teachers mostly reported using technology two to four times a week. The large majority (94.6%) of teachers use technology at least once a week. Results were consistent across grade and subject. Similarly, analysis by province was fairly consistent, with the exception of the Northern province where nearly a fifth (22.4%) of teachers reported that they never use technology in teaching students.

FIGURE 28. HOW OFTEN DO YOU USE TECHNOLOGY IN TEACHING STUDENTS IN THIS SUBJECT? (N=390)



"I was very happy to receive L3 program materials which have facilitated my work."

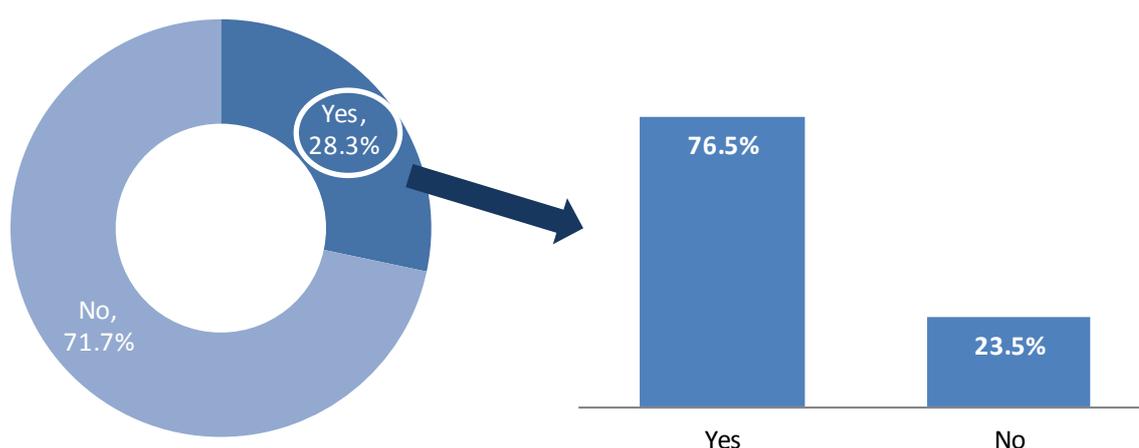
- Teacher from Western province

PARENTAL AND COMMUNITY INVOLVEMENT

All schools in the sample had a parent teacher association (PTA). More than a quarter of schools (28.3%) reported that members from the PTA had been trained by Concern Worldwide. On average, for schools that had PTA members trained by Concern, around 3 PTA members that attended the training. Three quarters of PTA members who had received training trained other PTA members.

FIGURE 29. PTA MEMBERS TRAINED BY CONCERN WORLDWIDE

Has the PTA been trained by Concern Worldwide? (n=60) Did the PTA members (who attended the training facilitated by Concern) train others PTA members? (n=17)



Just over a half (51.7%) of schools reported that their PTA/PTC had an action plan. Roughly a third of PTA/PTCs have undertaken initiatives to support teacher motivation in their schools. The major ways PTA/PTCs support teacher motivation include:

- Providing lunch and tea break for teachers at school;
- Providing financial incentives to best performing teachers; and
- Developing plans to train teachers and to continue their professional development.



Slightly more PTAs/PTCs (41.7%) have undertaken initiatives to support literacy and equity in education in their schools. Examples of initiatives include:

- Reading or poem competitions;
- Providing time for self-reading for students;
- Creating a school library;

- Developing strategies to avoid student dropout; and
- Sensitizing parents on gender equality.

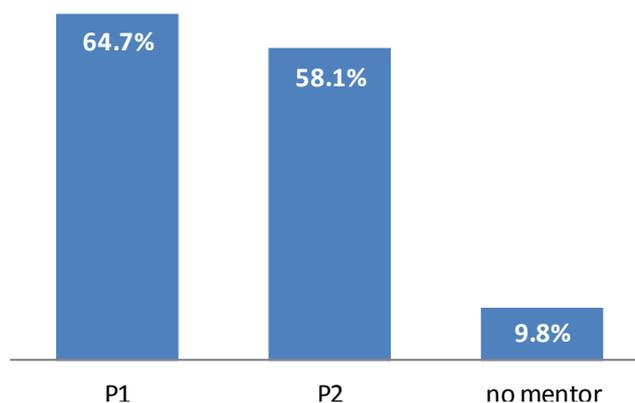
L3 TRAINING

Overall, about one half of surveyed teachers (50.4%) reported that they have received L3 training. When analyzed by grade, more teachers from P1 and P2 reported receiving L3 training, with 64.7% and 58.1% of P1 and P2 teachers respectively reporting that they received training. In comparison, only one quarter of P3 teachers had received L3 training.

A higher proportion of teachers from the Northern and Southern provinces reported attending training by their school-based mentor, with 84.3% and 87.3% of the teachers from Northern and Southern, respectively, reporting having attended L3 training.

The majority (96.7%) of P1 and P2 teachers reported using the L3 curriculum. Only 3.3% of P1 and P2 teachers reported using the old curriculum.

FIGURE 30. TEACHERS RECEIVED L3 TRAINING (N=560)



Teachers were asked whether they had any comments on L3 materials, training, or school-based mentors. The most common comments/suggestions from surveyed teachers include:

- Electricity/solar panels are needed for schools in order to power phones and speakers.
- Additional trainings are needed for teachers on L3 program, materials and technologies.
- Pace of audio sessions is challenging for many teachers; students require more time than is allotted in the audio programs to think.
- Additional phones and speakers are required so that teachers do not have to share.
- Teachers suggested that a school-based mentor would be helpful in those schools that do not have them.
- Stories in the English audio program are too long for their students.
- Ability to rewind the lesson on the phone would be helpful.
- L3 mathematics books are needed.

“This L3 program is helping us a lot because students now know some English words and their meaning in Kinyarwanda, and students like what their fellows in the audio program say and this makes them to always recall what they heard in the audio program.”

- Teacher from Eastern province

TRAINING BY MENTORS

Teachers who said they attended trainings by school-based mentors had students with higher average performance on oral reading fluency and mathematics assessment in both grades and subjects¹⁰, except P2 Kinyarwanda, where statistically there was no difference between student performance of mentor trained teachers, and not trained teachers.

FIGURE 31. AVERAGE STUDENT PERFORMANCE IN CLASSROOMS OF MENTOR-TRAINED AND NO TRAINED TEACHERS, BY GRADE



Since the implementation of the mentor program has just started, these results are very encouraging.

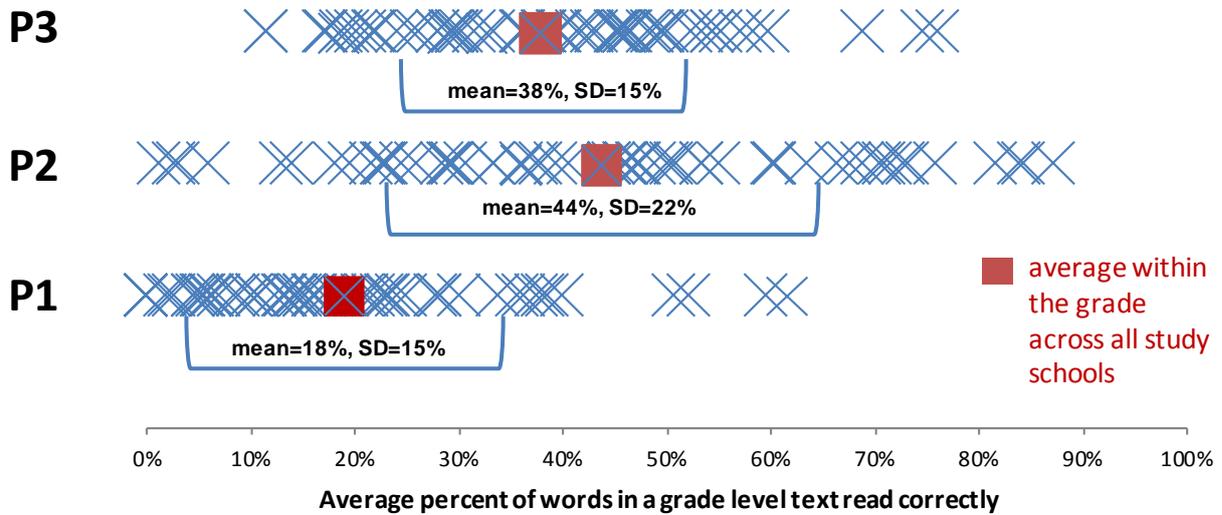
READING AND MATH SCHOOL-LEVEL RESULTS

An analysis of school averages in each grade¹¹ showed a remarkable diversity of results across schools, in each grade on both tests. Figure 32 shows a scatterplot of average percent of words in a grade-level text read correctly by tested students, by grade, in each tested school. Each cross on the graph represents average results in a study school.

¹⁰ The difference was found to be statistically significant at $p < .001$ level in P1 oral reading fluency and mathematics assessment, and at $p < .05$ level in P2 MARS.

¹¹ The averages were computed using percent correct read by sampled students in each grade, for each school. For provincial comparisons, results across the three tested grades were averaged for each school.

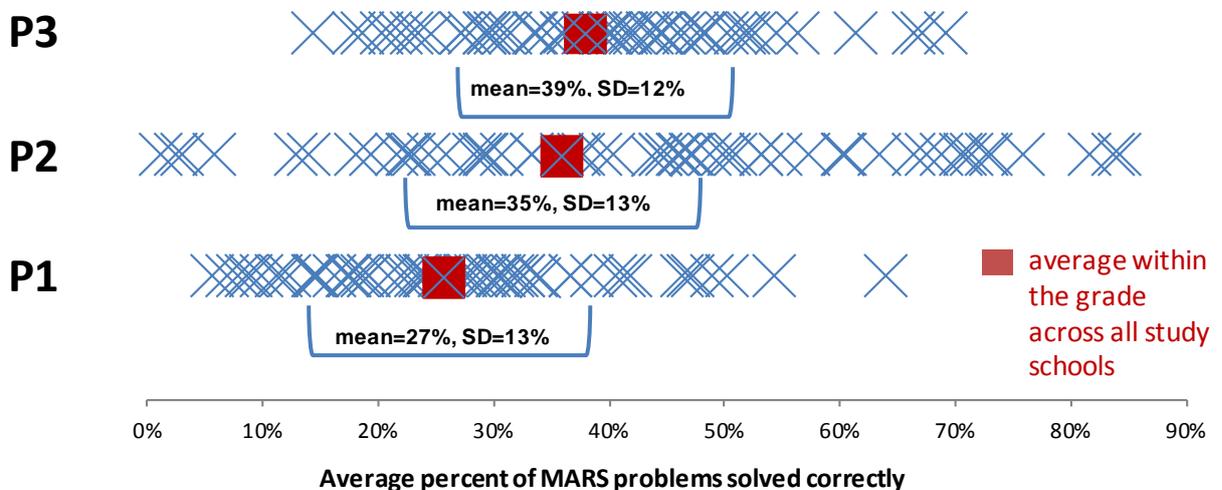
FIGURE 32. AVERAGE PERCENT CORRECT AMONG STUDENTS ON ORAL READING FLUENCY TEST IN STUDY SCHOOLS, BY GRADE



Similar analysis performed for the math scores across all schools in the sample. Schools are more clustered in the average results of their P1 students than either P2 or P3 students, with the majority of schools found in the range of 13 to 40%. Average results for P3 students are more dispersed, with the mean of 39% correct and the majority of schools ranging between

P2 results are most dispersed, with average scores the majority of schools between 22 and 46%. A few outlying cases in P2 have extreme results: four schools had very low average results (below 10%), and three schools had very high average results (over 80%). A study of these outliers could shed more light on the reasons behind these anomalies.

FIGURE 33. AVERAGE PERCENT CORRECT OF ON MARS TASKS IN STUDY SCHOOLS, BY GRADE



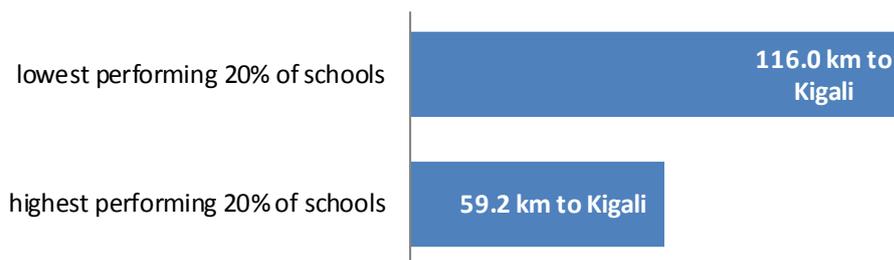
Comparisons of school-level average results on oral reading fluency and mathematics assessment tasks found that students in the same schools do below average on both tests, and do above average on both tests. In other words, the same dozen schools showed low average results among their P1, P2

and P3 students in both oral reading fluency and mathematics assessment. On the other end of the spectrum, in a handful of schools all tested students performed well above average. In the vast majority of schools, however, the average student results varied greatly.

Statistical comparisons of background characteristics of 20 percent of top performing and bottom performing schools did not reveal any differences in home environment, school/teacher characteristics, or socio-economic background of attending students. Furthermore, contrary to what might be expected, higher performing schools did not have smaller student/teacher ratio or smaller number of students enrolled in general.

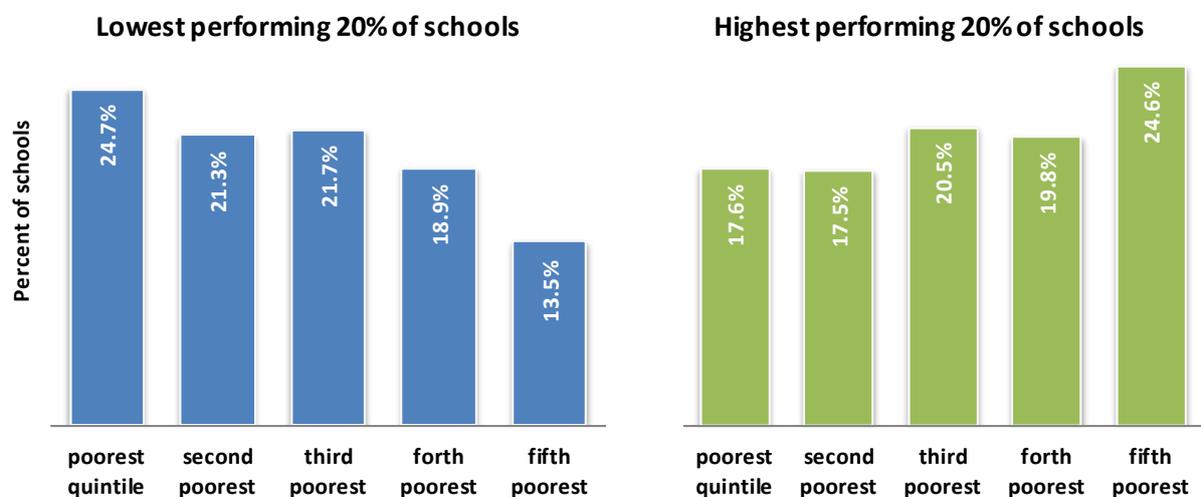
A single strong predictor emerged explaining 27 percent of variance: distance to Kigali. On average, lowest performing 20 percent of schools are located twice as far from Kigali as the highest 20 percent of schools.

FIGURE 34. AVERAGE DISTANCE TO KIGALI



Official data on the percent of households in different quintiles of wealth is also correlated with whether a school is found in the highest or lowest performing 20 percent, with lowest performing schools located in areas with higher rate of poverty, and higher performing schools located in the areas with lower rate of poverty.

FIGURE 35. PERCENT OF SCHOOLS WITHIN POVERTY QUINTILES, BY HIGHEST AND LOWEST PERFORMING SCHOOLS



A further investigation of why in some schools tested students averaged much higher than average would help document potential best practices in instruction, as well as shed light on structural deficiencies causing some schools to average significantly below their peers.

CONCLUSION

Results for both oral reading fluency and mathematics assessment showed very diverse classrooms, with some students performing at grade level and a very substantial proportion of students falling significantly below grade level. To address this challenge, teachers need to regularly conduct formative assessments specific to foundational skills being taught, and be equipped with strategies to provide ongoing remediation to those students not yet demonstrating mastery.

The data analysis showed that girls perform somewhat better than boys in reading, and boys perform better than girls in math. Teacher practices favoring genders in different subjects may have contributed to the differences. Students from urban districts were found, on average, to perform better than students from rural districts, although the results should be considered with caution since the sample was not constructed to be large enough to shed light on differences between locales. Schools that are closer to Kigali have higher average results than schools in more remote locations.

School-level data showed very large P1 classrooms, with numbers of enrolled students dropping in subsequent grades. All schools reported having received L3 materials and technology; the majority of P1 and P2 teachers reported having been trained by L3 and by school-based mentors. Statistical analyses showed that training by mentors is associated with higher oral reading fluency and mathematics scores of students.



APPENDIX A: METHODOLOGY

INSTRUMENTS

FLUENCY ASSESSMENT OF RWANDA SCHOOLS (FARS)

The REB and L3 experts worked collaboratively to develop reading tests for P1, P2 and P3 reading assessment. The developed tests reflected emerging national standards for reading in the first three primary grades, since the testing was taking place at the end of the school year. The criteria used for the test development included the text genre, text structure, vocabulary, sentence structure, letter-sound combinations, length, content, and the type of comprehension questions. The development process involved three stages:

1. Convening of the expert group to develop three passages appropriate for the end of the Primary 1, Primary 2 and Primary 3 with 5 comprehension questions each (July 2014)
2. Pilot test the three passages with a sample of learners (July-August 2014)
3. Based on the results of the pilot test, select the final text (August 2014).

Summary of the text development criteria is provided in Table 10, and the full sets of criteria can be found in Table 13 at the end of the Methodology Section. The end of Primary 1 was considered to correspond to Level 4, and the end of Primary 2 was considered to correspond to Level 9. Criteria for these levels were used to develop the reading tests.

According to the criteria, a team of experts from the REB and L3 developed three texts and corresponding sets of five comprehension questions for each language. They piloted the texts and questions with a small number of students. Based on the results from the pilot, the team selected the final versions for the FARS study.

TABLE 1. CRITERIA FOR DEVELOPING TEXTS IN KINYARWANDA

Criteria	P1 (Level 4)	P2 (Level 9)
Genre	Very simple narrative, familiar single theme; simple topic	Simple narrative; familiar themes; single idea or simple topic
Vocabulary	Familiar words	Familiar vocabulary; 1-3 syllables; nearly all high frequency words
Sentence structure	Simple sentence structure, short sentences, present tense.	Simple sentence structure; short and long sentences; present tense
Length (target)	15 words	35 words
Content	Simple structure; literal information	Simple structure; literal information
Comprehension questions	5 questions; literal questions, i.e., who, what, when, where, why	5 questions; literal questions, i.e., who, what, when, where, why

FARS was timed at 60 seconds for the reading portion which was followed by five comprehension questions.

MATHEMATICS ASSESSMENT OF RWANDA SCHOOLS (MARS)

MARS was developed and pilot-tested by L3 staff with the technical support from EDC mathematics experts. The tests were based on the results of an analysis of the Rwanda curriculum framework, mathematics teacher guides, and learning materials for the primary grades, to determine which mathematical concepts were pivotal for each grade. Selected concepts were then cross-referenced with the research-based international standards of teaching mathematics in early grades.

Tasks for Primary 1 and Primary 2 were used in the assessment since the testing was taking place early in the academic year, and students are not supposed to have mastered the concepts of their grade yet. This decision was made primarily to avoid a “floor” effect when we find most students with near zero scores.

Each subtest included 10 tasks; each subtest was timed at 60 seconds, for the entire MARS not to exceed 10 minutes in administration, per child, including introduction and conclusion.

A reliability analysis of the MARS showed a strong reliability for the MARS test for all three. The subtest with the lowest item-total correlation was P2 Subtest 3 (“Multiplying Numbers”) which had the correlation coefficient of .517. This result shows that students who are proficient in adding and subtracting do not have the same level of proficiency when it comes to more complex operations such as multiplying numbers. However, other P2 MARS tasks relate strongly to each other; in fact if subtest 3 was deleted, the Cronbach’s alpha would go up to .814.

Similarly, for the P1 MARS, subtest 3 (“Comparing numbers”) had the lowest item-total correlation (.619); if removed the Cronbach’s alpha would go up slightly to .832. As for the P3 MARS, subtest 2 (“Dividing Numbers”) was the least correlated subtest with an item-total correlation of .618. Overall results of the test reliability analysis (Cronbach’s alpha) tell us that P1, P2 and P3 MARS consistently measure procedural fluency in mathematics.

The results are discussed in details in the Findings: MARS section.

TABLE 2. MARS RELIABILITY ANALYSIS

Subtests	MARS P1		MARS P2		MARS P3	
	Item-Total Correlation	Alpha if Item is Deleted	Item-Total Correlation	Alpha if Item is Deleted	Item-Total Correlation	Alpha if Item is Deleted
Subtest 1	.715	.707	.704	.592	.643	.824
Subtest 2	.724	.725	.696	.617	.618	.831
Subtest 3	.619	.832	.517	.814	.725	.788
Subtest 4*	–	–	–	–	.755	.773
Cronbach’s alpha	.819		.777		.846	

* Grades P1 and P2 MARS test included only three subtests; MARS P3 test included four.

Table 12 summarizes the subtests and how they are presented in the report.

TABLE 3. FARS AND MARS SUBTESTS

P1 Test Tasks				
#	Description (Instrument)	Tasks	Max. Pts.	Timed
FARS				
1A	Oral Reading Fluency	27-word passage	27	Yes (60 sec.)
1B	Reading Comprehension	5 questions	5	No
MARS				
1	Adding Numbers	10 equations	10	Yes (60 sec.)
2	Subtracting Numbers	10 equations	10	Yes (60 sec.)
3	Comparing Numbers	10 equations	10	Yes (60 sec.)
P2 Test Tasks				
#	Description (Instrument)	Tasks	Max. Pts.	Timed
FARS				
1A	Oral Reading Fluency	42-word passage	42	Yes (60 sec.)
1B	Reading Comprehension	5 questions	5	No
MARS				
1	Adding Numbers	10 equations	10	Yes (60 sec.)
2	Subtracting Numbers	10 equations	10	Yes (60 sec.)
3	Multiplying Numbers	10 equations	10	Yes (60 sec.)
P3 Test Tasks				
#	Description (Instrument)	Tasks	Max. Pts.	Timed
FARS				
1A	Oral Reading Fluency	58-word passage	58	Yes (60 sec.)
1B	Reading Comprehension	5 questions	5	No
MARS				
1	Multiplying Numbers	10 equations	10	Yes (60 sec.)
2	Dividing Numbers	10 equations	10	Yes (60 sec.)
3	Adding Numbers	10 equations	10	Yes (60 sec.)
4	Subtracting Numbers	10 equations	10	Yes (60 sec.)

DATA COLLECTION

Teams of REB staff with support from L3 M&E specialists administered the FARS/MARS instruments to the sample of students. Data collectors were identified by REB and trained by L3 staff in September of 2014 in Kigali. The training was designed to standardize the administration of the tools and increase the reliability of the assessment. It began with orienting the data collectors to the study and reviewing the fluency and mathematics instruments. Because the data were collected electronically, data collectors were trained how to use tablets. A significant portion of the training time was devoted to

practice using the tools, both in the training environment and in schools. During actual data collection, teams of two REB-appointed and L3-trained data collectors traveled to five provinces; three out of five teams were accompanied by an L3 M&E specialist traveling with them to supervise data collection. The other two teams had regular communication with L3 M&E Manager who supervised the entire assessment to address any potential issues or concerns. Since the data capture was done electronically, daily data checks were conducted by L3 M&E Advisor to ensure high quality of data. Data checks included timer data, duration of administration, time of start and time of finish of each assessment, and GPS coordinates of the places of assessments. Completeness of the data and the accuracy of timers were ensured by the software used for the assessment.



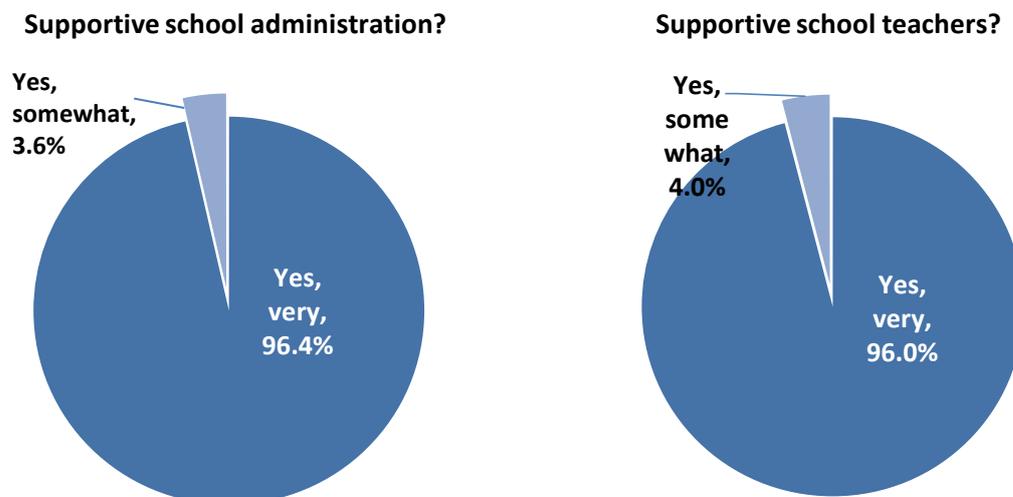
Data were then collected from the 60 sampled schools. Teams of data collectors collected data at the same time, between September 22 and September 30 of 2014. All data were collected electronically, using tablets with SurveyToGo software in which FARS and MARS were programmed. All tasks were timed at 60 seconds; the timers were implemented automatically to reduce the possibility of an error.

All testing was implemented in Kinyarwanda.

The entire assessment took between 4 and 25 minutes, with the average time of 10 minutes per child.

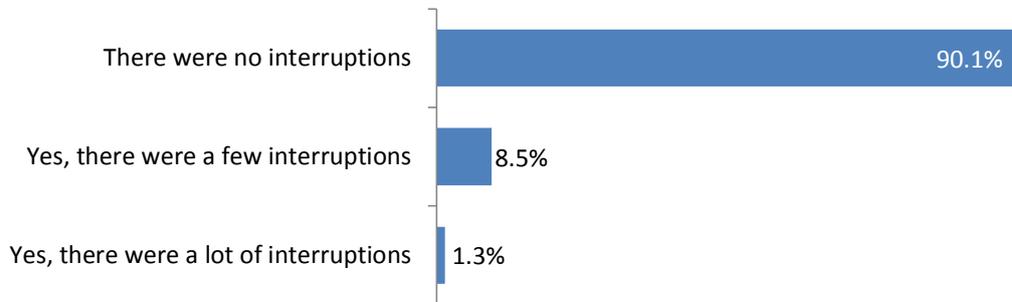
Assessors were asked whether schools and teachers were supportive of data collection. The majority of assessors reported that the school administration and teachers were supportive of data collection. Nearly all assessors (96%) reported that both school administration teachers were very supportive of data collection; only around 4% of assessors felt that school administration and teachers were only somewhat supportive of data collection.

FIGURE 1. SCHOOLS/TEACHERS ARE SUPPORTIVE OF DATA COLLECTION (N=223)



Generally, assessors reported that they were able to conduct interviews without interruptions by teachers or other learners walking into the room where the assessment was being conducted. In fact, 90% of assessors reported they had no interruptions when conducting assessments. Less than 5% of assessors indicated that they experienced a lot of interruptions.

FIGURE 2. ASSESSMENTS WERE CONDUCTED WITHOUT INTERRUPTIONS (N=223)

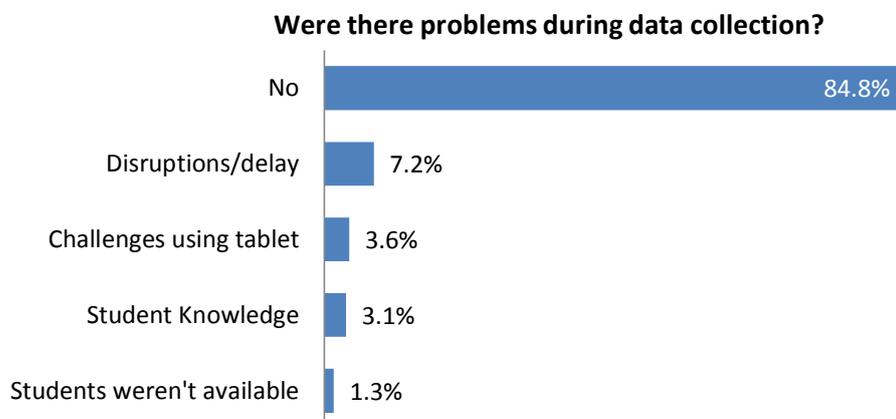


Assessors were asked whether students they assessed were able to understand the language they were speaking. All assessors reported that all students they assessed were able to understand the language they were speaking.

Assessors were also asked whether they experienced problems during data collection. The majority (84.8%) of assessors reported that they did not experience any problems during data collection at the sample schools. The most common problems assessors faced were disruptions during assessments and challenges/mistakes using the tablet (i.e. selecting the wrong province on the tablet, etc.). A few assessors expressed that students were able to read which made administering the assessment challenging. Further, in a few cases assessors mentioned that they faced challenges finding the students they were to assess.



FIGURE 3. PROBLEMS DURING DATA COLLECTION (N=223)



DATA ANALYSIS

Collecting data electronically eliminated the need for data entry. L3 M&E staff cleaned the data sets and conducted appropriate statistical analyses, including frequency distributions, comparisons of means and multivariate statistical analysis (regression).

For the analysis of the FARS data, we used the words correct per minute (wcpm) score as the main fluency measure which was calculated as follows:

$$WCPM = (Words\ Read\ Correctly / Number\ of\ Seconds\ Used) \times 60$$

For instance, if a student read 10 words correctly from the text and used 30 out of the 60 seconds, their rate would be 20 correct words per minute:

$$WCPM = (10 / 30) \times 60 = 20$$

MARS data contained three sections for each grade. The analysis is presented both by section and by total scores across the sections.

Results from the student context survey and the demographics section were used for the multivariate analysis of student-level results. Composite variables were constructed for each of the three sections of the context survey and used in the multivariate analysis.

SAMPLING PARAMETERS

The sampling approach followed random clustered sampling method to obtain a nationally representative sample of non-private schools (public or government-aided schools only). The sample was determined based on the following assumptions:

- Type of analysis: logistic regression
- Alpha (probability of Type I error): $.05/2 = .025$. Alpha is divided by two because two separate measures are used by the test (fluency and comprehension)
- Power (probability of Type II error): 0.9, or 90 percent
- Expected effect size: 0.3 (moderate)
- Expected inter-class correlation (ICC, or ρ): 0.1

Using Optimal Design cluster sampling software, the following sample size was computed:

- Number of clusters (schools) = 60
- Cluster size (number of students in a school, per each grade, per each gender) = 5 randomly selected boys and 5 randomly selected girls, 10 students in each grade, 30 students in each school.

Total sample size for each grade: 600 students. Total number of students: 1,800.

LIMITATIONS

The assessment had some limitations. In cross-sectional designs, major threats to validity¹ involve selection-history (when other events occur between cohorts that may impact one group but not the other), selection-instrumentation (when the test used with cohorts is slightly different), and selection-mortality (when there is a different rate of dropout in different tested cohorts, for whatever reason). While it is possible to control for the selection-instrumentation bias by extensive pilot testing, other two threats relate to the passage of time and external events outside of control or knowledge of the study team. It is therefore unknown to what extent external factors may impact different cohorts.

Other limitations originate from the assessment's sampling strategy. First, the sample size was designed to provide national estimates of literacy and mathematics achievement of P1, P2 and P3 students. While the sample was stratified by province to ensure adequate representation of students from all regions of the country, the province-level or district-level sub-samples are not large enough to be treated as separate samples. These sub-samples are large enough to detect very substantial changes or differences, but may not be sufficient to draw definitive province or district-level conclusions about the effects of the intervention. A much larger sample size would be required to enable such analyses.

Finally, a serious limitation was the timing of the assessment. While the assessment is supposed to provide baseline data on P1, P2 and P3 reading and mathematics grade level competencies of students, in some schools the L3 intervention was already rolled out. Consequently, P1 and P2 results might reflect not the pure baseline, but the initial effects of the L3 intervention. Although no intervention was rolled out in P3, some P3 teachers are the same as P2 teachers and may have already been trained by L3 mentors. Some teachers might also have started using P2 materials in P3 classrooms. Since no other data exist on fluency of P1, P2 and P3 students, the extent to which the results may have been skewed due to L3 intervention is unknown.

¹ W. Trochim, Research Methods Knowledge Base. Cornell University, 2006.

TABLE 4.CRITERIA FOR FARS DEVELOPMENT: CHARACTERISTICS OF TEXTS ACCORDING TO THE LEVEL OF DIFFICULTY

Level	Presentation of the text	Illustrations	Length	Choice of words	Syntax	Style
0	<ul style="list-style-type: none"> • Simple presentation • Writing is separate from illustration • Text on 1 page, illustration on the other • Text is always in the same place on the page 	<ul style="list-style-type: none"> • Direct link between the text and the illustration • Each idea is illustrated • There is more space for the illustration than for the text 	<ul style="list-style-type: none"> • 1 to 3 words per line • 1 line per page • 16 to 24 words • About 8 pages 	<ul style="list-style-type: none"> • Only familiar and frequent words • Simple vocabulary that is frequently used orally 	<ul style="list-style-type: none"> • Word or group of words 	<ul style="list-style-type: none"> • Predictable structure • Repetitive structure (pattern book) • A single idea is presented • Lists of things or actions
1	<ul style="list-style-type: none"> • Simple presentation • Writing is separate from illustration • Text is always in the same place on the page 	<ul style="list-style-type: none"> • Direct link between the text and the illustration • Each idea is illustrated • About 8 pages 	<ul style="list-style-type: none"> • 2 to 5 words per line • 1 to 2 lines per page • 21 to 40 words • About 8 pages 	<ul style="list-style-type: none"> • Only familiar and frequent words • Simple vocabulary that is frequently used orally 	<ul style="list-style-type: none"> • Declarative sentences • Simple sentences (S-V-C) • Verbs are in the simple present tense 	<ul style="list-style-type: none"> • Predictable structure • Repetitive structure (pattern book) • A single idea is presented
2	<ul style="list-style-type: none"> • Simple presentation • Writing and illustrations are sometimes on the same page • Text is always in the same place on the page 	<ul style="list-style-type: none"> • Direct link between the text and the illustration • Each idea is illustrated • There is more space for the illustration than for the text 	<ul style="list-style-type: none"> • 3 to 8 words per line • 1 to 2 lines per page • 30 to 55 words • About 8 pages 	<ul style="list-style-type: none"> • Only familiar and frequent words • Simple vocabulary that is frequently used orally 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • Simple sentences (S-V-C) • Verbs are in the simple present tense of the indicative or the imperative 	<ul style="list-style-type: none"> • Predictable structure • Repetitive structure (pattern book) • Story structure (beginning, middle and end) • Narrative or informative text • Some dialogues
3	<ul style="list-style-type: none"> • Simple presentation • Writing and illustrations are sometimes on the same page • Text is always in the same place on the page 	<ul style="list-style-type: none"> • Direct link between the text and the illustration • Each idea is illustrated • There is more space for the illustration than for the text 	<ul style="list-style-type: none"> • 5 to 8 words per sentence • 1 to 2 lines per page • 50 to 80 words • About 8 pages 	<ul style="list-style-type: none"> • Only familiar and frequent words • Simple vocabulary that is frequently used orally 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the simple present tense of the indicative or the imperative 	<ul style="list-style-type: none"> • Predictable structure • Repetitive structure (pattern book) • Story structure (beginning, middle and end) • Narrative or informative text • Dialogues
4	<ul style="list-style-type: none"> • Simple presentation • Writing and illustrations are sometimes on the same page • Text location may vary • Sentences continue one more than one line • Each new sentence begins on a new line 	<ul style="list-style-type: none"> • Direct link between the text and the illustration • More than one idea or action is contained in the illustration • There is more space for the illustration than for the text 	<ul style="list-style-type: none"> • 5 to 8 words per sentence • 2 to 3 lines per page • 75 to 100 words • About 8 to 12 pages 	<ul style="list-style-type: none"> • Mostly familiar and frequent words • Simple vocabulary • Text includes 1 to 3 new words not present in child's oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the simple present tense of the 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Only one theme is presented • Narrative or informative text • Dialogues

Level	Presentation of the text	Illustrations	Length	Choice of words	Syntax	Style
					<ul style="list-style-type: none"> indicative or the imperative There may be verbs on the present continuous 	
5	<ul style="list-style-type: none"> Simple presentation Writing may be presented in “talking bubbles” Text is separate from illustrations (except for “talking bubbles”) Text location may vary Sentences continue one more than one line Each new sentence begins on a new line 	<ul style="list-style-type: none"> Direct link between the text and the illustration More than one idea or action is contained in the illustration There is more space for the illustration than for the text 	<ul style="list-style-type: none"> 5 to 11 words per sentence 2 to 5 lines per page 75 to 130 words About 8 to 12 pages 	<ul style="list-style-type: none"> Mostly familiar and frequent words Simple vocabulary Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> Declarative and/or exclamatory sentences There can be some interrogative and negative sentences Simple sentences (S-V-C) Verbs are in the simple present or continuous present tense of the indicative or the imperative There can be verbs in the past or the future tense 	<ul style="list-style-type: none"> Story structure (beginning, middle and end) Only one theme is presented with several events Narrative or informative text Dialogues
6	<ul style="list-style-type: none"> Simple presentation Writing may be presented in “talking bubbles” Text is separate from illustrations (except for “talking bubbles”) Text location may vary Font reduced and easy to see Sentences continue one more than one line Each new sentence begins on a new line 	<ul style="list-style-type: none"> The illustration supports the text The illustration takes up several ideas in the text The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> 2 to 12 words per sentence 3 to 5 lines per page 130 to 180 words About 8 to 16 pages 	<ul style="list-style-type: none"> Mostly familiar and frequent words Simple vocabulary Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> Declarative and/or exclamatory sentences There can be some interrogative and negative sentences Simple sentences (S-V-C) Verbs are in the simple present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> Story structure (beginning, middle and end) Only one theme is presented with several events Narrative or informative text Dialogues
7	<ul style="list-style-type: none"> Simple presentation Writing may be presented in “talking bubbles” Text is separate from illustrations (except for “talking bubbles”) Text location may vary Font reduced and easy to see Sentences continue one more than one line Each new sentence begins on a new line 	<ul style="list-style-type: none"> The illustration supports the text The illustration takes up several ideas in the text The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> 4 to 12 words per sentence 3 to 8 lines per page 120 to 200 words About 8 to 16 pages 	<ul style="list-style-type: none"> Mostly familiar and frequent words Simple vocabulary Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> Declarative and/or exclamatory sentences There can be some interrogative and negative sentences Simple sentences (S-V-C) Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> Story structure (beginning, middle and end) Only one theme is presented with several events Narrative or informative text Dialogues

Level	Presentation of the text	Illustrations	Length	Choice of words	Syntax	Style
8	<ul style="list-style-type: none"> • Simple presentation • Writing may be presented in “talking bubbles” • Text is separate from illustrations (except for “talking bubbles”) • Text location may vary • Font reduced and easy to see • Sentences continue one more than one line • Each new sentence begins on a new line 	<ul style="list-style-type: none"> • The illustration supports the text but only in part • The illustration takes up several ideas in the text • The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> • Average 7 to 8 words per sentence • 4 to 9 lines per page • 180 to 270 words • About 8 to 16 pages 	<ul style="list-style-type: none"> • Some familiar and frequent words • Some vocabulary is a little more complex • Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Only one theme is presented with several events • Narrative or informative text • Dialogues
9	<ul style="list-style-type: none"> • Simple presentation • Writing may be presented in “talking bubbles” • Text is separate from illustrations (except for “talking bubbles”) • Text location may vary • Font reduced and easy to see • Sentences continue one more than one line • Each new sentence begins on a new line • There are some pages that contain only text 	<ul style="list-style-type: none"> • The illustration offers a weak to moderate support to the text • The illustration takes up several ideas in the text • The illustration lengthen the text by adding detail • The illustration promote an interpretation of the story • The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> • Average 9 words per sentence • 4 to 10 lines per page • 250 to 320 words • About 8 to 16 pages 	<ul style="list-style-type: none"> • Some familiar and frequent words • Some vocabulary is a little more complex • New specific vocabulary linked to the context • Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Only one theme is presented with several events • Narrative or informative text • Dialogues
10	<ul style="list-style-type: none"> • Simple presentation • Writing may be presented in “talking bubbles” • Text is separate from illustrations (except for “talking bubbles”) • Text location may vary • Font reduced and easy to see • Sentences continue one more than one line • Each new sentence begins on a new line • There are short paragraphs 	<ul style="list-style-type: none"> • The illustration offers a weak to moderate support to the text • The illustration takes up several ideas in the text • The illustration lengthen the text by adding detail • The illustration promote an interpretation of the story • The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> • Average 9 words per sentence • 4 to 12 lines per page • 300 to 400 words • About 14 to 16 pages 	<ul style="list-style-type: none"> • Some familiar and frequent words • Some vocabulary is a little more complex • New specific vocabulary linked to the context • Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Story with multiple episodes links to a single plot line • Narrative or informative text • Dialogues

Level	Presentation of the text	Illustrations	Length	Choice of words	Syntax	Style
11	<ul style="list-style-type: none"> • Simple presentation • Writing may be presented in “talking bubbles” • Text is separate from illustrations (except for “talking bubbles”) • Text location may vary • Font reduced and easy to see • Sentences continue one more than one line • Each new sentence begins on a new line • There are short paragraphs 	<ul style="list-style-type: none"> • The illustration offers a weak to moderate support to the text • The illustration summarize the main idea of the text • The illustration promote an interpretation of the story • The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> • Average 8 to 10 words per sentence • 4 to 14 lines per page • 350 to 460 words • About 14 to 16 pages 	<ul style="list-style-type: none"> • Some familiar and frequent words • Some vocabulary is a little more complex • New specific vocabulary linked to the context • Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Story with multiple episodes links to a single plot line • Narrative or informative text • Dialogues
12	<ul style="list-style-type: none"> • Simple presentation • Writing may be presented in “talking bubbles” • Text is separate from illustrations (except for “talking bubbles”) • Text location may vary • Font reduced and easy to see • Sentences continue one more than one line • Each new sentence begins on a new line • There are short paragraphs 	<ul style="list-style-type: none"> • The illustration offers a weak to moderate support to the text • The illustration summarize the main idea of the text • The illustration promote an interpretation of the story • The meaning of the story is more in the text than in the illustration 	<ul style="list-style-type: none"> • 4 to 14 lines per page • 420 to 600 words • About 16 to 20 pages 	<ul style="list-style-type: none"> • Some familiar and frequent words • Some vocabulary is a little more complex • New specific vocabulary linked to the context • Text includes some new words not present in child’s oral vocabulary 	<ul style="list-style-type: none"> • Declarative and/or exclamatory sentences • There can be some interrogative and negative sentences • Simple sentences (S-V-C) • Verbs are in the present, present continuous, past and/or future tense of the indicative or present of the imperative 	<ul style="list-style-type: none"> • Story structure (beginning, middle and end) • Story with multiple episodes links to a single plot line • Narrative or informative text • Dialogues • Longer text with simple sentence structures to facilitate extended reading

APPENDIX B. DATA COLLECTION TOOLS

STUDENT CONTEXT SURVEY

HOME ENVIRONMENT	Circle the student's response
1. What language(s) do you speak at home? (select all that apply) <i>Mu rugo iwanyu muvuga uruhe rurimi?</i>	a. Kinyarwanda/Ikinyarwanda b. French/Igifaransa c. English/Icyongereza d. Swahili/Ikiswahili e. Arabic/Icyarabu f. Urundi rurimi
2. Did you go to nursery/pre-school? <i>Ese wize ikiburamwaka (Garidiyene)?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
3. Do you have books at home for you to read (other than school books)? <i>Ese ufite ibindi bitabo mu rugo byo gusoma atari ibyo kwishuri cyangwa by'Imana?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
4. Do people at home sometimes read stories to you from a book? <i>Ese iwanyu mu rugo bajya bagusomera cyangwa bakubwira inkuru (imigani) bavanye mu gitabo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
5. Do people at home sometimes tell you stories or sing you songs? <i>Ese iwanyu mu rugo bajya bakubwira inkuru (imigani) cyangwa bakukurimbira indirimbo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
6. How often do you see your mother (or main caregiver) reading books or newspapers? <i>Ni inshuro zingaha ujya ubona mama wawe cyangwa ukurera asoma ibitabo cyangwa ibinyamakuru?</i>	a. Every day/Buri muni b. 2-4 times a week/Incuro 2-4 mu cyumweru c. Once a week/Rimwe mu cyumweru d. Less than once a week/Munsi ya rimwe mu cyumweru e. Never /Nta narimwe
7. Do you sometimes miss school because you have to help out at home? <i>Ese ujya usiba ishuri bitewe no gukora imirimo yo mu rugo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
SCHOOL/TEACHER	Circle the student's response
8. Does your math teacher usually give you homework to do at home? <i>Ese mwarimu w' imibare ajya abaha umukoro wo gukorera mu rugo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi

9. Does your Kinyarwanda teacher usually give you homework to do at home? <i>Ese mwarimu w'ikinyarwanda ajya abaha umukoro wo gukorera mu rugo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
10. How often does your Kinyarwanda teacher give you homework to do at home? <i>Ni incuro zingahe Mwarimu w'ikinyarwanda ajya abaha umukoro wo gukorera mu rugo?</i>	a. Every day/Buri muni b. 2-4 times a week/Incuro 2-4 mu cyumweru c. Once a week/Rimwe mu cyumweru d. Less than once a week/Muni ya rimwe mu cyumweru e. Never /Nta narimwe
11. Does your Kinyarwanda teacher usually read you stories in class? <i>Ese mwarimu w' ikinyarwanda ajya abasomera inkuru mu ishuri?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
12. How often do you get a chance to choose books to read? <i>Ese ujya uhabwa amahirwe yo kwihitiramo igitabo usoma?</i>	a. Every day/Buri muni b. 2-4 times a week/Incuro 2-4 mu cyumweru c. Once a week/Rimwe mu cyumweru d. Less than once a week/Muni ya rimwe mu cyumweru e. Never /Nta narimwe
SOCIO-ECONOMIC STATUS	Circle the student's response
13. Did you have a meal today before you came to school? <i>Ese wafashe ifunguro mbere yo kuza ku ishuri uyu muni ?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
14. Do you have radio at home? <i>Ese mu rugo mwaba mugira iradiyo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
15. Does anyone at your house have a bicycle or a motorbike or a car? <i>Ese mu rugo iwanyu hari uwaba atunze igare, ipikipiki cyangwa imodoka?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
16. Do you have running water at home? <i>Ese iwanyu mu rugo hari robine/amazi mufite ?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
17. Do you have electricity at home? <i>Mufite umuriro w'amashanyarazi iwanyu mu rugo?</i>	a. Yes/Yego b. No/Oya c. Don't know/Simbizi
18. How many rooms are in your house? <i>Inzu mutuyemo ifite ibyumba bingahe?</i>	[number]

P1 ASSESSMENT INFORMATION SHEET

A. Assessor's Name	
B. Date of Assessment	
C. Province:	
D. School District:	
E. School Name:	
F. Student's Name:	Family name _____ Other names _____
G. Student's Oldest Sibling's First Name ² :	
H. Student's Age:	[number of full years]
I. Student's Gender	<input type="radio"/> Boy <input type="radio"/> Girl
J. Consent	<input type="radio"/> Yes <input type="radio"/> No
K. Student's Class	<input type="radio"/> P1 <input type="radio"/> P2 <input type="radio"/> P3
Please enter this student's teachers' names:	Kinyarwanda teacher's name: _____ Math teacher's name: _____

² If the student IS the oldest child in the family, write down "self".

🔊 Ngiye kugusaba gusoma inkuru. Ugerageze gusoma cyane.

Uriteguye dutangire?

Ngaho tangira

Mahoro na Kagabo

Mahoro yagiye ku isoko guhaha ariko arayoba. Nuko asubira mu rugo arira. Yahuye na Kagabo amusaba kumuyobora. Kagabo aramuherekeza amugeza ku isoko. Nuko Mahoro ataha anezerewe cyane.

Task 1b: Reading Comprehension

🔊 Noneho ngiye kukubaza ibibazo kur'iyi nkuru umaze gusoma

Questions (<i>Correct Answer</i>)	Correct	Incorrect	No answer	Not Attempted
1. Mahoro yari agiye he?				
2. Ni iki cyarijije Mahoro?				
3. Mahoro yahuye na nde ubwo yari amaze kuyoba?				
4. Kagabo yafashije iki Mahoro?				
5. Mahoro yatashye ameze ate?				

Number of correct answers

MARS Task 1: Adding Numbers**Sheet A**

60 seconds



Dore indi myitozo yoguteranya turibukore [glide hand from left to right].

Ngbye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Write: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$2 + 7 =$	(9)	
2.	$1 + 3 =$	(4)	
3.	$3 + 2 =$	(5)	
4.	$4 + 5 =$	(9)	
5.	$2 + 4 =$	(6)	
6.	$1 + 2 =$	(3)	
7.	$3 + 4 =$	(7)	
8.	$7 + 3 =$	(10)	
9.	$1 + 6 =$	(7)	
10.	$6 + 4 =$	(10)	

Total correct: _____/10



Dore indi myitozo yo gukuramo turibukore [glide hand from left to right].

Nguye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Write: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$7 - 4 =$	(3)	
2.	$9 - 5 =$	(4)	
3.	$5 - 2 =$	(3)	
4.	$3 - 2 =$	(1)	
5.	$8 - 4 =$	(4)	
6.	$6 - 5 =$	(1)	
7.	$9 - 7 =$	(2)	
8.	$10 - 3 =$	(7)	
9.	$8 - 3 =$	(5)	
10.	$9 - 4 =$	(5)	

Total correct: _____/10



Reba kuri buri tsinda ry' imibare ikurikira. Muri buri tsinda, umubare munini ni uwuhe?

Ngiye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

6	8	
10	18	
53	44	
82	91	
79	80	
63	56	
25	16	
54	62	
61	59	
24	13	

Total correct: _____/10

P2 ASSESSMENT INFORMATION SHEET

A. Assessor's Name	
B. Date of Assessment	
C. Province:	
D. School District:	
E. School Name:	
F. Student's Name:	Family name _____ Other names _____
G. Student's Oldest Sibling's First Name ³ :	
H. Student's Age:	[number of full years]
I. Student's Gender	<input type="radio"/> Boy <input type="radio"/> Girl
J. Consent	<input type="radio"/> Yes <input type="radio"/> No
K. Student's Class	<input type="radio"/> P1 <input type="radio"/> P2 <input type="radio"/> P3
Please enter this student's teachers' names:	Kinyarwanda teacher's name: _____ Math teacher's name: _____

³ If the student IS the oldest child in the family, write down "self".

 Ngiye kugusaba gusoma inkuru. Ugerageze gusoma cyane.

Uriteguye dutangire?

Ngaho tangira

Kanyange yamenye gusoma

Kanyange yiga mu mwaka wa kabiri. Akunda gusoma no kwandika. Yamenye gusoma inyuguti, amagambo n'interuro. Yamenye gusoma no kwandika udukuru. Kanyange afata ibikoresho by'ishuri neza kandi akabigirira isuku. Buri muni atahana igitabo cyo gusomera mu rugo. Buri mugoroba, akora umukoro mwarimu yamuhaye.

Task 1b: Reading Comprehension

 Noneho ngiye kukubaza ibibazo kur'iyi nkuru umaze gusoma

Questions	Correct	Incorrect	No answer	Not Attempted
1. Ni nde uvugwa mu mwandiko?				
2. Kanyange yiga mu mwaka wa kangahe?				
3. Ni ibiki Kanyange akunda?				
4. Ni iki Kanyange akora buri mugoroba?				
5. Ni iki uyu mwandiko ukwigishije?				

Number of correct answers



Dore indi myitozo yoguteranya turibukore [glide hand from left to right].

Ngiye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Write: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$13 + 3 =$	(16)	
2.	$16 + 4 =$	(20)	
3.	$45 + 5 =$	(50)	
4.	$11 + 7 =$	(18)	
5.	$15 + 4 =$	(19)	
6.	$13 + 10 =$	(23)	
7.	$63 + 2 =$	(65)	
8.	$7 + 13 =$	(20)	
9.	$21 + 6 =$	(27)	
10.	$13 + 7 =$	(20)	

Total correct: _____/10



Dore indi myitozo yo gukuramo turibukore [glide hand from left to right].

Ngiye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Write: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

11. $12 - 4 =$	(8)	
12. $6 - 3 =$	(3)	
13. $10 - 5 =$	(5)	
14. $13 - 1 =$	(12)	
15. $10 - 1 =$	(9)	
16. $20 - 10 =$	(10)	
17. $10 - 5 =$	(5)	
18. $17 - 6 =$	(11)	
19. $15 - 10 =$	(5)	
20. $20 - 17 =$	(3)	

Total correct: _____/10



Dore indi myitozo yo gukuba tugiye gukora [glide hand from left to right].

Ngiye kwifashisha iyi saha ibara. Ngaho kora ibibazo byinshi bishoboka.

Niba utazi igisubizo, jya ku kibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$2 \times 2 =$	(4)	
2.	$3 \times 5 =$	(15)	
3.	$4 \times 5 =$	(20)	
4.	$2 \times 6 =$	(12)	
5.	$6 \times 3 =$	(18)	
6.	$7 \times 4 =$	(28)	
7.	$9 \times 1 =$	(9)	
8.	$5 \times 6 =$	(30)	
9.	$7 \times 7 =$	(49)	
10.	$8 \times 9 =$	(72)	

Total correct: _____/10

P3 ASSESSMENT INFORMATION SHEET

A. Assessor's Name	
B. Date of Assessment	
C. Province:	
D. School District:	
E. School Name:	
F. Student's Name:	Family name _____ Other names _____
G. Student's Oldest Sibling's First Name ⁴ :	
H. Student's Age:	[number of full years]
I. Student's Gender	<input type="radio"/> Boy <input type="radio"/> Girl
J. Consent	<input type="radio"/> Yes <input type="radio"/> No
K. Student's Class	<input type="radio"/> P1 <input type="radio"/> P2 <input type="radio"/> P3
Please enter this student's teachers' names:	Kinyarwanda teacher's name: _____ Math teacher's name: _____

⁴ If the student IS the oldest child in the family, write down "self".

👂 Ngiye kugusaba gusoma inkuru. Ugerageze gusoma cyane.

Uriteguye dutangire?

Ngaho tangira

Nkunda igihugu cyanjye

Nitwa Mugisha. Igihugu cyanjye cyitwa u Rwanda. Abagituye bitwa Abanyarwanda. Nshimishwa n'ibiganiro n'inyigisho binyuzwa kuri Radiyo Rwanda yumvwa na benshi. Sinshobora guhombywa izi nyigisho n'abantu bigize intyozza, banshuka gukurikirana inyigisho zimpyinagaza aho kunteza imbere. Nk'umwana muto, nkwiye guhora ndi maso, nirinda kuryarywa n'abashaka kundoha mu ngeso mbi. Niyemeje kwiga neza kuko nkunda igihugu cyanjye. Ndifuza gukorera igihugu cyambyaye.

Task 1b: Reading Comprehension

👂 Noneho ngiye kukubaza ibibazo kur'iyi nkuru umaze gusoma

Questions	Correct	Incorrect	No answer	Not Attempted
1. Ni nde wivuga muri uyu mwandiko?				
2. Igihugu cye cyitwa ngo iki?				
3. Ni iki kimushimisha?				
4. Ni iki Mugisha yiyemeje ?				
5. Uyu mwandiko urakwigisha iki?				

Number of correct answers

Task 1: Multiplying Numbers

Sheet A

60 seconds



Dore indi myitozo yo gukuba tugiye gukora [glide hand from left to right].

Ngiye kwifashisha iyi saha ibara. Ngaho kora ibibazo byinshi bishoboka.

Niba utazi igisubizo, jya ku kibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$2 \times 3 =$	(6)	
2.	$3 \times 4 =$	(12)	
3.	$4 \times 2 =$	(8)	
4.	$10 \times 2 =$	(20)	
5.	$3 \times 6 =$	(18)	
6.	$6 \times 2 =$	(12)	
7.	$5 \times 5 =$	(25)	
8.	$2 \times 8 =$	(16)	
9.	$5 \times 4 =$	(20)	
10	$5 \times 40 =$	(200)	

Total correct: _____/10



Dore indi myitozo yo gukuba tugiye gukora [glide hand from left to right].

Nguye kwifashisha iyi saha ibara. Ngaho kora ibibazo byinshi bishoboka.

Niba utazi igisubizo, jya ku kibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

$4 : 2 = (2)$	
$6 : 3 = (2)$	
$8 : 2 = (4)$	
$6 : 2 = (3)$	
$10 : 5 = (2)$	
$8 : 4 = (2)$	
$10 : 2 = (5)$	
$2 : 2 = (1)$	
$9 : 3 = (3)$	
$12 : 6 = (2)$	

Total correct: _____/10



Dore indi myitozo yoguteranya turibukore [glide hand from left to right].

Ngiye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

1.	$7 + 2 =$	(9)	
2.	$13 + 3 =$	(16)	
3.	$16 + 4 =$	(20)	
4.	$45 + 5 =$	(50)	
5.	$11 + 17 =$	(28)	
6.	$15 + 40 =$	(55)	
7.	$13 + 23 =$	(36)	
8.	$17 + 13 =$	(30)	
9.	$21 + 6 =$	(27)	
10.	$130 + 12 =$	(142)	

Total correct: _____/10

Task 4: Subtracting Numbers

Sheet D

60 seconds



Dore indi myitozo yo gukuramo turibukore [glide hand from left to right].

Ngiye kwifashisha iyisaha ibara. Ngaho kora imibare myinshi uko ushoboye.

Niba utazi igisubizo, jya kukibazo gikurikiyeho. Uriteguye? . . .

- Tangirira aha [point to first problem].

Circle: 1 = Correct.

0 = Incorrect or no response

[] After last problem attempted

21. $7 - 4 =$	(3)	
22. $13 - 3 =$	(10)	
23. $18 - 1 =$	(17)	
24. $23 - 3 =$	(20)	
25. $17 - 5 =$	(12)	
26. $40 - 15 =$	(25)	
27. $100 - 50 =$	(50)	
28. $38 - 6 =$	(32)	
29. $25 - 9 =$	(16)	
30. $40 - 37 =$	(3)	

Total correct: _____/10

SCHOOL FORM

SCHOOL FORM: to be completed by head teacher

<i>To be completed by the assessor</i>	
A. Assessor's Name/Izina ry'Usuzuma	
B. Date of Assessment/Itariki y'isuzuma	
C. Province:	
D. School District:	
E. School Name:	

Name of Head-teacher: _____ Phone No: _____

- 1. Materials checklist:** Did the school receive from L3 the following (indicate quantity of each) **Ishuri muyobora ryabonye ibitabo bivuye muri L3 (Andika umubare):**

Item	Quantity/umubare			Item	Quantity/umubare		
	T1	T2	T3		T1	T2	T3
P1 Kinyarwanda guide/ <i>Imfashanyigisho Kinyarwanda P1</i>				P1 Kinyarwanda reader/ <i>Igitabo cy'umunyeshuri P1 Kinyarwanda</i>			
P1 Kinyarwanda Read aloud/ <i>Igitabo cy'inkuru P1 Kinyarwanda</i>				P2 Kinyarwanda reader/ <i>Igitabo cy'umunyeshuri P2 Kinyarwanda</i>			
P2 Kinyarwanda guide/ <i>Imfashanyigisho Kinyarwanda P2</i>				P1 English reader/ <i>Igitabo cy'umunyeshuri P1 icyongereza</i>			
P2 Kinyarwanda Read aloud/ <i>Igitabo cy'inkuru P2 Kinya</i>				P2 English reader/ <i>Igitabo cy'umunyeshuri P2 icyongereza</i>			
P1 English guide/ <i>Imfashanyigisho P1</i>				Solar Panel/ <i>Icyuma gitanga amashanyarazi</i>			

<i>Icyongereza</i>					
P2 English guide/ <i>Imfashanyigisho P2 Icyongereza</i>				Cellphones/ <i>telefone</i>	
P1 Math guide/ <i>Imfashanyigisho P1 Imibare</i>				Speakers/ <i>indangururamajwi</i>	
P2 Math guide/ <i>Imfashanyigisho P2 Imibare</i>				SD cards/ <i>memorikadi</i>	
2. PTA/PTC information				Answers	
2.1 Does the school have a PTA/PTC? / <i>Mwabamugira PTA/PTC?</i>				<input type="checkbox"/> Yes / <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	
2.2 Has the PTA been trained by ConcernWorldwide? / <i>Niba ihari yaba yarahuguwe na Concern Worldwide?</i>				<input type="checkbox"/> Yes/ <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	
2.3 How many PTA/PTC members attended the training? / <i>Ni bangahe bitabiriye amahugurwa?</i>				_____ (number/ <i>umubare</i>)	
2.4 Did the PTC members (who attended the training facilitated by Concern) train other PTA/PTC members? / <i>Abitabiriye amahugurwa (yateguwe na ConcernWorldwide) bahuguye abandi bagize PTA/PTC?</i>				<input type="checkbox"/> Yes/ <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	
2.5 Does the PTA/PTC have an action plan? / <i>PTA/PTC ifite iteganyabikorwa?</i>				<input type="checkbox"/> Yes/ <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	
2.6 Has the PTC/PTA undertaken initiatives to support teacher motivation? / <i>PTA/PTC yaba yaratangije gahunda zafasha mwarimu gukora umurimo we awishimiye?</i>				<input type="checkbox"/> Yes/ <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	
(if YES specify how)/Niba zihari ,zivuge?					
2.7 Has the PTC/PTA undertaken initiatives to support literacy and equity in education? / <i>PTA/PTC yaba yaratangije gahunda ziteza imbere umuco wo gusoma, ubudasumbana no guha abana bose amahirwe angina?</i>				<input type="checkbox"/> Yes/ <i>yego</i> <input type="checkbox"/> No/ <i>oya</i>	

(if YES specify how) Niba zihari, zivuge?

3. School-Based Mentors	Answers/ibisubizo
3.1 Does the School have a Mentor? /Mufite mentor?	<input type="checkbox"/> Yes/yego <input type="checkbox"/> No/oya
3.2 Does the Mentor train the teachers/head teachers?/Mentor ajya ahugura abarimu?	<input type="checkbox"/> Yes/yego <input type="checkbox"/> No/oya
3.3 How many P1 and P2 math, English and Kinyarwanda teachers trained this month by the school-based mentor? /N I abarimu bangahe bigisha imibare, ikinyarwanda, icyongereza bo muri P1 na P2 bahuguwe na Mentor muri uku kwezi?	_____ (number of male teachers) Umubare w' Abagabo _____ (number of female teachers) Umubare w' Abagore

4. Enrolment (Indicate the total number of students enrolled, not just those present during the visit)/Vuga umubare w'abanyeshuri bose banditse:

	Students/abanyeshuri		No of classrooms Umubare w'ibyumba by'amashuri	Shift/Isimburana (Double/(Single))
	Male/Gabo	Female/Gore		
P1				
P2				
P3				

5. Number of Teachers/Umubare w'abarimu

GRADE	Subject/isomo	Number of Teachers	
		Male/Gabo	Female/Gore
P1	Kinya P1		
	Math P1		
	English P1		
	Total number of P1 teachers*/ Umubare w'abarimu bigisha P1		
P2	Kinya P2		
	Math P2		
	English P2		
	Total number of P2 teachers:/ Umubare w'abarimu bigisha muri P2		
P3	Kinya P3		
	Math P3		
	English P3		

	Total number of P3 teachers: Umubare w'abarimu bigisha muri P3		
	TOTAL NUMBER OF P1-P3 teachers Igiteranyo cya P1 –P3		

*in some schools a teacher may team more than one subject. Please indicate here the total number of teachers in this grade

/Hari amwe mumashuri afite umuwarimu wigisha amasomo arenze rimwe. Vuga umubare w'abarimu bigisha muri uyu mwaka.

Signature
Assessor

Signature
Head Teacher

GRADE MONITORING FORM

<i>To be completed by the assessor</i>		
A. Assessor's Name/Izina ry'Usuzuma		
B. Date of Assessment /Itariki		
C. Province:		
D. School District:		
E. School Name:		
TO BE COMPLETED BY TEACHER		
1. What grade are you teaching?/Ni uwuhe mwaka wigishamo?	<input type="checkbox"/> P1 <input type="checkbox"/> P2 <input type="checkbox"/> P3	
2. What subject are you teaching this grade? Ni irihe somo wigisha muri uwo mwaka?	<input type="checkbox"/> Kinyarwanda <input type="checkbox"/> Math <input type="checkbox"/> English	
3. What is your name? Amazina yawe ni aye?	Family name/Izina ry'umuryango _____ Other names/ Andi mazina _____	
4. What is your gender? Igitsina	<input type="checkbox"/> Male/Gabo <input type="checkbox"/> Female/Gore	
5. Which curriculum do you use while teaching this subject with this grade?/Ni iyihe mfashanyigisho ukoresha iyo wigisha iri somo?	<input type="checkbox"/> L3 curriculum/curriculum ya L3 <input type="checkbox"/> Old curriculum/Curriculum ya cyera (skip to Q9) (komeza ku kibazo cya 9 niba ukoresha indi curriculum itari iya L3)	
Q-s for new curriculum only	6. What is the term number of the curriculum? (Ni ikihe gihembwe ugezeho wigisha?)	<input type="checkbox"/> Term 1 <input type="checkbox"/> Term 2 <input type="checkbox"/> Term 3
	7. What is the week number of the curriculum you are currently teaching?(Ni icyumweru cyakangahe ugezeho wigisha)	_____ (week #)(icyumweru cya)
	8. What is the lesson number of the curriculum you are currently teaching?(Ni isomo rya kangahe ugezeho wigisha?)	_____ (lesson #)(isomo rya)
9. Have you attended L3 training?(Wigeze ujya mu mahugurwa ya L3)	<input type="checkbox"/> Yes/Yego <input type="checkbox"/> No/Oya	
10. Have you attended a training by your school-based mentor?(wigeze uhugurwa na school based mentor w'ikigo cy'amashuri cyawe?)	<input type="checkbox"/> Yes/Yego <input type="checkbox"/> No/Oya <input type="checkbox"/> Our school does not have mentor(ikigo cy'amashuri cyacu nta school based mentor kigira)	

<p>11. Did you receive technology from L3? /(Ni ibihe ibikoresha by'ikoranabuhanga bya L3 mwakiriye)</p>	<p><input type="checkbox"/> Yes, cell phone/Yego twakiriye telephone</p> <p><input type="checkbox"/> Yes, speakers/Yego, indangururamajyi</p> <p><input type="checkbox"/> Yes, SD card/Yego twakiriye memory card</p>
<p>12. If you said yes in the previous question, how often do you use this technology in teaching students this subject?(Niba warakiriye ibikoresho by'ikoranabuhanga, ni inshuro zingaha ujya ubikoresha iyo wigisha abanyeshuri iri somo?)</p>	<p><input type="checkbox"/> Every day (buri muni)</p> <p><input type="checkbox"/> 2-4 times a week(kabiri-kane mu cyumweru)</p> <p><input type="checkbox"/> Once a week(rimwe mu cyumweru)</p> <p><input type="checkbox"/> More rarely than once a week(Gacye muni ya rimwe mu cyumweru)</p> <p><input type="checkbox"/> Never(Nta na rimwe)</p>
<p>13. Do you have any comments about L3 materials, training, or school-based mentors? (<i>please write on the other side of the form</i>)? Haba hari igitekerezo cyangwa icyivuzo watanga ku bikoresho bya L3, ku mahugurwa cyangwa kuri gahunda y'aba school based mentor?(byandike ku rupapuro inyuma)</p>	

APPENDIX C. DETAILED RESULTS OF STATISTICAL ANALYSES OF FARS AND MARS

DETAILED RESULTS FOR FARS SUBTESTS

Descriptive statistics for P1 FARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Oral Passage Reading (wcpm)	4.77	.05	60.3	12.00	.08
Oral Passage Reading (pct)	17.22	.18	60.3	43.36	.28
Comprehension Questions (pct)	13.85	.16	68.6	44.08	.30

Descriptive statistics for P1 FARS subtests, by sex				
Sex	Subtest	All students		Percent of students with zero scores
		Mean	SE	
Boys	Oral Passage Reading (wcpm)	4.50	.07	60.6
	Oral Passage Reading (pct)	16.42	.23	60.6
	Comprehension Questions (pct)	13.19	.25	68.5
Girls	Oral Passage Reading (wcpm)	5.05	.08	60.0
	Oral Passage Reading (pct)	18.06	.26	60.0
	Comprehension Questions (pct)	14.54	.21	68.6

Descriptive statistics for P1 FARS subtests, by province ⁵			
Province	Subtest	All students	
		Mean	SE
Eastern	Oral Passage Reading (wcpm)	6.27	.14
	Oral Passage Reading (pct)	22.65	.49
	Comprehension Questions (pct)	20.06	.46
Kigali City	Oral Passage Reading (wcpm)	6.94	.23
	Oral Passage Reading (pct)	25.29	.80
	Comprehension Questions (pct)	15.17	.65
Northern	Oral Passage Reading (wcpm)	3.69	.10
	Oral Passage Reading (pct)	13.48	.35
	Comprehension Questions (pct)	10.40	.30
Southern	Oral Passage Reading (wcpm)	5.18	.09
	Oral Passage Reading (pct)	19.01	.33
	Comprehension Questions (pct)	15.67	.30

⁵ Note: Study was not designed to accurately draw conclusions at the province level. Resultantly, data on percent of student with zero scores and students with scores above zero were not reported at provincial level.

Western	Oral Passage Reading (wcpm)	3.74	.09
	Oral Passage Reading (pct)	13.14	.29
	Comprehension Questions (pct)	10.03	.27

Descriptive statistics for P1 FARS subtests, by rural/urban			
Rural/ Urban	Subtest	All students	
		Mean	SE
Urban	Oral Passage Reading (wcpm)	6.07	.19
	Oral Passage Reading (pct)	21.31	.64
	Comprehension Questions (pct)	17.24	.60
Peri-urban	Oral Passage Reading (wcpm)	3.69	.14
	Oral Passage Reading (pct)	13.56	.50
	Comprehension Questions (pct)	10.84	.42
Rural	Oral Passage Reading (wcpm)	4.77	.06
	Oral Passage Reading (pct)	17.26	.20
	Comprehension Questions (pct)	13.88	.18

Descriptive statistics for P2 FARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Oral Passage Reading (wcpm)	19.19	.12	32.6	28.50	.11
Oral Passage Reading (pct)	43.16	.24	32.6	64.08	.22
Comprehension Questions (pct)	44.49	.35	37.6	71.34	.18

Descriptive statistics for P2 FARS subtests, by Sex					
Sex	Subtest	All students		Percent of students with zero scores	
		Mean	SE		
Boys	Oral Passage Reading (wcpm)	16.08	.17	38.7	
	Oral Passage Reading (pct)	36.53	.35	38.7	
	Comprehension Questions (pct)	40.02	.35	42.4	
Girls	Oral Passage Reading (wcpm)	22.19	.15	26.9	
	Oral Passage Reading (pct)	49.54	.33	26.9	
	Comprehension Questions (pct)	48.79	.36	33.0	

Descriptive statistics for P2 FARS subtests, by province ⁶			
Province	Subtest	All students	
		Mean	SE
Eastern	Oral Passage Reading (wcpm)	21.90	.29
	Oral Passage Reading (pct)	47.63	.57
	Comprehension Questions (pct)	51.77	.59
Kigali City	Oral Passage Reading (wcpm)	23.26	.69
	Oral Passage Reading (pct)	47.48	1.24
	Comprehension Questions (pct)	49.98	1.25
Northern	Oral Passage Reading (wcpm)	19.38	.26
	Oral Passage Reading (pct)	44.75	.60
	Comprehension Questions (pct)	40.07	.56
Southern	Oral Passage Reading (wcpm)	20.34	.21
	Oral Passage Reading (pct)	45.72	.46
	Comprehension Questions (pct)	47.09	.47
Western	Oral Passage Reading (wcpm)	15.64	.18
	Oral Passage Reading (pct)	36.21	.41
	Comprehension Questions (pct)	39.24	.44

Descriptive statistics for P2 FARS subtests, by rural/urban			
Rural/ Urban	Subtest	All students	
		Mean	SE
Urban	Oral Passage Reading (wcpm)	23.96	.51
	Oral Passage Reading (pct)	44.89	.83
	Comprehension Questions (pct)	49.57	.87
Peri-urban	Oral Passage Reading (wcpm)	20.72	.32
	Oral Passage Reading (pct)	46.97	.70
	Comprehension Questions (pct)	50.08	.69
Rural	Oral Passage Reading (wcpm)	18.43	.12
	Oral Passage Reading (pct)	42.39	.27
	Comprehension Questions (pct)	43.04	.28

Descriptive statistics for P3 FARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Oral Passage Reading (wcpm)	22.10	.10	21.3	28.08	.09
Oral Passage Reading (pct)	37.53	.17	21.3	47.69	.14
Comprehension Questions (pct)	33.87	.17	26.2	45.88	.14

⁶ Note: Study was not designed to accurately draw conclusions at the province level. Resultantly, data on percent of student with zero scores and students with scores above zero were not reported at provincial level.

Descriptive statistics for P3 FARS subtests, by Sex				
Sex	Subtest	All students		Percent of students with zero scores
		Mean	SE	
Boys	Oral Passage Reading (wcpm)	20.70	.14	23.0
	Oral Passage Reading (pct)	34.94	.23	23.0
	Comprehension Questions (pct)	32.86	.23	27.5
Girls	Oral Passage Reading (wcpm)	23.50	.14	19.6
	Oral Passage Reading (pct)	40.11	.24	19.6
	Comprehension Questions (pct)	34.89	.24	24.8

Descriptive statistics for P3 FARS subtests, by province				
Province	Subtest	All students		
		Mean	SE	
Eastern	Oral Passage Reading (wcpm)	18.76	.21	
	Oral Passage Reading (pct)	31.54	.34	
	Comprehension Questions (pct)	41.00	.41	
Kigali City	Oral Passage Reading (wcpm)	27.98	.44	
	Oral Passage Reading (pct)	48.25	.76	
	Comprehension Questions (pct)	45.04	.79	
Northern	Oral Passage Reading (wcpm)	23.03	.24	
	Oral Passage Reading (pct)	39.57	.42	
	Comprehension Questions (pct)	24.82	.34	
Southern	Oral Passage Reading (wcpm)	22.60	.20	
	Oral Passage Reading (pct)	38.89	.34	
	Comprehension Questions (pct)	33.67	.31	
Western	Oral Passage Reading (wcpm)	22.35	.19	
	Oral Passage Reading (pct)	37.26	.30	
	Comprehension Questions (pct)	33.44	.29	

Descriptive statistics for P3 FARS subtests, by rural/urban				
Rural/ Urban	Subtest	All students		
		Mean	SE	
Urban	Oral Passage Reading (wcpm)	26.27	.28	
	Oral Passage Reading (pct)	45.30	.49	
	Comprehension Questions (pct)	42.05	.49	
Peri-Urban	Oral Passage Reading (wcpm)	25.54	.35	
	Oral Passage Reading (pct)	41.37	.52	
	Comprehension Questions (pct)	40.70	.53	
Rural	Oral Passage Reading (wcpm)	21.08	.11	
	Oral Passage Reading (pct)	36.00	.19	
	Comprehension Questions (pct)	31.86	.19	

DETAILED RESULTS FOR MARS SUBTESTS

Descriptive statistics for P1 MARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Task 1: Adding Numbers (pct)	22.38	.18	41.0	37.89	.22
Task 1: Adding Numbers (cpm)	2.31	.02	41.0	3.92	.02
Task 2: Subtracting Numbers (pct)	15.07	.15	58.5	36.32	.24
Task 2: Subtracting numbers (cpm)	1.55	.02	58.5	3.73	.03
Task 3: Comparing Numbers (pct)	39.61	.21	19.2	49.02	.21
Task 3: Comparing Numbers (cpm)	4.72	.05	19.2	5.85	.06

Descriptive statistics for P1 MARS subtests, by sex				
Sex	Subtest	All students		Percent of students with zero scores
		Mean	SE	
Boys	Task 1: Adding Numbers (pct)	26.90	.27	37.0
	Task 1: Adding Numbers (cpm)	2.81	.03	37.0
	Task 2: Subtracting Numbers (pct)	17.55	.23	54.7
	Task 2: Subtracting numbers (cpm)	1.83	.03	54.7
	Task 3: Comparing Numbers (pct)	40.89	.30	19.8
	Task 3: Comparing Numbers (cpm)	4.67	.04	19.8
Girls	Task 1: Adding Numbers (pct)	17.69	.23	45.0
	Task 1: Adding Numbers (cpm)	1.80	.02	45.0
	Task 2: Subtracting Numbers (pct)	12.51	.20	62.4
	Task 2: Subtracting numbers (cpm)	1.26	.02	62.4
	Task 3: Comparing Numbers (pct)	38.29	.29	18.6
	Task 3: Comparing Numbers (cpm)	4.79	.10	18.6

Descriptive statistics for P1 MARS subtests, by province			
Province	Subtest	All students	
		Mean	SE
Eastern	Task 1: Adding Numbers (pct)	28.21	.43
	Task 1: Adding Numbers (cpm)	2.93	.05
	Task 2: Subtracting Numbers (pct)	18.84	.35
	Task 2: Subtracting numbers (cpm)	1.89	.04
	Task 3: Comparing Numbers (pct)	55.21	.43
	Task 3: Comparing Numbers (cpm)	7.97	.25
Kigali City	Task 1: Adding Numbers (pct)	28.45	.82
	Task 1: Adding Numbers (cpm)	3.00	.10
	Task 2: Subtracting Numbers (pct)	15.72	.57
	Task 2: Subtracting numbers (cpm)	1.79	.07
	Task 3: Comparing Numbers (pct)	55.20	.99
	Task 3: Comparing Numbers (cpm)	6.10	.13
Northern	Task 1: Adding Numbers (pct)	16.01	.33
	Task 1: Adding Numbers (cpm)	1.60	.03
	Task 2: Subtracting Numbers (pct)	7.98	.23
	Task 2: Subtracting numbers (cpm)	0.80	.02
	Task 3: Comparing Numbers (pct)	32.97	.44
	Task 3: Comparing Numbers (cpm)	3.41	.05
Southern	Task 1: Adding Numbers (pct)	27.26	.37
	Task 1: Adding Numbers (cpm)	2.85	.04
	Task 2: Subtracting Numbers (pct)	22.41	.35
	Task 2: Subtracting numbers (cpm)	2.33	.04
	Task 3: Comparing Numbers (pct)	39.22	.38
	Task 3: Comparing Numbers (cpm)	4.28	.04
Western	Task 1: Adding Numbers (pct)	17.00	.29
	Task 1: Adding Numbers (cpm)	1.74	.03
	Task 2: Subtracting Numbers (pct)	9.96	.24
	Task 2: Subtracting numbers (cpm)	1.01	.02
	Task 3: Comparing Numbers (pct)	31.68	.40
	Task 3: Comparing Numbers (cpm)	3.65	.05

Descriptive statistics for P1 MARS subtests, by rural/urban			
Rural/ Urban	Subtest	All students	
		Mean	SE
Urban	Task 1: Adding Numbers (pct)	20.78	.52
	Task 1: Adding Numbers (cpm)	2.13	.05
	Task 2: Subtracting Numbers (pct)	10.84	.42
	Task 2: Subtracting numbers (cpm)	1.16	.05
	Task 3: Comparing Numbers (pct)	51.44	.63
	Task 3: Comparing Numbers (cpm)	5.97	.09
Peri-Urban	Task 1: Adding Numbers (pct)	21.22	.50
	Task 1: Adding Numbers (cpm)	2.21	.06
	Task 2: Subtracting Numbers (pct)	11.54	.41
	Task 2: Subtracting numbers (cpm)	1.21	.04
	Task 3: Comparing Numbers (pct)	35.14	.63
	Task 3: Comparing Numbers (cpm)	4.19	.09
Rural	Task 1: Adding Numbers (pct)	22.74	.20
	Task 1: Adding Numbers (cpm)	2.35	.02
	Task 2: Subtracting Numbers (pct)	16.11	.18
	Task 2: Subtracting numbers (cpm)	1.65	.02
	Task 3: Comparing Numbers (pct)	38.82	.23
	Task 3: Comparing Numbers (cpm)	4.65	.07

Descriptive statistics for P2 MARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Task 1: Adding Numbers (pct)	31.51	.19	28.4	43.99	.20
Task 1: Adding Numbers (cpm)	3.97	.04	28.4	5.55	.05
Task 2: Subtracting Numbers (pct)	45.32	.22	21.9	58.03	.19
Task 2: Subtracting numbers (cpm)	5.66	.04	21.4	7.21	.05
Task 3: Multiplying Numbers (pct)	24.79	.13	15.7	29.41	.13
Task 3: Multiplying Numbers (cpm)	4.20	.05	15.7	4.99	.06

Descriptive statistics for P2 MARS subtests, by sex				
Sex	Subtest	All students		Percent of students with zero scores
		Mean	SE	
Boys	Task 1: Adding Numbers (pct)	33.12	.28	27.2
	Task 1: Adding Numbers (cpm)	4.19	.05	27.2
	Task 2: Subtracting Numbers (pct)	47.94	.32	20.4
	Task 2: Subtracting numbers (cpm)	6.02	.06	20.4
	Task 3: Multiplying Numbers (pct)	22.07	.18	19.2
	Task 3: Multiplying Numbers (cpm)	3.95	.08	19.2
Girls	Task 1: Adding Numbers (pct)	29.96	.26	29.5
	Task 1: Adding Numbers (cpm)	3.76	.06	29.5
	Task 2: Subtracting Numbers (pct)	42.79	.30	23.3
	Task 2: Subtracting numbers (cpm)	5.31	.06	22.4
	Task 3: Multiplying Numbers (pct)	27.40	.19	12.4
	Task 3: Multiplying Numbers (cpm)	4.44	.07	12.4

Descriptive statistics for P2 MARS subtests, by province			
Province	Subtest	All students	
		Mean	SE
Eastern	Task 1: Adding Numbers (pct)	31.51	.37
	Task 1: Adding Numbers (cpm)	3.21	.04
	Task 2: Subtracting Numbers (pct)	44.50	.42
	Task 2: Subtracting numbers (cpm)	4.63	.05
	Task 3: Multiplying Numbers (pct)	23.15	.25
	Task 3: Multiplying Numbers (cpm)	2.33	.03
Kigali City	Task 1: Adding Numbers (pct)	41.39	1.09
	Task 1: Adding Numbers (cpm)	6.87	.33
	Task 2: Subtracting Numbers (pct)	54.35	1.05
	Task 2: Subtracting numbers (cpm)	10.41	.43
	Task 3: Multiplying Numbers (pct)	31.16	.70
	Task 3: Multiplying Numbers (cpm)	7.75	.42
Northern	Task 1: Adding Numbers (pct)	24.15	.45
	Task 1: Adding Numbers (cpm)	2.48	.05
	Task 2: Subtracting Numbers (pct)	38.15	.53
	Task 2: Subtracting numbers (cpm)	4.13	.06
	Task 3: Multiplying Numbers (pct)	22.47	.28
	Task 3: Multiplying Numbers (cpm)	3.02	.08
Southern	Task 1: Adding Numbers (pct)	42.10	.37
	Task 1: Adding Numbers (cpm)	6.53	.12
	Task 2: Subtracting Numbers (pct)	59.74	.37
	Task 2: Subtracting numbers (cpm)	8.58	.11
	Task 3: Multiplying Numbers (pct)	29.97	.27
	Task 3: Multiplying Numbers (cpm)	7.47	.16
Western	Task 1: Adding Numbers (pct)	24.57	.31
	Task 1: Adding Numbers (cpm)	2.54	.03
	Task 2: Subtracting Numbers (pct)	35.26	.39
	Task 2: Subtracting numbers (cpm)	3.81	.04
	Task 3: Multiplying Numbers (pct)	21.43	.24
	Task 3: Multiplying Numbers (cpm)	2.53	.04

Descriptive statistics for P2 MARS subtests, by rural/urban			
Rural/ Urban	Subtest	All students	
		Mean	SE
Urban	Task 1: Adding Numbers (pct)	36.82	.63
	Task 1: Adding Numbers (cpm)	5.27	.16
	Task 2: Subtracting Numbers (pct)	46.20	.70
	Task 2: Subtracting numbers (cpm)	7.67	.22
	Task 3: Multiplying Numbers (pct)	28.86	.45
	Task 3: Multiplying Numbers (cpm)	5.47	.20
Peri-Urban	Task 1: Adding Numbers (pct)	31.44	.54
	Task 1: Adding Numbers (cpm)	6.19	.24
	Task 2: Subtracting Numbers (pct)	48.99	.64
	Task 2: Subtracting numbers (cpm)	7.10	.19
	Task 3: Multiplying Numbers (pct)	27.73	.40
	Task 3: Multiplying Numbers (cpm)	5.02	.15
Rural	Task 1: Adding Numbers (pct)	30.86	.21
	Task 1: Adding Numbers (cpm)	3.49	.03
	Task 2: Subtracting Numbers (pct)	44.67	.24
	Task 2: Subtracting numbers (cpm)	5.20	.04
	Task 3: Multiplying Numbers (pct)	23.85	.14
	Task 3: Multiplying Numbers (cpm)	3.93	.06

Descriptive statistics for P3 MARS subtests					
Subtest	All students		Percent of students with zero scores	Students with scores above zero	
	Mean	SE		Mean	SE
Task 1: Multiplying Numbers (pct)	45.50	.19	10.1	50.62	.19
Task 1: Multiplying Numbers (cpm)	5.49	.03	10.1	6.11	.04
Task 2: Dividing Numbers (pct)	26.84	.18	26.1	36.34	.20
Task 2: Dividing numbers (cpm)	3.48	.03	26.0	4.70	.03
Task 3: Adding Numbers (pct)	45.46	.17	9.5	50.25	.15
Task 3: Adding Numbers (cpm)	5.58	.03	9.5	6.16	.04
Task 4: Subtracting Numbers (pct)	38.32	.18	17.6	46.51	.17
Task 4: Subtracting Numbers (cpm)	6.13	.09	17.5	7.43	.11

Descriptive statistics for P3 FARS subtests, by Sex				
Sex	Subtest	All students		Percent of students with zero scores
		Mean	SE	
Boys	Task 1: Multiplying Numbers (pct)	44.28	.27	11.5
	Task 1: Multiplying Numbers (cpm)	5.65	.06	11.5
	Task 2: Dividing Numbers (pct)	27.73	.26	24.0
	Task 2: Dividing numbers (cpm)	3.70	.04	23.7
	Task 3: Adding Numbers (pct)	48.67	.25	9.4
	Task 3: Adding Numbers (cpm)	6.35	.06	9.4
	Task 4: Subtracting Numbers (pct)	42.57	.26	15.5
	Task 4: Subtracting Numbers (cpm)	7.78	.17	15.3
Girls	Task 1: Multiplying Numbers (pct)	46.72	.28	8.7
	Task 1: Multiplying Numbers (cpm)	5.34	.04	8.7
	Task 2: Dividing Numbers (pct)	25.95	.25	28.3
	Task 2: Dividing numbers (cpm)	3.26	.04	28.3
	Task 3: Adding Numbers (pct)	42.26	.22	9.7
	Task 3: Adding Numbers (cpm)	4.81	.03	9.7
	Task 4: Subtracting Numbers (pct)	34.07	.24	19.7
	Task 4: Subtracting Numbers (cpm)	4.48	.07	19.7

Descriptive statistics for P3 FARS subtests, by province			
Province	Subtest	All students	
		Mean	SE
Eastern	Task 1: Multiplying Numbers (pct)	38.16	.43
	Task 1: Multiplying Numbers (cpm)	3.95	.05
	Task 2: Dividing Numbers (pct)	25.13	.38
	Task 2: Dividing numbers (cpm)	2.88	.05
	Task 3: Adding Numbers (pct)	43.28	.33
	Task 3: Adding Numbers (cpm)	4.82	.07
	Task 4: Subtracting Numbers (pct)	34.85	.34
	Task 4: Subtracting Numbers (cpm)	4.85	.15
Kigali City	Task 1: Multiplying Numbers (pct)	46.25	.95
	Task 1: Multiplying Numbers (cpm)	6.13	.21
	Task 2: Dividing Numbers (pct)	26.51	.86
	Task 2: Dividing numbers (cpm)	4.45	.26
	Task 3: Adding Numbers (pct)	47.78	.75
	Task 3: Adding Numbers (cpm)	5.81	.17
	Task 4: Subtracting Numbers (pct)	39.31	.89
	Task 4: Subtracting Numbers (cpm)	6.37	.26
Northern	Task 1: Multiplying Numbers (pct)	51.02	.45
	Task 1: Multiplying Numbers (cpm)	5.70	.06
	Task 2: Dividing Numbers (pct)	26.37	.41
	Task 2: Dividing numbers (cpm)	2.98	.05
	Task 3: Adding Numbers (pct)	39.83	.36
	Task 3: Adding Numbers (cpm)	3.99	.04
	Task 4: Subtracting Numbers (pct)	34.46	.37
	Task 4: Subtracting Numbers (cpm)	3.46	.04
Southern	Task 1: Multiplying Numbers (pct)	44.19	.38
	Task 1: Multiplying Numbers (cpm)	5.60	.06
	Task 2: Dividing Numbers (pct)	21.85	.34
	Task 2: Dividing numbers (cpm)	3.39	.06
	Task 3: Adding Numbers (pct)	48.28	.35
	Task 3: Adding Numbers (cpm)	6.20	.06
	Task 4: Subtracting Numbers (pct)	40.21	.37
	Task 4: Subtracting Numbers (cpm)	5.94	.08
Western	Task 1: Multiplying Numbers (pct)	47.96	.34
	Task 1: Multiplying Numbers (cpm)	6.18	.08
	Task 2: Dividing Numbers (pct)	33.03	.35
	Task 2: Dividing numbers (cpm)	4.13	.05
	Task 3: Adding Numbers (pct)	47.37	.32
	Task 3: Adding Numbers (cpm)	6.42	.08
	Task 4: Subtracting Numbers (pct)	41.03	.33
	Task 4: Subtracting Numbers (cpm)	8.77	.29

Descriptive statistics for P3 FARS subtests, by rural/urban

Rural/ Urban	Subtest	All students	
		Mean	SE
Urban	Task 1: Multiplying Numbers (pct)	53.99	.64
	Task 1: Multiplying Numbers (cpm)	6.91	.12
	Task 2: Dividing Numbers (pct)	36.69	.66
	Task 2: Dividing numbers (cpm)	4.68	.12
	Task 3: Adding Numbers (pct)	52.98	.50
	Task 3: Adding Numbers (cpm)	6.26	.11
	Task 4: Subtracting Numbers (pct)	44.91	.55
	Task 4: Subtracting Numbers (cpm)	7.44	.30
Peri-Urban	Task 1: Multiplying Numbers (pct)	51.15	.54
	Task 1: Multiplying Numbers (cpm)	7.86	.19
	Task 2: Dividing Numbers (pct)	32.89	.58
	Task 2: Dividing numbers (cpm)	4.88	.10
	Task 3: Adding Numbers (pct)	46.68	.45
	Task 3: Adding Numbers (cpm)	7.81	.18
	Task 4: Subtracting Numbers (pct)	42.43	.51
	Task 4: Subtracting Numbers (cpm)	6.70	.14
Rural	Task 1: Multiplying Numbers (pct)	43.62	.22
	Task 1: Multiplying Numbers (cpm)	4.97	.03
	Task 2: Dividing Numbers (pct)	24.74	.20
	Task 2: Dividing numbers (cpm)	3.13	.03
	Task 3: Adding Numbers (pct)	44.36	.19
	Task 3: Adding Numbers (cpm)	5.17	.03
	Task 4: Subtracting Numbers (pct)	36.90	.20
	Task 4: Subtracting Numbers (cpm)	5.88	.11

Results of Multivariate Linear Regression Analysis for Variables Predicting FARS and MARS Achievement

GRADE	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	MODEL 1			MODEL 2			MODEL 3		
			B	SE B	β	B	SE B	β	B	SE B	β
P1	FARS percent correct	School and teacher	.244	.070	.023	.076	.074	.007	.083	.074	.008
		Home environment				.605	.088	.047	.550	.091	.043
		Socio-economic status							.292	.107	.018
		R^2	.000			.002			.003		
P1	FARS comprehension	School and teacher	.109	.064	.011	-.072	.068	-.007	-.063	.068	-.006
		Home environment				.649	.081	.055	.582	.083	.049
		Socio-economic status							.355	.099	.024
		R^2	.000			.003			.003		
P1	MARS percent correct	School and teacher	.134	.062	.014	.045	.065	.005	.035	.065	.004
		Home environment				.321	.078	.028	.391	.080	.034
		Socio-economic status							-.369	.095	-.026
		R^2	.000			.001			.001		
P2	FARS percent correct	School and teacher	3.816	.123	.197	2.436	.125	.126	2.274	.125	.117
		Home environment				3.957	.105	.242	3.471	.109	.213
		Socio-economic status							1.947	.126	.100
		R^2	.039			.092			.101		
P2	FARS comprehension	School and teacher	3.190	.126	.161	1.856	.129	.094	1.695	.129	.085
		Home environment				3.824	.109	.229	3.343	.113	.200
		Socio-economic status							1.928	.130	.097
		R^2	.026			.074			.082		
P2	MARS percent correct	School and teacher	.276	.078	.023	-.357	.080	-.030	-.389	.080	-.032
		Home environment				1.817	.068	.179	1.721	.070	.169
		Socio-economic status							.386	.081	.032
		R^2	.000			.030			.031		

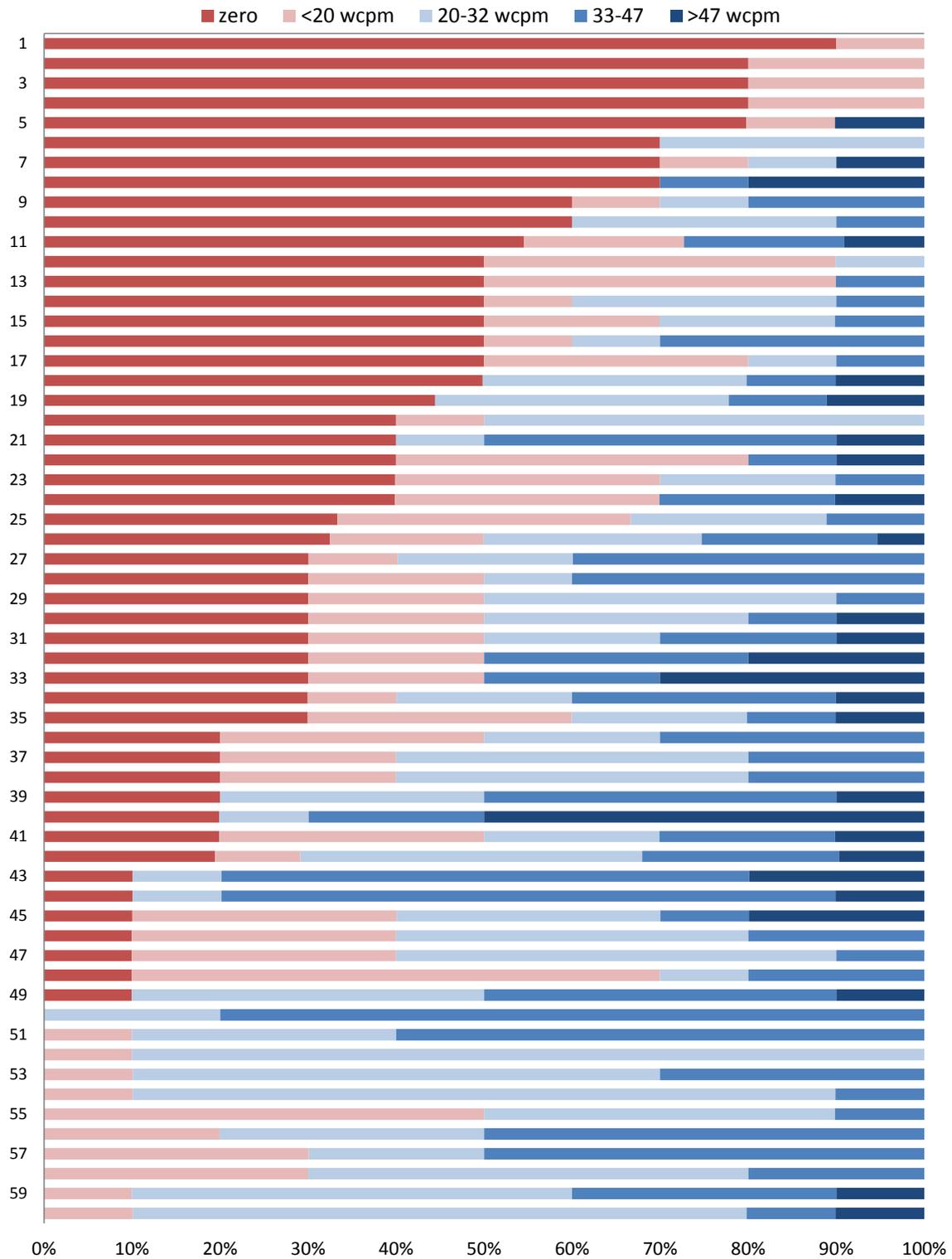
* $p < .01$; ** $p < .001$

Results of Multivariate Linear Regression Analysis for Variables Predicting FARS and MARS Achievement											
GRADE	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	MODEL 1			MODEL 2			MODEL 3		
			<i>B</i>	<i>SE B</i>	<i>β</i>	<i>B</i>	<i>SE B</i>	<i>β</i>	<i>B</i>	<i>SE B</i>	<i>β</i>
P3	FARS percent correct	School and teacher	1.750	.097	.116	1.268	.101	.084	1.114	.102	.074
		Home environment				1.210	.076	.106	.998	.078	.087
		Socio-economic status							1.307	.096	.089
		<i>R</i> ²		.013			.023			.031	
	FARS comprehension	School and teacher	1.336	.097	.089	.966	.101	.064	.781	.101	.052
		Home environment				.927	.076	.082	.672	.077	.059
		Socio-economic status							1.574	.096	.109
		<i>R</i> ²		.008			.014			.025	
	MARS percent correct	School and teacher	1.127	.086	.084	.834	.090	.062	.746	.091	.056
Home environment					.735	.068	.073	.614	.069	.061	
Socio-economic status								.749	.086	.058	
<i>R</i> ²			.007			.012			.015		

p* < .01; *p* < .001

APPENDIX D. DETAILED RESULTS ON ORAL READING FLUENCY BY SCHOOL

P2 ORAL READING FLUENCY PROFICIENCY RESULTS, BY SCHOOL



P3 oral reading fluency proficiency results, by school

