EdData II

Education Evaluation Services in the Democratic Republic of Congo (DRC)

**The DRC 2015 Early Grade Reading Assessment,
Early Grade Mathematics Assessment, and
Snapshot of School Management Effectiveness – Grade 3 Report of Findings**

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Acknowledgments

Table of Contents

List of Figures

List of Tables

Abbreviations

ALP	Accelerated Learning Program
CENADEP	*Centre National d'Appui au Développement et à la Participation Populaire*
cwpm	correct words per minute
DIFD	UK Department for International Development
DRC	Democratic Republic of the Congo
EdData	Education Data for Decision Making
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
GDRC	Government of the Democratic Republic of the Congo
IEP	Interim Education Plan (*Plan intérimaire de l'éducation*) 2012–2014
MEPSP	*Ministère de l'Enseignement Primaire, Secondaire et Professionnel* (Ministry of Primary, Secondary, and Vocational Education)
ORF	oral reading fluency
SES	socioeconomic status
SSME	Snapshot of School Management Effectiveness
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UPE	universal primary education
USAID	United States Agency for International Development

1   Background[1]

The education system in the Democratic Republic of the Congo (DRC) is characterized by low coverage and low quality. National data indicate that on average, only 57% of the children who enter Grade 1 complete Grade 6.[2] Of those children who reach Grade 6, only 49% of girls and 65% of boys will pass the primary school graduation exam, which means that less than 28% of girls and 37% of boys who start primary school will complete Grade 6 and pass the exam.

More than 30% of employed teachers in the sector lack the high school degree necessary to be certified to teach.[3] The 2010 US Agency for International Development (USAID) Early Grade Reading Assessment (EGRA) revealed that 68% of pupils in Grades 3 and 4 were unable to read a single word, while 91% of those who managed to read a sentence could not understand what they had read.

USAID supports the Government of DRC's (GDRC's) new education strategy goals of increasing access, equity, and retention and improving the quality and relevance of education. USAID supported the GDRC and the *Ministère de l'Enseignement Primaire, Secondaire et Professionnel* (Ministry of Primary, Secondary, and Vocational Education [MEPSP]) to implement three major policy decisions during USAID's fiscal year 2013:

1. Designate reading as a specific subject in the curriculum
2. Add more instructional time during the school day for reading
3. Create a National Reading Commission

Over the course of several months, USAID's partners helped the 40-member National Reading Commission develop a National Reading Roadmap and establish performance standards for reading in French and DRC's four regional languages (Kikongo, Lingala, Kiswahili, and Tshiluba). With USAID's assistance, the Reading Commission established reading performance benchmarks for Grades 1–6,[4] standards for grade-level texts, and requirements for reading assessment instruments. The Reading Roadmap and Standards will provide benchmarks and targets for future government and partner action to improve reading outcomes, although revisions will be needed to make them more suited to the DRC context and more language-specific.

DRC is the second largest country in Africa, with 2.345 million square kilometers (equal to two-thirds of Europe). The DRC remains one of the least developed countries in the world. Riddled with instability, conflict, limited infrastructure, and low levels of educational access and outcomes, the DRC has consistently been ranked at the bottom of the Human Development Index. It is estimated that of the more than 70 million inhabitants, 15 million are of primary school age, of whom 3.5 million are out of school.[5]

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[1] Background section drawn in its entirety from the USAID | East Africa solicitation, *Education Evaluation Services in the DRC Under the EdData II BPA*. (2014, March). RFTOP # SOL-660-14-000003.
[2] MEPSP. (2014). *Stratégie sectorielle de l'éducation et de la formation: 2014–2023*. DRC.
[3] MEPSP. (2012). *Plan intérimaire de l'éducation 2012–2014*. DRC.
[4] These standards and benchmarks require field testing, validation, and potential revisions.
[5] Global Initiative on Out-of-School Children. (2013). *National survey on the situation of out-of-school children and adolescents*. Report on the MEPSP's 2012 survey, prepared for the UK Department for International Development (DFID) and the United Nations Children's Fund.

For those in school, learning levels are extremely poor; in one region with USAID-supported activities, assessment showed that 68% of Grade 3 and 4 pupils were unable to read a single word of simple text.[6]

The GDRC has recently committed to abolishing school fees and creating a free universal primary education (UPE) system, similar to neighboring countries in the region. Experience from the region has shown that the abolition of school fees and the move toward UPE is likely to result in a massive increase in enrollment. This increase will severely strain the entire education system and result in an even more inadequate supply of infrastructure, teachers, and teaching and learning materials. After nearly 20 years of implementing UPE, neighboring countries such as Zambia, Malawi, Kenya, and Uganda are still struggling to build the education system capacity required to handle the increase in enrollments that followed the school fee abolition. Due to frequent conflict and instability in the DRC, capacity to implement UPE here is considered to be significantly lower than in many neighboring countries.

Regional experience has shown that low system capacity, exacerbated by rapidly rising enrollments, results in high dropout rates and stubbornly high out-of-school youth populations. To ensure that USAID/DRC does not promote an education system that increases initial enrollment to only lose pupils after one to three years, the Mission will simultaneously support access, quality, and governance of the school system.

Access to education is a crucial precondition to education impact, but access alone is not sufficient to make development gains. The most important measure of success, both for the individual child and the nation's economic development, is the quantity and quality of a child's learning.[7] Parents, communities, and governments send children to school with an expectation of a return on their investments. Parents send their children to school with expectations of improved employment opportunities, income, status, and quality of life. Ministers and parliaments count on expanded education leading to economic growth, improved health outcomes, and nation building. Where learning fails to occur, parents may see limited possibilities for increased economic opportunities derived from education. They often pull their children, especially girls, out of school and invest their resources elsewhere. International evidence suggests that actual learning is more closely related to subsequent economic performance than school attendance.[8]

USAID conducted EGRA in DRC as part of ongoing USAID-funded activities. The results of these assessments found that children in Grades 2 and 4 struggle to identify letters of the alphabet with automaticity. On average at the end of the academic year, Grade 4 pupils could read only approximately 6 words per minute in French, and Grade 6 pupils were able to read only 19 words per minute in French, well below required levels for fluency and comprehension.[9] These data substantiate that once children enter school, they are not learning the requisite competencies to successfully move through the education system.

As part of the GDRC's efforts to reform the education sector, the MEPSP has developed an Interim Education Plan (IEP) for the period 2012–2014. The plan

[6] Good Planet Foundation. (2013). *Accelerating Progress to 2015: Democratic Republic of the Congo*. A report series to the United Nations Special Envoy for Global Education. April 2013 Working Paper, pg. 6.
[7] Pritchett, Banerji, & Kenny. (2013). *Schooling is not education! Using assessment to change the politics of non-learning*. A Report of the Center for Global Development Study Group on Measuring Learning Outcomes. Center for Global Development.
[8] Pritchett, L. (2013). *The rebirth of education: Why schooling in developing countries is flailing; how the developed world is complicit; and what to do next*. Center for Global Development.
[9] RTI International. (2011). *PAQUED (Projet d'Amélioration de la Qualité de l'Éducation): DRC: Baseline Report, Early Grade Reading Assessment (EGRA)*. Prepared for USAID and Education Development Center.

focuses on three key principles: access, quality, and governance. In the primary sector, the IEP identifies the three most pressing challenges to ensure universal access to primary education: (1) reducing school fees and transitioning costs from households to the state, (2) incorporating the significant out-of-school population back into the formal school system, and (3) ensuring that girls achieve the primary school graduation certificate. In June 2012, the DRC was admitted to the Global Partnership for Education based on a positive external evaluation and formal endorsement of the IEP by the education donor group. To implement the IEP, the GDRC has committed to increasing funding for the education sector by 3.7 times, from 175 billion Congolese francs ($161 million or 8% of the national budget) in 2009 to 841 billion Congolese francs ($773 million or 15% of the national budget) by 2015.[10]

1.1 Purpose of the 2015 Early Grade Reading and Mathematics Assessments and Snapshot of School Management Effectiveness

This study primarily provides USAID and the GDRC with information regarding the ability of Grade 3 children to read in three of the DRC's national languages (Lingala, Kiswahili, and Tshiluba), those same pupils' receptive and productive oral French skills, and Grade 5 children's ability to read in French. Other elements of the study provide insight into the numeracy skills of Grade 3 children in one district in Katanga as well as the French reading and numeracy skills of Level 3 pupils in the Accelerated Learning Programs (ALPs).[11] The study also provides background context and data related to key pupil, teacher, head teacher, and school variables that are hypothesized to be good predictors of pupil performance in early grade literacy and numeracy. This diagnostic information will help policymakers make data-informed decisions regarding remediation strategies that can improve the quality of instruction and pupil learning outcomes in early primary grades.

Initially, the three components of the Education Data for Decision Making (EdData II) study—EGRA, Early Grade Mathematics Assessment (EGMA), and Snapshot of School Management Effectiveness (SSME)—were intended to serve as a baseline for the ACCELERE! project. However, the ACCELERE! project had not completely finalized its rollout plan—which included decisions on final intervention areas—at the time of EdData data collection. The sample was drawn based on the draft rollout plan and may not be valid as a baseline if education sub-provinces were changed after data collection was conducted.

2 Evaluation Approach

2.1 Assessment Design

The Grade 3 pupils were assessed in national languages (Lingala, Tshiluba, or Kiswahili) and in productive and receptive oral language skills in French. These three languages are both the national languages and the language of instruction in Grade 3; therefore, all instruments were designed and administered in these languages. Grade 3 pupils were also assessed on their basic foundational mathematics skills. Grade 5 pupils were assessed in French. A full SSME was conducted and provides a multifaceted picture of school management practices. Management data collected through the SSME suite of instruments also includes information on pedagogical

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[10] MEPSP. (2012). *Plan intérimaire de l'éducation 2012–2014*. DRC.
[11] Because the ALP sample was relatively small (12 schools), we have not disaggregated for all of the ALP details in the sections below.

approaches; time on task; interactions among pupils, teachers, administrators, and parents; record keeping; discipline; availability and condition of school infrastructure; availability of pedagogical materials; and school safety.

2.2 Overview of SSME

The SSME consists of a range of instruments that yield a quick, but rigorous and multifaceted, picture of school management and pedagogical practice in a country or region. The SSME was designed to capture indicators of effective schools that past research has shown to affect pupil learning. The resulting data are designed to enable school, district, provincial, or national administrators and donors to learn what is currently occurring in their schools and classrooms and to assess how to make these schools more effective.

Building off of the framework for the analysis of effective schools described by Heneveld and Craig,[12] the SSME collects a variety of information, including information on pupil and household characteristics, basic school inputs (e.g., school infrastructure, pedagogical materials, and teacher and head teacher characteristics), and classroom teaching and learning processes (e.g., instructional content, pupil–teacher interaction, and assessment techniques). In addition, the EGRA and EGMA components of the national baseline study provide information on the achievement of learning outcomes in reading, writing, and arithmetic.

A four-person team administers the SSME during a single school day. Each of the SSME's components is designed to elicit information from a different perspective. The SSME's components are the Student Questionnaire, the Head Teacher Questionnaire, the Teacher Questionnaire, the School Inventory, Classroom Inventory, Classroom Observation (Kiswahili, Lingala, or Tshiluba reading lesson), and Classroom Observation (Mathematics). The design of the SSME aims to balance the need to include a broad mix of variables with the competing need to create a tool that will disrupt the school day as little as possible. When combined, the components of the assessment produce a multifaceted and comprehensive picture of a school's learning environment. When the results from multiple schools in a region are compared, it then becomes possible to account for differences in school performance. The assessment tools are presented in *Appendix 2*. The seven SSME components are briefly discussed as follows:

1. Student Questionnaire: Administered to each pupil randomly selected for assessment

2. Head Teacher Questionnaire: Administered to the head teacher in each school visited

3. Teacher Questionnaire: Administered to the teachers whose pupils are selected for assessment

4. School Inventory: Administered at each school visited

5. Classroom Inventory: Administered in each of the sampled classes

6. Classroom Observation (National Languages): Administered during reading and writing lessons in Grade 3 classrooms

7. Classroom Observation (Mathematics): Administered during mathematics lessons in Grade 3 classrooms

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[12] Heneveld, W. and Craig, H. (1996). *Schools count: World Bank project designs and the quality of primary education in sub-Saharan Africa*. World Bank Technical Paper Number 303 (Africa Technical Department Series). Washington, DC: World Bank.

Because the purpose and activities of the EGRA and EGMA are somewhat less intuitive than those for the SSME, the next two subsections (2.3 and 2.4) present additional background on the EGRA and EGMA before explaining the specific components of these two instruments.

2.3 Overview of EGRA

Why test early grade reading?

The ability to read and understand a simple text is one of the most fundamental skills a child can learn. Without basic literacy, there is little chance that a child can escape the intergenerational cycle of poverty. Yet in many countries, pupils enrolled in school for as many as six years are unable to read and understand a simple text. Recent evidence indicates that learning to read both *early* and at a sufficient *rate* are essential for learning to read well. Acquiring literacy becomes more difficult as pupils grow older; children who do not learn to read in the first few grades are more likely to repeat and eventually drop out, while the gap between early readers and nonreaders increases over time.

Before one can assess early reading, one must understand the component skills involved in skilled reading. A powerful and influential model of the component processes involved in reading comprehension is the "Simple View of Reading."[13] According to this model, reading comprehension could be predicted by the formula *Reading Comprehension = Decoding × Listening Comprehension*. Thus, children who lack decoding skills (the ability to read words) would be classified as nonreaders.

A seminal model that captures the growth of decoding, linguistic comprehension, and reading comprehension was proposed by Jeanne Chall in 1983.[14] Since the original publication of Chall's *Stages of Reading Development*, several studies have confirmed Chall's model, and have made the phases "Learning to Read" and "Reading to Learn" well known among researchers and practitioners. When children are learning to read, they must learn the letters of the alphabet, learn the sounds associated with each letter, and apply this knowledge to decode (or "sound out") new words, in addition to building a set of high-frequency sight words (such as "the" or "to" in English) that they can recognize instantly. By the end of this phase, children develop sufficient speed and accuracy in decoding and word recognition that they can read with fluency. When children read with fluency, they can read orally with the same speed and expression that they use in speech.

Recent evidence indicates that learning to read both early and at a sufficient rate, with comprehension, is essential for learning to read well. A substantial body of research documents the fact that children can learn to read by the end of Grade 2, and indeed need to be able to read to be successful in school. Importantly, children who do not learn to read in the early grades (Grades 1–3) are likely to fall behind in reading and other subjects, to repeat grades, and eventually to drop out.

Purpose of EGRA

Historically, there has been very little information regarding pupil learning in the early grades in low-income countries. EGRA was developed to provide a way to measure a child's initial reading skills. More specifically, it was constructed to assess the

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[13] Gough, P. B. and Tunmer, W. E. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*, 6–10. See also Hoover, W. A. and Gough, P. B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127–160.
[14] Chall, J. (1983). *Stages of Reading Development*. New York: McGraw-Hill.

reading and language skills identified to be critical for becoming fluent readers who comprehend what they read. By assessing pupils' knowledge of the alphabetic principle, decoding skills, oral reading fluency, and comprehension of written text and oral language, EGRA may inform ministries of education, donors, teachers, and parents about primary grade pupils' reading skills. Because of its direct links with the skills critical for successful reading achievement, EGRA may assist education systems in setting standards and curricular planning to best meet children's needs in learning to read.

EGRA, in the DRC as elsewhere, is not intended to be a high-stakes accountability measure to determine whether a pupil should move up to the next grade, nor should it be used to evaluate individual teachers. Rather, the subtasks included in EGRA can be adapted for teacher use as formative assessments. As a formative assessment, teachers can either use EGRA in its entirety or select subtasks to monitor classroom progress as a whole, determine trends in pupil performance, and adapt instruction to meet the classroom needs.

What EGRA measures

The EGRA instrument is composed of a variety of subtasks designed to assess foundational reading skills crucial to becoming a fluent reader. EGRA is designed to be a method-independent approach to assessment—that is, the instrument does not reflect a particular method of reading instruction (i.e., "whole language" or "phonics-based" approach). Rather, EGRA measures basic skills that a child must have to eventually be able to read fluently and with comprehension—the ultimate goal of reading. The EGRA subtasks are based on research regarding a comprehensive approach to reading acquisition across languages. These skills are described below:

- **The alphabetic principle** is considered essential for learning to read an alphabetic language. The alphabetic principle refers to the recognition and understanding of how the speech sounds of a language relate to units of print (or letters, in Bemba). Mastering the alphabetic principle is critical for decoding, or sounding out, new and unfamiliar words.

- **Fluency** is often defined as the ability to orally read connected text with speed, accuracy, and proper expression. Reading fluency is considered critical for comprehension because rapid, effortless word-identification processes enable the reader to focus on the text and its meaning rather than decoding or sounding out the words.[15]

- **Reading comprehension**, considered the goal of reading, refers to the ability to actively engage with, and construct meaning from, the texts that are read.

- **Listening comprehension** refers to one's ability to make sense of oral language in the absence of print. Listening comprehension taps many skills and sources of knowledge, such as vocabulary knowledge, facility with grammar, and general background knowledge. Although pupils whose language of instruction differs from their home language have been found to learn to read words at the same rate as those who are learning in their home

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[15] National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* (NIH Publication No. 00-4769). Washington, DC: US Government Printing Office. See also Perfetti, C. A. (1992). The representation problem in reading acquisition. In P. B. Gough, L. C. Ehri, and R. Treiman (Eds.), *Reading acquisition* (pp. 145–174). Hillsdale, NJ: Erlbaum.

languages, nonnative speakers have been found to show greater difficulties in listening comprehension.[16]

EGRA measures each of the above abilities/components to assess the foundational reading skills. The skills are tested in individual subtasks and presented in order of increased level of difficulty (i.e., letter sound identification, then word reading, etc.). Because the first few subtasks are easier, EGRA can therefore measure a range of reading abilities for beginning readers. The subtasks included in the EGRA DRC instrument are described in *Table 1*.

The EGRA instrument for the DRC

The EGRA, as adapted for the DRC, is an individually and orally administered standardized assessment of beginning reading (reading-related skills in Tshiluba, Lingala, and Kiswahili). Administering the instrument in two languages to each pupil takes approximately 45 minutes.

Table 1 summarizes the EGRA national languages and French instruments and subtasks for the DRC.

Table 1.   EGRA instrument subtasks in DRC

Subtask	Skill	Description: The child is asked to…
Receptive Oral Language (3 National Languages and French)	Vocabulary	…point to a common object in the environment when told the name of that object orally; …place an object in a location as instructed.
Productive Oral Language (3 National Languages and French)	Oral language vocabulary	…verbally identify the name of an object when shown an image of that object on a piece of paper.
Letter Name or Sound Recognition	Knowledge of the alphabet and the names and sounds of both uppercase and lowercase letters	…say the names of letters or sounds of the letters, while looking at a printed page of 100 letters of the alphabet in random order, upper and lower cases. (*Timed subtask*)
Familiar Words Reading (3 National Languages)	Ability to read a randomly presented list of frequently occurring words by sight or automatically	…read a list of common words. (*Timed subtask*)
Non-Word Reading (3 National Languages)	Alphabetic principle (letter-sound correspondence and fluency) automatic decoding	…read a list of 50 non-words printed on a page. Words were constructed from actual orthography, but were not real words. (*Timed subtask*)
Oral Reading (3 National Languages)	Fluency (automatic word reading in context)	…read out loud a grade-level-appropriate short story printed on a page. (*Timed subtask*)
Reading Comprehension (Kiswahili and English)	Comprehension	…verbally respond to five questions that the assessor asks about the short story. (*Untimed subtask*)

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[16] Geva, E. and Yaghoub Zadeh, Z. (2006). Reading efficiency in native English-speaking and English-as-a-second-language children: The role of oral proficiency and underlying cognitive-linguistic processes. *Scientific Studies of Reading*, *10*, 31–58. See also Quiroga, T., Lemos-Britton, Z., Mostafapour, E., Abbott, R. D., and Berninger, V. W. (2002). Phonological awareness and beginning reading in Spanish-speaking ESL first graders: Research into practice. *Journal of School Psychology, 40*, 85–111.

All EGRA administrations also include a "stop" rule, which requires assessors to discontinue the administration of a subtask if a pupil is unable to respond correctly to any of the items in the first line (in the case of DRC, the first 10 syllables, the first five words, or the first line of the oral reading story). This rule was established to avoid frustrating pupils who do not understand the subtask or lack the skills to respond. In the case of the reading comprehension questions, pupils were only asked the questions that corresponded to the section of the text they had read within the available time.

2.4   Overview of EGMA

Why test early grade mathematics?

A strong foundation in mathematics during the early grades is crucial for success in mathematics in the later years. Mathematics is a skill very much in demand in today's economy, as has been demonstrated by various economists. Most competitive jobs require some level of mathematics skill. It has also been noted that the problem-solving skills and mental agility and flexibility that children develop through mathematics transfer to other areas of life and work. Furthermore, countries' rankings on mathematics skills

A child working on addition problems during EGMA administration.

are becoming a matter of political currency because of international assessments such as Trends in International Mathematics and Science Study (more commonly known by its acronym, TIMSS). Mathematics curricula for the early grades are now in agreement across most countries in terms of the skills children should have. For example, goals such as knowing and using number names, learning and understanding the values of numbers, knowing key symbols, and comparing and ordering sets of objects are skills found in many curricula, including curricula in developing countries.

Purpose of EGMA

The EGMA was designed to provide information about basic competencies—those competencies that should typically be mastered in the very early grades and without which pupils will struggle, or potentially drop out of school. Subtasks selected for EGMA were drawn from extensive research on early mathematics learning and assessment and were constructed by a panel of experts on mathematics education and cognition. The conceptual framework for mathematical development is grounded in extensive research that has been conducted over the past 60 years.[17] To develop

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[17] See, for example, Baroody, A. J., Lai, M.-L., and Mix, K. S. (2006). The development of number and operation sense in early childhood. In O. Saracho and B. Spodek (Eds.), *Handbook of research on the education of young children* (pp. 187–221). Mahwah, NJ: Erlbaum; Chard, D. J., Clarke, B., Baker, S., Otterstedt, J., Braun, D., and Katz, R. (2005). Using measures of number sense to screen for difficulties in mathematics: Preliminary findings. *Assessment for Effective Intervention, 30*(2), 3–14; and Clements, D. and Samara, J.

the EGMA protocol, developers systematically sampled early numeracy skills, particularly those underlying number sense. These abilities and skills are key in the progression toward the ability to solve more advanced problems and the acquisition of more advanced mathematics skills.[18]

What EGMA measures

Several criteria were defined for subtasks to be included in the instrument, to support the goal of providing stakeholders—from ministries of education to aid agencies to local education officials—with the information essential to making informed changes in teacher education and support, curriculum development, and implementation:

- Represent skills that developing country and developed country curricula have determined should be acquired in early grades
- Reflect those skills that are most predictive of future performance, according to available research and scientific advice
- Represent a progression of skills that lead toward proficiency in mathematics
- Target both conceptual and computational skills
- Represent skills and tasks that can be improved through instruction

The EGMA is an individually administered oral test, which allows for the targeted skills to be assessed without confounding the results if individual pupils have problems with language or writing that might otherwise impede their performance. By administering the test orally, administrators can better ensure that pupils understand instructions provided in a language they know.

The EGMA instrument for the DRC

Table 2 summarizes the subtasks of the EGMA designed for the DRC.

Table 2.   EGMA instrument subtasks in DRC

Subtask	Skill	Description: The child is asked to…
Subtasks that assess more procedural (recall) type knowledge		
Addition and Subtraction Level 1 (basic facts)	This subtask requires knowledge of and confidence with basic addition and subtraction facts. It is expected that pupils should develop some level of automaticity and fluency with these facts because they need them throughout mathematics.	…mentally solve addition and subtraction problems, with sums and differences less than 20. The problems ranged from those with only single digits to problems that involved the bridging of the 10. There were 10 items per addition and subtraction subtask. (*Timed subtask*)
Subtasks that assess more conceptual (application) type knowledge		
Quantity Discrimination (number comparison)	This subtask requires the ability to make judgments about differences by comparing quantities represented by numbers.	…identify the larger of a pair of numbers. The number pairs used ranged from a pair of single-digit numbers to five pairs of double-digit numbers and four pairs of three-digit numbers. There were 10 items. (*Untimed subtask*)

(2007). Early childhood mathematics learning. In F. K. Lester, Jr. (Ed.), *Second handbook on mathematics teaching and learning* (pp.461–555). Charlotte, NC: Information Age.
[18] See, for example, Baroody et. al. (2006); Clements and Samara (2007); and Foegen, A., Jiban, C., and Deno, S. (2007). Progress monitoring measures in mathematics: A review of literature. *The Journal of Special Education, 41*(2), 121–139.

Subtask	Skill	Description: The child is asked to…
Missing Number (number patterns)	This subtask requires the ability to discern and complete number patterns.	…determine the missing number in a pattern of four numbers, one of which is missing. Patterns used included counting forward and backward by ones, fives, tens, and twos. There were 10 items. (*Untimed subtask*)
Addition and Subtraction Level 2*	This subtask requires the ability to use and apply the procedural addition and subtraction knowledge assessed in the Level 1 subtask to solve more complicated addition and subtraction problems.	…solve addition and subtraction problems that involve the knowledge and application of the basic addition and subtraction facts assessed in the Level 1 subtask. Pupils were allowed to use any strategy that they wanted, including the use of paper and pencil supplied by the administrator. The problems extended to the addition and subtraction of two-digit numbers involving bridging. There were five items per addition and subtraction subtask. (*Untimed subtask*).
Word Problems	This subtask requires the ability to interpret a situation (presented orally to the pupil), make a plan, and solve the problem.	…solve problems presented orally using any strategy that they wanted, including the use of paper and pencil and/or counters supplied by the assessor. Because the focus of this subtask was on assessing the pupils' ability to interpret a situation, make a plan, and solve a problem, the numerical values involved in the problem were deliberately small to allow for the targeted skills to be assessed without confounding problems with calculation skills that might otherwise impede performance. The problem situations used were designed to evoke different mathematical situations and operations. There were six items. (*Untimed subtask*).

* The Addition and Subtraction Level 2 subtasks are more conceptual than the Addition and Subtraction Level 1 subtasks because the pupil must understand what they are doing, applying the Level 1 skills. Although the Level 2 subtasks are not purely conceptual, because, with time, pupils will develop some automaticity with the items in these subtasks, they are more conceptual than the Level 1 subtasks, especially so for Grade 3 pupils.

2.5 Instrument adaptation process for the DRC: EGRA, EGMA, and SSME

The RTI–developed EGRA, EGMA, and SSME instruments have been used in dozens of countries by numerous organizations. However, this does not mean the instruments are merely translated for the country in which they are to be used. Rather, the base instruments are adapted to the local context and vetted by a body of national experts from the education community in the host country. The grade-appropriate curriculum and textbooks are analyzed and used to inform changes and adaptations made to the base EGRA, EGMA, and SSME instruments. These instruments are truly localized to fit the country in which they are to be used.

A five-day adaptation workshop was held in Kinshasa in November 2014 for respected members from the education community across the DRC. Workshop participants included participants from MEPSP Kinshasa headquarters selected for their expertise in early grade literacy and mathematics pedagogy, school management, and assessment; primary school instructors; experts in linguistics from the *Centre de Linguistique Théorique et Appliquée* (Center for Theoretical and Applied Linguistics) and the *Université Pédagogique Nationale* (National Pedagogical University); USAID personnel; and RTI subject-matter experts. Four experts from RTI

led the reading, writing, and mathematics portions of the workshop. The reading and writing expert led the adaptation discussions for the EGRA instruments, and the mathematics expert led the adaptation process for the EGMA instruments and for the SSME instruments. Together, the workshop participants modified the base EGRA, EGMA, and SSME tools to be used during the assessment.

Adaptation workshop participants had the opportunity to administer draft versions of the instruments at a school in Kinshasa, gaining insight into both how the instruments function and how pupils in Kinshasa are performing.

The instruments were rendered into the RTI–developed Tangerine® software. The baseline assessment assessors then used tablets loaded with the Tangerine versions of the instruments to collect the data.

2.6   Sample

Population of interest

The population of interest for the 2015 baseline EGRA/EGMA consisted of all Grade 3 and Grade 5 pupils who were attending public schools located in the specific education sub-provinces specified by Chemonics (see ***Table 3***). Census lists for these schools were provided by the provincial ministry representatives. It should be noted that all census lists came with varying school information and may not have been complete nor accurate lists; however, the sample was drawn from what was believed to be the most up-to-date and accurate list of schools. After the lists were cleaned and processed, the total population was estimated to include approximately 3,683 schools.

Table 3.   Population of interest for the 2015 DRC baseline EGRA/EGMA

Province	Year of expected entry	Education sub-provinces[*]	Total schools in sub province[†]
Equateur	Year 2	Businga, Gemena 1 (Gemena), Gemena 2 (Bwamanda)	509
	Year 3	Bikoro, Ingende, Mbandaka 1, Mbandaka 2	557
Kasai Occidental	Year 2	Kamuesha / Tshikapa Est, Kananga 1, Kitangua / Tshikapa Ouest, Tshikapa Centre	672
	Year 3	Kananga 2 Kazumba Centre Kazumba Nord Kazumba Sud	581
Kasai Oriental	Year 2	Kabinda I, Kamiji	46
	Year 3	Mbuji-Mayi 1, Mbuji-Mayi 2, Mbuji-Mayi 3, Miabi	212
Katanga	Year 1	Kamina I, Kipushi, Likasi, Lubumbashi II, Sakania	450
	Year 3	Kalemie, Kasaji, Kolwezi I, Kolwezi II, Mutshatsha	483

* Education sub-provinces as indicated by Chemonics to USAID as of September 9, 2015, just before baseline data collection. Note: Education sub-provinces may have changed since baseline data collection.
† Estimated.

Sample methodology

This sample for the 2015 baseline EGRA/EGMA was selected using a three-stage sample of schools, classrooms, and pupils. A total of 240 schools were selected with equal probability within each of the individual "Province" and "Year of Expected Entry" cohorts. Once prospective sample schools were verified, the assessment team traveled to the sample schools and randomly selected one Grade 3 classroom and one Grade 5 classroom. In each selected classroom, 5 male pupils and 5 female pupils were selected (see ***Table 4***). This sample methodology provided an estimated 2,400 Grade 3 pupils and 2,400 Grade 5 pupils.

Table 4.   Sample methodology for Grade 3 and Grade 5 DRC 2015 baseline

Stage number	Item sampled	Stratified by…	Probability of selection
		Province and Year of Expected Entry	
Stage 1	Schools (240)	Katanga–Year 1 (50)	Equal*
		Katanga–Year 3 (30)	
		Equateur–Year 2 (50)	
		Equateur–Year 3 (30)	
		Kasai Occidental–Year 2 (30)	
		Kasai Occidental–Year 3 (30)	
		Kasai Oriental–Year 2 (20)	
		Kasai Oriental–Year 3 (20)	
		Grade (3/5)	
Stage 2	Classrooms (480)	Grade 3 (240)	Equal
		Grade 5 (240)	
		Gender (male/female)	
Stage 3	Pupils (~4,800)	Grade 3 Male (1,200)	Equal
		Grade 3 Female (1,200)	
		Grade 5 Male (1,200)	
		Grade 5 Female (1,200)	

* Equal probability was used for school selection because the census data provided did not contain enrollment figures.

The sample was properly weighted at each sample stage to allow for a proper representation of the schools, as well as the Grade 3 and Grade 5 teachers and pupils attending the specified educational sub-provinces (see ***Table 5***).

Final sample counts and estimates[19]

Data were collected October 19–December 15, 2015 in a staggered manner by province. A total of 2,347 Grade 3 pupils were assessed from 239 Grade 3 classrooms and a total of 240 schools. Please refer back to **Table 4** for more details on the number of classrooms and pupils sampled by grade and gender within each "Province" or "Year of Entry" cohort. Please see the Grade 5 Report for final sample counts for Grade 5.

Table 5.   Final sample counts for Grade 3 DRC 2015 baseline

Province/year cohort	# of schools sampled	# of Grade 3 classrooms sampled	# of Grade 3 pupils sampled
Katanga/Year 1	50	49	Males: 255 Females: 223
Katanga/Year 3	30	30	Males: 159 Females: 135
Equateur/Year 2	29	29	Males: 153 Females: 128
Equateur/Year 3	31	31	Males: 161 Females: 144
Kasai Occidental/Year 2	30	30	Males: 155 Females: 146
Kasai Occidental/Year 3	30	30	Males: 169 Females: 132
Kasai Oriental/Year 2	19	19	Males: 108 Females: 83
Kasai Oriental/Year 3	21	21	Males: 96 Females: 100

The final precision estimates for each grade can be found in **Table 6**. We can see that 95% confidence intervals in the Grade 3 estimated mother tongue mean oral reading fluency (ORF) scores are extremely closely grouped—the majority of them are under ±1.0 correct words per minute (cwpm). A large reason for this closely grouped precision is due to the fact that many of these pupils were not able to read a

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[19] An additional 12 schools were selected to gather descriptive information regarding pupil performance in ALPs in two provinces: Nord Kivu and Sud Kivu—6 schools per province, 1 classroom per school, 5 male pupils and 5 female pupils per classroom, with a total of 12 schools, 12 classrooms, and 120 pupils.

single word in the mother tongue reading passage; therefore, there is very little variation among scores.

It should also be noted that the mean scores in the Year 3 cohort are all higher than the Year 1 or Year 2 mean scores in each of the given provinces. For example, the mean score for Equateur/Year 2 is only 0.2 cwpm; however, Equateur/Year 3 is 3.5 cwpm. There is a strong implication that the Grade 3 pupils targeted to receive the intervention in Year 3 are significantly outperforming those targeted to receive the intervention in Year 1 or Year 2 for each province. This would have had potentially important implications for midline and endline results if the educational sub-provincial levels were still the same as indicated in Table 3. However, the educational sub-provinces have changed since these data were collected.

Table 6.   Means and precision estimates of the Grade 3 pupils' ORF (mother tongue)

Province/year cohort	# of sampled pupils	Mean	95% CI	SD	ICC	DEFF
Equateur/Year 2	281	0.2	±0.2	1.1	0.000	1.4
Equateur/Year 3	305	3.5	±1.8	8.2	0.176	3.6
Kasai Occidental/Year 2	301	1.8	±0.8	5.4	0.074	2.7
Kasai Occidental/Year 3	301	3.9	±2.1	9.1	0.217	4.5
Kasai Oriental/Year 2	191	2.6	±1.3	6.6	0.041	0.4
Kasai Oriental/Year 3	196	2.1	±0.8	5.3	0.028	1.7
Katanga/Year 1	478	0.6	±0.5	2.7	0.279	2.3
Katanga/Year 3	294	1.7	±1.3	4.9	0.193	8.3
Overall	**2,347**	**1.9**	**±0.5**	**5.8**	**0.182**	**4.1**

95% CI: 95% confidence interval band on the estimated mean
SD: standard deviation
ICC: intra-class correlation
DEFF: design effect.

2.7   Assessments

Different assessments were administered in each of the provinces, according to the needs of the baseline and according to the language of instruction. Pupils in Katanga Province were assessed with the EGMA in addition to the EGRA, and their classrooms were also observed during a reading lesson and a math lesson. All Grade 3 pupils were assessed using EGRA in the language of instruction for that province and also participated in the French Vocabulary subtask. All grades and provinces received Classroom Observations of reading lessons, Teacher Questionnaires, and Classroom Inventories, and all schools received Head Teacher Questionnaires and School Inventories. Please see *Table 7* for a more detailed list of assessments used in each province, language, and grade.

Table 7.   Assessments by province, language, and grade

Province, language, grade	Pupil-level instruments	Classroom-level instruments	School-level instruments
Katanga, Kiswahili, Grade 3	• Kiswahili EGRA • Kiswahili EGMA • French Oral Vocabulary • Student Questionnaire	• Classroom Observation of Reading • Classroom Observation of Math • Teacher Questionnaire • Classroom Inventory	• Head Teacher Questionnaire • School Inventory
Equateur, Lingala, Grade 3	• Lingala EGRA • French Oral Vocabulary • Student Questionnaire	• Classroom Observation of Reading • Teacher Questionnaire • Classroom Inventory	• Head Teacher Questionnaire • School Inventory
Kasai Occidental, Tshiluba, Grade 3	• Tshiluba EGRA • French Oral Vocabulary • Student Questionnaire	• Classroom Observation of Reading • Teacher Questionnaire • Classroom Inventory	• Head Teacher Questionnaire • School Inventory
Kasai Oriental, Tshiluba, Grade 3	• Tshiluba EGRA • French Oral Vocabulary • Student Questionnaire	• Classroom Observation of Reading • Teacher Questionnaire • Classroom Inventory	• Head Teacher Questionnaire • School Inventory

2.8   Demographic Information

Demographic data gathered from the Student and Teacher Questionnaires are able to provide some background about the particular Grade 3 children and teachers that made up this sample. In some provinces, slightly more female pupils than male pupils were sampled, although the sample methodology called for them to be sampled evenly. This could be explained by higher female enrollment in the sampled schools. A large proportion of Grade 3 pupils were also overaged for their grade, with the appropriate Grade 3 age range being 8–9 years of age.

The percentage of pupils reporting being absent from school in the week prior to the survey was between one-quarter and one-third of pupils in most provinces, but was significantly lower in Katanga. The percentage of pupils reporting being late to school in the week prior to the survey was similar to those reporting being absent, but with only a slightly lower percentage of pupils reporting being late in Katanga than in the other provinces. (The pupils reporting being absent in the week prior to the survey in all provinces mostly reported being so due to illness. The majority of pupils reporting being late for school in the prior week also reported being so due to illness.)

Overall, the percentage of Grade 3 pupils being taught by male teachers was approximately 61%, but that percentage varied widely from province to province, with only 15.6% of Grade 3 pupils in Kasai Occidental having a female teacher, and 51.7% of Grade 3 pupils in Katanga having a female teacher. The percentage of pupils speaking the language assessed as their home language also varied widely among the provinces, with more than half of the pupils in Equateur speaking the language at home, but less than 2% of pupils speaking the language at home in the other three provinces. Refer to *Table 8* for more descriptive demographic information about the Grade 3 pupils sampled.

Table 8   Demographic information for Grade 3 pupils

Province	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Overall
Pupil gender					
Male	53.4%	49.1%	49.1%	52.9%	51.3%
Female	46.6%	50.9%	50.9%	47.1%	48.7%
Age based on grade					
Underage (under 8)	4.3%	8.7%	4.2%	17.7%	9.9%
Of age (8–9)	48.1%	48.4%	41.8%	50.5%	48.2%
Overage (over 9)	47.6%	42.9%	54.0%	31.8%	41.9%
Absent last week					
No	75.1%	65.7%	69.2%	83.2%	73.7%
Yes	25.0%	34.3%	30.8%	16.8%	26.3%
Late to school last week					
No	70.4%	75.1%	65.8%	77.4%	73.6%
Yes	29.6%	25.0%	34.2%	22.6%	26.4%
Teacher's gender					
Male	68.8%	58.9%	84.4%	48.3%	60.8%
Female	31.2%	41.1%	15.6%	51.7%	39.2%
Speaks language of assessment at home	Lingala	Tshiluba	Tshiluba	Kiswahili	
Speaks language at home	57.6%	0.2%	1.7%	0.9%	14.2%
Does not speak language at home	42.4%	99.8%	98.3%	99.1%	85.8%

2.9   Assessor Training and Data Collection

Five international project staff spent two weeks in September 2015 training a group of 50 assessors and supervisors in Lubumbashi as well as two master trainers from the *Centre National d'Appui au Développement et à la Participation Populaire* (CENADEP), recruited in Lubumbashi and the Kivus. Of the 50 trained assessors, 44 were selected to conduct data collection

Assessor training in Mbandaka.

based on observed performance during school practice and inter-rater reliability results. Subcontractor CENADEP's master trainers then traveled to three venues in Mbuji-Mayi, Kanagna, and Mbandaka to train a total of 97 assessors and supervisors, 84 of whom were retained to conduct data collection in Equateur, Kasai Occidentale, and Kasai Orientale. Assessors received training on how to administer each subtask of the EGRA and EGMA, how to interact with pupils (and school staff) during the assessment, and how to properly implement the protocol for visiting the sampled schools and randomly selecting the pupils to be assessed. Assessors learned how to operate handheld electronic tablet devices loaded with the Tangerine® software. This software, designed for education survey data collection, allowed assessors to gather all the data on the tablets rather than on paper, thus streamlining the data collection and data cleaning process. Assessors were trained in how to administer the tests as well as how to save and upload the finished assessments. In all, 128 assessors were trained and retained to conduct data collection in the 252 schools.

Data collection took place from October to December 2015. Pupils were given EGRA and EGMA stimulus sheets to respond to with guidance from the assessor, and the assessors scored the pupils' responses on the tablet. Assessors conducted Classroom Observations; completed Student, Teacher, and Head Teacher Questionnaires; and completed School and Classroom Inventories. At the end of each school visit, assessors used a wireless router and modem to upload the collected data to a central server.

An assessor practices EGRA administration in Katanga.

3 Results/Findings

3.1 EGRA Results

3.1.1 Pupil Demographics

During the EGRA administration, pupils were asked a number of demographic questions in order to gain more background information to help interpret EGRA scores. Average responses by province follow.

Did you go to kindergarten?

Overall, across the provinces, the majority of pupils reported not having attended kindergarten (*Figure 1*). The largest percentage of pupils (27%) reporting that they had attended kindergarten came from Katanga, while percentages of kindergarten attendance in the two Kasai regions were comparable (14% and 16% for Kasai Occidental and Kasai Oriental, respectively).

Figure 1. **Grade 3: Did you go to kindergarten?**
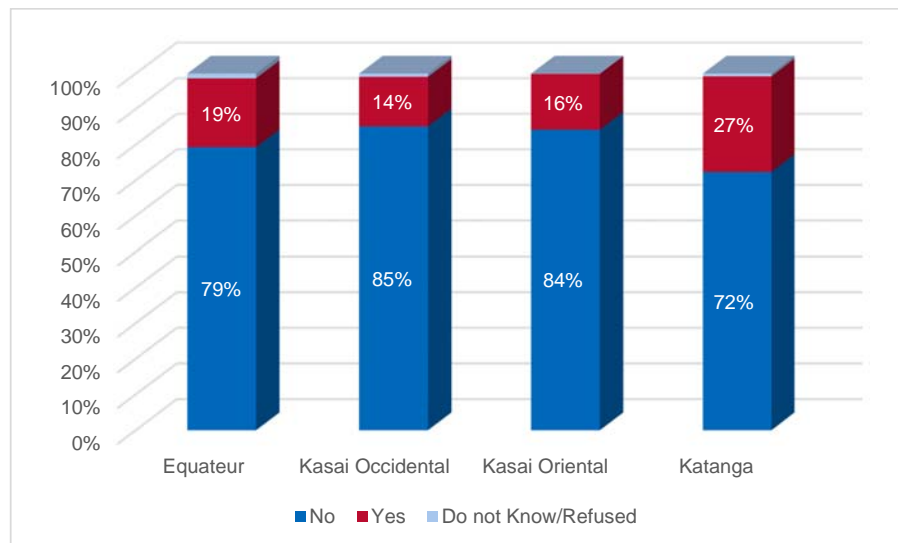
Children were also asked a series of questions regarding their level of reading engagement and practice at home.

Outside of school books, do you have books that you can read at home?

When asked if they have books other than school books at home that they can read, most pupils indicated that they do not (*Figure 2*). Across all provinces except Kasai Oriental, the percentages of pupils without books at home to read were comparable, ranging from 79% in Kasai Occidental to 81% and 84% in Equateur and Katanga, respectively. In Kasai Oriental, however, this percentage was somewhat lower, with 69% of pupils reporting having no reading books other than school books in the home, and 31% reporting that they do have reading books. This percentage is still too low—all pupils need reading books at home in order to practice the skills being taught in the classroom—however, the trend in Kasai Oriental is promising and should be encouraged.

Figure 2.   Grade 3: Do you have non-school books to read at home?
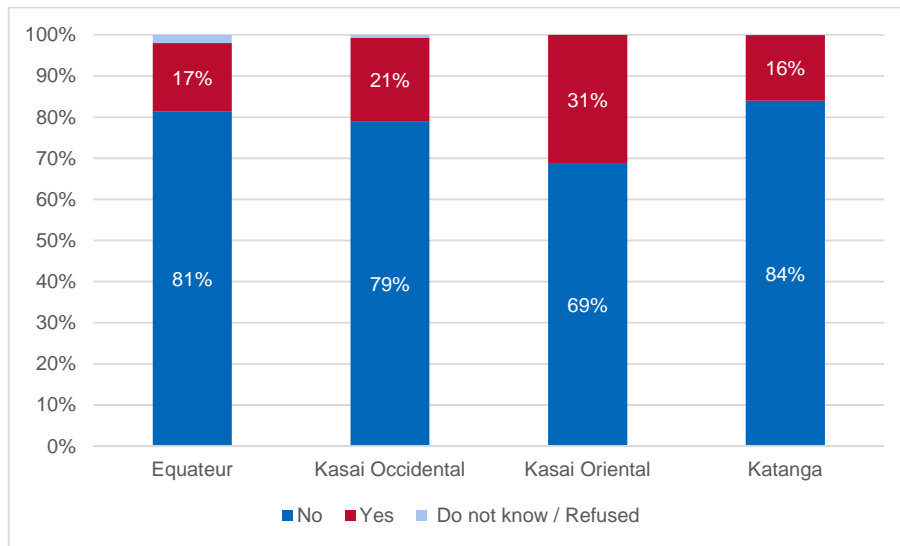
How often each week do you read aloud to someone at home? and How often each week does someone read stories to you at home?

Pupils were also asked to report how often each week they read aloud to someone at home, and how often each week they are read to by someone else at home. As seen in *Figure 3*, well over 50% of pupils in all provinces reported never reading to or being read to at home. Between 10% and 20% of pupils reported reading to and being read to by someone at home two to three times a week, which was the most prevalent answer after "No, never." However, few pupils reported reading aloud to someone or being read to by someone in the home daily.

Figure 3.   Grade 3: How often do you read and are you read to at home each week?
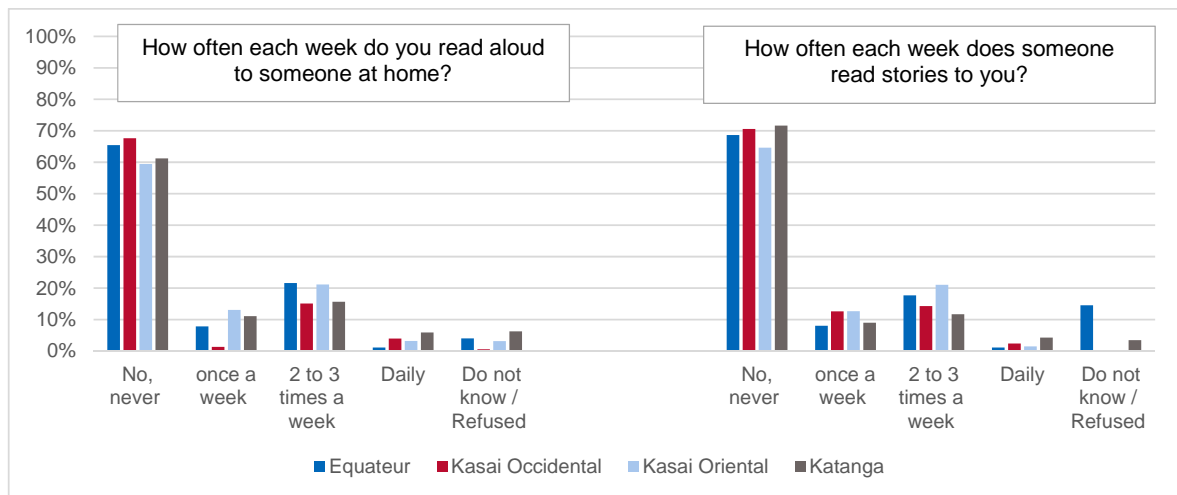
When you have homework, does someone help you to do it at home?

Pupils also indicated if they have help with their homework at home, when they do have homework. Given the lack of reading engagement at home, it is not surprising that most pupils reported not receiving help at home with homework (***Figure 4***). Again, somewhat more pupils in Kasai Oriental reported receiving homework support at home, which aligns with pupils in that province being more engaged at home with reading. However, the fact that more than half of pupils in all provinces reported not receiving support at home to complete homework suggests a lack of engagement by parents in their children's learning.

Figure 4.   Grade 3: Do you receive help with homework at home?
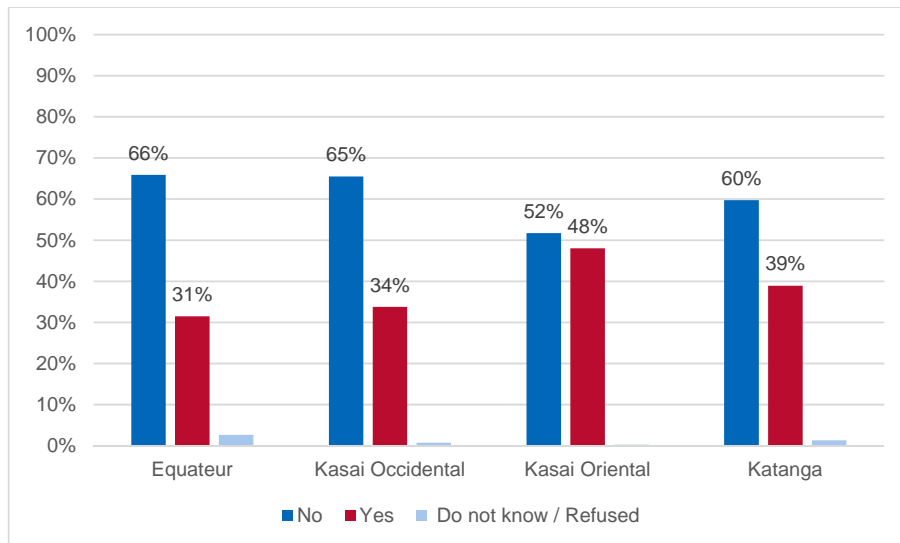
What does your teacher do when you respond well to a question? and What does your teacher do when you do not respond well to a question?

Given the role of teacher–pupil interaction, pupils were asked to report on teacher feedback and management strategies used in the classroom, in particular feedback given when a pupil responds correctly and when a pupil responds incorrectly. When asked about teacher responses to correct responses in the classroom, it is encouraging that most pupils (between 67% in Kasai Oriental and 84% in Katanga) reported that their teachers praise them (***Figure 5***). In Kasai Oriental, nearly one-third of pupils (30%) reported that they were given a reward for correct responses.

DRC 2015 EGRA, EGMA, and SSME Grade 3 Report of Findings

Figure 5. Grade 3: What does your teacher do when you respond correctly?
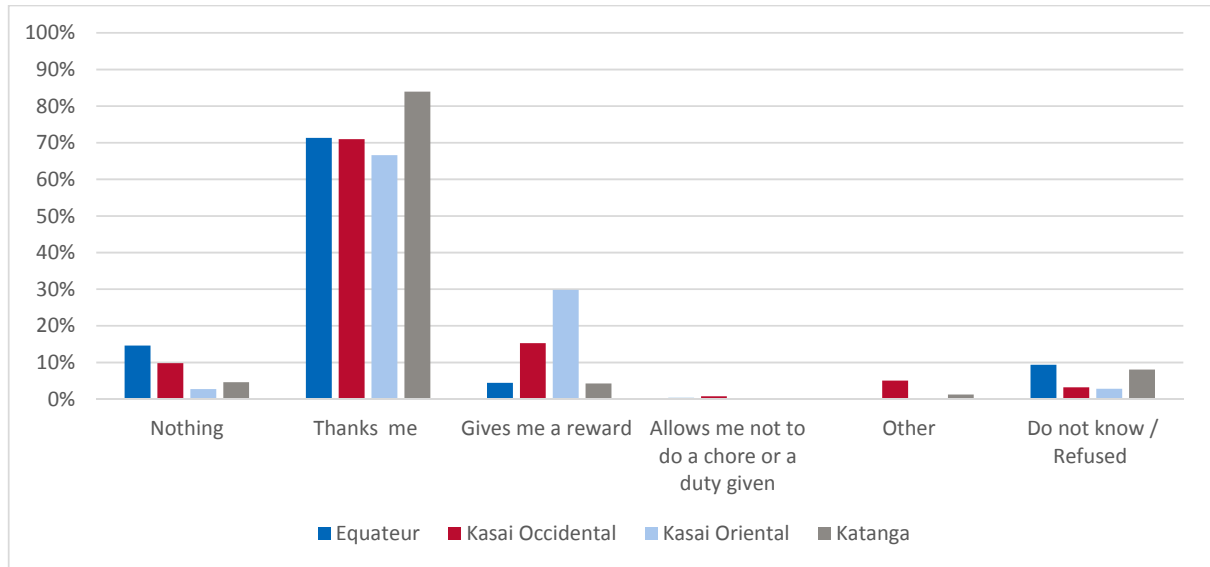
However, when asked how their teachers respond to incorrect responses in class, the most common response in both Equateur and Katanga was that the teacher strikes the pupil (*Figure 6*). In Kasai Occidental and Kasai Oriental, the most common response was that the teacher simply asks another pupil, without providing constructive feedback to the first pupil that would help that pupil learn from the incorrect response. Another punitive measure of scolding the pupil was also reported by more than 10% of pupils in Equateur and Katanga. It is encouraging that at least in Equateur, more than 15% of pupils reported teachers encouraging the pupil to try again. This type of positive, constructive feedback is needed to support and foster pupil learning.

Figure 6. Grade 3: What happens when you respond incorrectly in class?
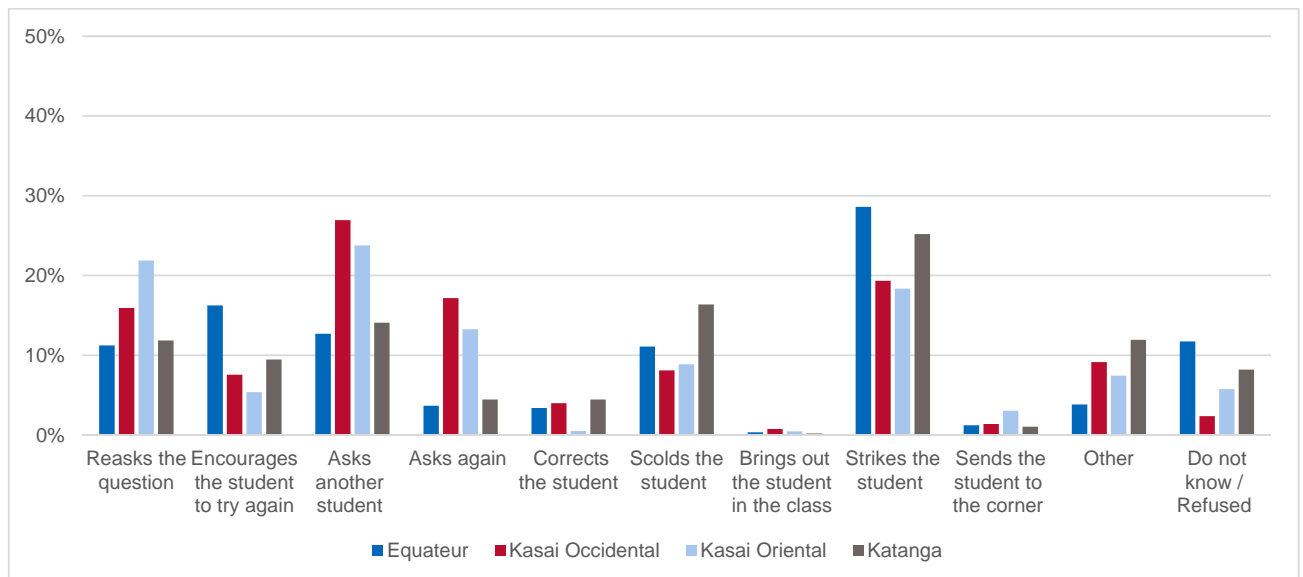
What does the teacher do when a pupil does not behave well in class?

Given the prevalence of punitive responses to incorrect answers given, it is not surprising that pupils reported striking as a common teacher response to pupils not behaving well in class (*Figure 7*). Across all provinces, more than 60% of pupils reported that the teacher would strike the pupil, and up to 16% of pupils in Kasai Oriental reported that pupils would be scolded. Other punitive measures, such as asking the pupil to kneel and sending the pupil to the corner, were less frequently reported.

Figure 7.   Grade 3: What does the teacher do when a pupil does not behave well?
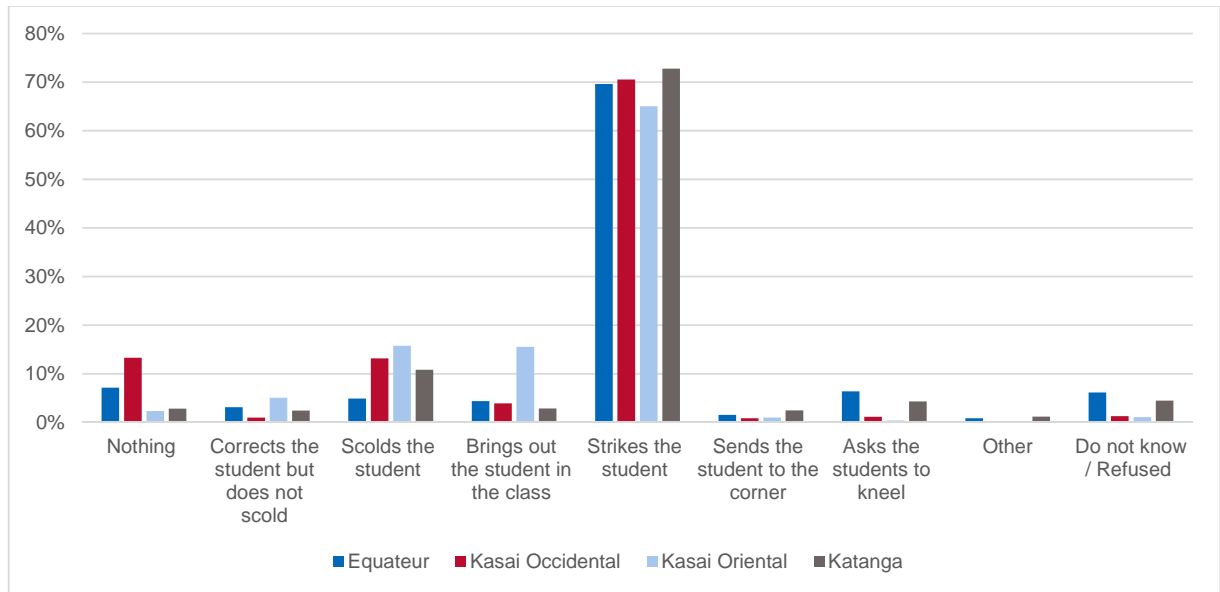
Do you feel safe traveling to/from school? and Do you feel safe in school?

Finally, pupils were asked about how safe they felt traveling to/from school and in school. More than 80% of pupils in Equateur and Katanga provinces reported feeling safe traveling to and from school and in school (*Figure 8*). This was reversed in Kasai Oriental and Kasai Occidental, where more than 80% of pupils felt unsafe traveling to/from school and in school.

Figure 8. **Grade 3: Do you feel safe traveling to/from and in school?**
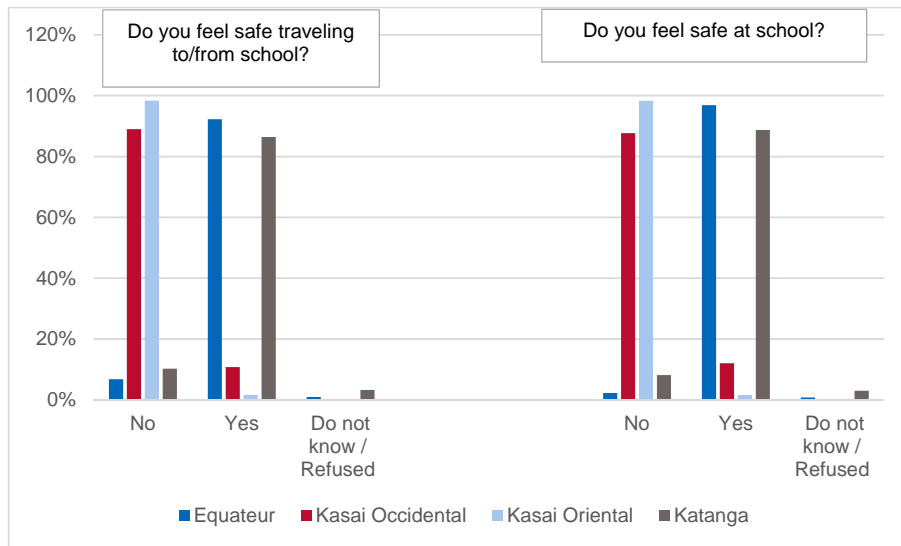
Is the pupil's home language the same as language of assessment?

Finally, assessors were asked to determine if the pupil's home language was the same as the language of assessment. As seen in *Figure 9*, in Kasai Occidental, Kasai Oriental, and Katanga, for between 98% and 100% of pupils, the home language was not the language of assessment. Only in Equateur was the home language the same as the language of assessment for the majority (58%) of pupils.

Figure 9. **Grade 3: Is home language the same as language of assessment?**
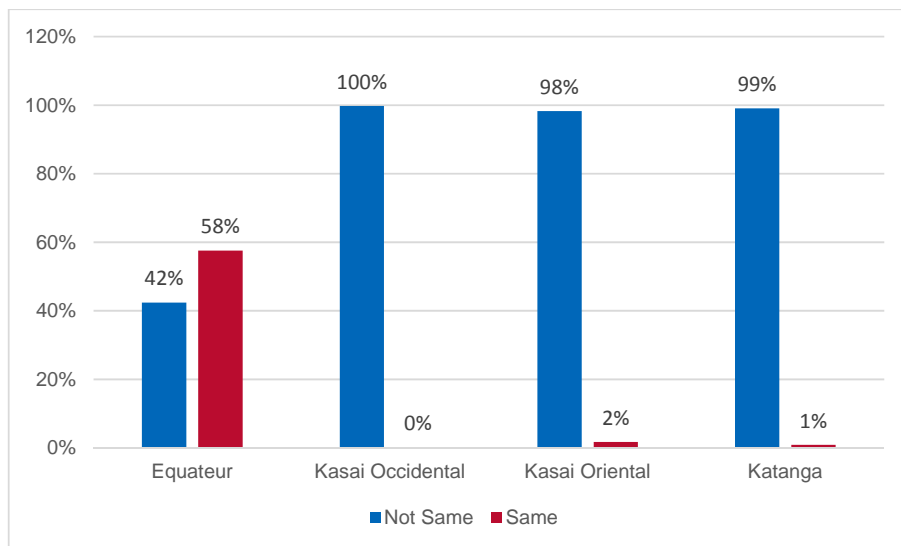
3.1.2 Zero Scores

The percentages of pupils unable to respond correctly to any item on each mother tongue subtask reflects relatively strong performance on the pre-reading skills of vocabulary and letter identification, but much weaker performance on word identification and passage reading subtasks and reading comprehension. **Figure 10** displays percentages of pupils with zero scores by province.

Figure 10.   Grade 3 (mother tongue): Percentages of pupils with zero scores, by province
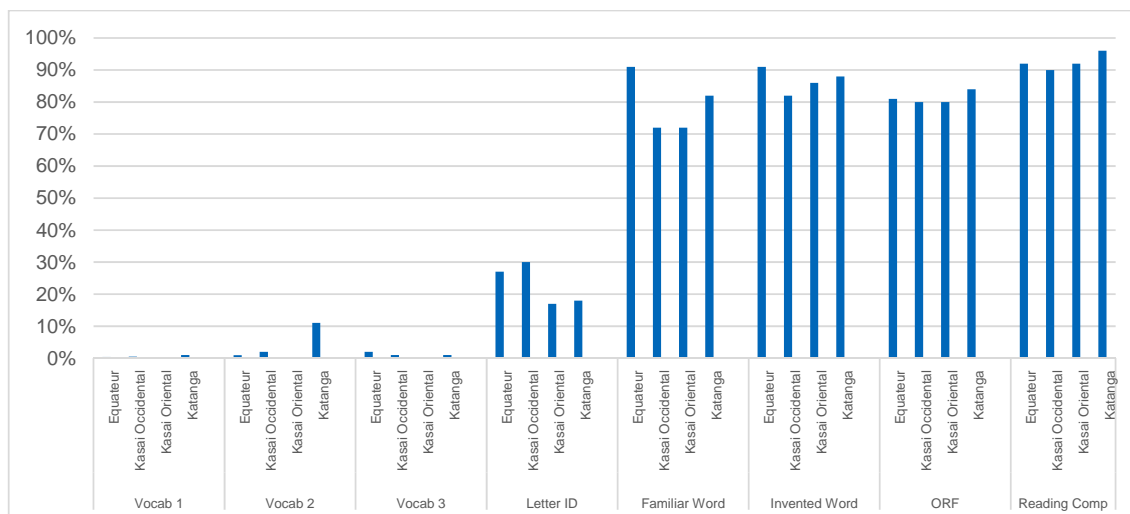
As seen in **Figure 10**, very few pupils scored zero on the mother tongue vocabulary subtasks, indicating that most pupils were fluent enough in speaking and understanding the mother tongue to correctly identify and produce simple vocabulary. Similarly, fewer than 30% of pupils across provinces scored zero on the Letter Sound Identification (Letter ID) subtask, with fewer than 20% pupils in Kasai Oriental and Katanga scoring zero. On reading tasks of Familiar Word Reading, Invented Word Reading, Oral Reading, and Reading Comprehension, however, pupil performance dropped, with more than 70% of pupils in all provinces scoring zero on these subtasks.

3.1.3 EGRA Results by Subtask

Vocabulary

Three vocabulary subtasks were used to measure oral abilities in the mother tongue. In the first, pupils were asked orally to point to various parts of their bodies, such as their mouth or their foot (Vocabulary 1). In the second, pupils were asked to place a pencil in various places relative to their bodies or other objects, such as behind the child, under a piece of paper (Vocabulary 2). In the third, expressive vocabulary task, pupils were shown pictures of common things in their environment, such as book and airplane, and asked to say the name of each (Vocabulary 3).

As seen in **Table 9**, although most pupils across provinces did not have zero scores, neither did most pupils excel at any of the subtasks. Even excluding those relatively few pupils with zero scores, on average pupils did not correctly respond to all vocabulary items. Pupil performance was the highest on the Vocabulary 1 subtask, and particularly so for pupils from Kasai Occidental and Kasai Oriental (7.3 and 7.8

items correct out of 8, respectively—zero scores excluded). Pupils in Katanga performed particularly poorly on the Vocabulary 2 and 3 subtasks, with mean scores (excluding zero scores) for Katanga pupils of 2.9 and 3.7 words correct, respectively.

Another way of interpreting pupil performance is to look at just those items that the pupil attempted, rather than all of the items in the subtask. While this is a more lenient approach—in that in real life pupils are expected to know all letters they encounter—taking this approach can offer a perspective into whether pupils' scores were perhaps low because they skipped many of the letters, or if they truly did not know even the letters that they tried to identify. Across all vocabulary subtasks, pupils were administered, and thus attempted, all items. Trends in the percent correct of attempted items for these subtasks, therefore, parallel trends in mean scores, with performance on attempted items also highest for the first and second vocabulary subtasks for the first three provinces and with pupils in Katanga struggling on the second and third vocabulary subtasks.

Table 9.   Grade 3 (mother tongue): Vocabulary

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Vocabulary 1 (8 items)						
Equateur	6.1	8	76.0	6.1	8	76.3
Kasai Occidental	7.2	8	90.2	7.3	8	90.7
Kasai Oriental	7.8	8	97.3	7.8	8	97.3
Katanga	5.9	8	74.0	6.0	8	74.8
Vocabulary 2 (6 items)						
Equateur	4.8	6	80.0	4.8	6	80.8
Kasai Occidental	4.5	6	75.0	4.6	6	76.6
Kasai Oriental	4.9	6	82.3	4.9	6	82.4
Katanga	2.6	6	43.6	2.9	6	49.1
Vocabulary 3 (8 items)						
Equateur	4.8	8	59.7	4.9	8	60.9
Kasai Occidental	6.7	8	84.0	6.8	8	84.8
Kasai Oriental	6.8	8	85.0	6.8	8	85.0
Katanga	3.7	8	46.1	3.7	8	46.7

Letter Sound Identification

Looking specifically at Letter Sound Identification (***Table 10***), although the majority of pupils did not score zero, on average pupil performance was relatively weak: out of 100 letters total, on average pupil mean scores range from 9 letters (Equateur) to 12.9 letters (Kasai Occidental). Pupils attempted to identify only between 23 letters (Equateur and Katanga) and 28 letters (Kasai Occidental), and out of those letters pupils attempted, pupils were only able to correctly identify approximately one-third, with zero scores included (percent correct of attempted ranging from 30.5% in Equateur to 37.1% in Kasai Oriental). Of course, when removing from the analysis pupils who scored zero on this subtask, mean scores improve slightly, to between 12.3 and 18.3 letters correctly identified in 60 seconds (Equateur and Kasai Occidental, respectively). This finding suggests that even in the mother tongue, pupils in Grade 3 have not yet achieved fluency with identifying the sounds of letters, despite the fact that this is a skill that pupils ideally should have mastered in Grade 1.

Table 10.   Grade 3 (mother tongue): Letter sound identification (100 items)

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Equateur	9.0	23.0	30.5	12.3	27.7	41.5
Kasai Occidental	12.9	27.8	34.3	18.3	35.2	48.7
Kasai Oriental	11.7	26.0	37.1	14.2	29.3	44.8
Katanga	10.0	22.8	36.0	12.3	25.6	44.0

Word Reading

As demonstrated by the greater prevalence of zero scores on the word reading subtasks (***Figure 10***), pupils overall struggled more when reading lists of words than they did when identifying letters, whether the words were familiar or invented. ***Table 11*** shows that, on average, pupils were able to correctly identify only between 1.1 (Equateur) and 3.9 (Kasai Occidental) familiar words in the 60 seconds, and between less than one (0.7, Equateur) and 2.2 (Kasai Occidental) invented words per minute. As expected, when removing the large number of pupils with zero scores from the analysis, performance overall increases, but still not to a level that would indicate fluency with word reading.

Table 11.   Grade 3 (mother tongue): Familiar and invented word reading

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Familiar Word Reading (50 items)						
Equateur	1.1	6.2	5.6	11.1	17.7	59.0
Kasai Occidental	3.9	9.7	15.8	14.1	22.1	56.9
Kasai Oriental	3.2	9.4	13.8	11.3	20.7	49.6
Katanga	2.1	7.1	12.2	11.9	16.6	67.6
Invented Word Reading (50 items)						
Equateur	0.7	6.1	3.7	7.1	16.5	40.5
Kasai Occidental	2.2	8.7	8.6	12.5	25.3	47.7
Kasai Oriental	1.7	7.9	6.8	11.7	25.0	47.1
Katanga	1.4	6.9	6.3	11.5	20.3	52.1

Oral Reading Fluency (ORF)

Reading connected text is typically easier than reading words in isolation because connected text provides cues that assist reading. Even so, scores on the ORF subtask were quite low across provinces. As presented in *Table 12*, overall, including the high number of pupils scoring zero, mean scores on ORF ranged from 1.3 cwpm (Katanga) to 2.6 cwpm (Kasai Occidental). On average, only approximately 10 words were attempted by pupils overall, and pupils were largely unable to correctly read the words that they did attempt, with percent corrrect of attempted items ranging from 8.7% (Katanga) to 12.7% (Kasai Occidental).

Removing zero scores improves overall means, as would be expected given the larger number of zero scores. However, even when zero scores are excluded, mean scores only range from 8.1 cwpm (Katanga) to 13.0 cwpm (Kasai Occidental). Considering only non-zero scores, pupils overall attempted only up to 18 words in the passage; however, even from this relatively small number of words attempted, pupils were only able to read up to 63.7% (Kasai Occidental) of those words correctly. Evidence suggests that pupils must be able to read at 45–60 words per minute in order to have the fluency and automaticity needed to comprehend what is read.[20] The fact that pupils in general were not able to read connected grade-level text more fluently than 13 words per minute suggests that they have not yet reached a level of fluency that would allow them to comprehend what they read.

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[20] Helen Abadzi has stated that for most alphabet-centric languages, a minimum ORF rate of at least 45 words per minute is necessary to understand a simple passage given the capacity of short-term memory (Abadzi, 2011).

Table 12.　Grade 3 (mother tongue): ORF

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Equateur	1.7	9.6	9.1	9.3	16.6	48.5
Kasai Occidental	2.6	10.0	12.7	13.0	17.9	63.7
Kasai Oriental	2.2	9.7	12.4	11.1	16.5	62.9
Katanga	1.3	8.7	8.7	8.1	13.1	55.5

Reading Comprehension (5 items)

The EGRA is administered such that a pupil is asked reading comprehension questions that relate to the text actually read by that pupil, and reading comprehension questions are developed to correspond with text at approximately every tenth word in the passage. Therefore, if a pupil reads approximately 10 words, that pupil should be given one reading comprehension question to answer.

Given that ORF scores that included zero scores were below three words per minute, it is to be expected that few pupils would have received even the first reading comprehension question. As a result, mean comprehension scores would be well below one question correct. This is the case, as shown in *Table 13*, with mean scores including zero scores ranging from 0.1 in three of the provinces to 0.2 (Kasai Occidental). Removing zero scores does raise overall means; however, even when zero scores were removed, pupils overall were able to answer two or fewer comprehension questions. This can be attributed in part to low ORF scores, which means that pupils on average, excluding zero scores, were given two to three questions to answer. However, even among questions administered, pupils were able to answer only up to 78.4% (Kasai Occidental) correctly, suggesting that pupils were not fully comprehending the text that they were able to read.

Table 13.　Grade 3 (mother tongue): Reading comprehension

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Equateur	0.1	0.4	6.1	1.5	2.1	72.6
Kasai Occidental	0.2	0.4	7.5	1.9	2.6	78.4
Kasai Oriental	0.1	0.4	5.8	1.7	2.4	76.0
Katanga	0.1	0.3	2.6	1.3	2.4	64.8

Grade 3 French Vocabulary

In addition to the mother tongue subtasks, pupils in Grade 3 were administered the three vocabulary subtasks in French. With the exception of pupils in Kasai Occidental on the Vocabulary 2 subtask—on which 50% of pupils scored zero—there were no more than 30% zero scores on any of the three French vocabulary subtasks (see *Figure 11*).

Figure 11.   Grade 3 (French): Percentages of pupils with zero scores, by province
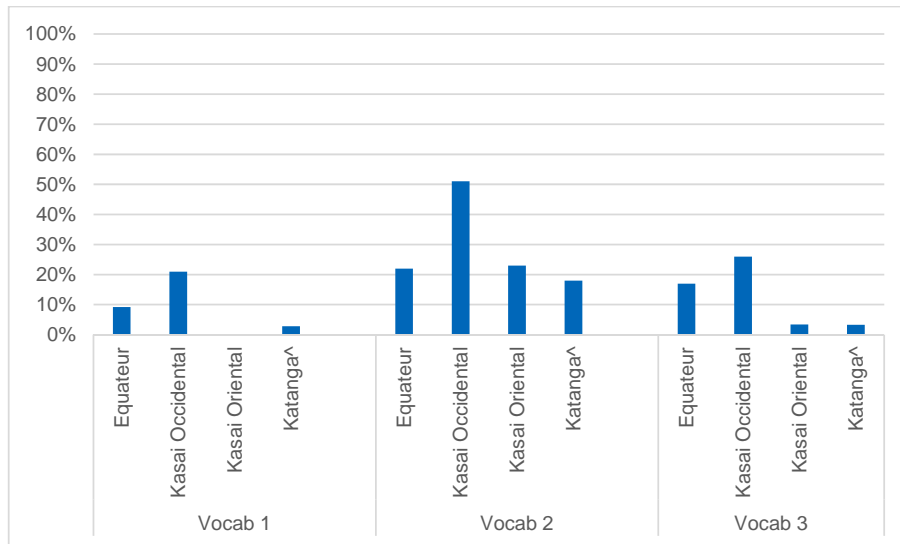
However, *Table 14* shows that vocabulary mean scores overall were lower in French than they were in the mother tongue. Including zero scores, across the three subtasks, pupils were able on average to respond correctly to no more than 5 vocabulary items. In particular, pupils scored lower on the second and third vocabulary subtasks, which were theoretically more difficult than the first one. Excluding zero scores does not substantially raise scores; with zero scores excluded, pupils averaged only 3.5 (Equateur) to 5.0 (Kasai Oriental) vocabulary items correct on the Vocabulary 1 subtask; 2.5 (Kasai Occidental) to 3.0 (Katanga) items correct on the Vocabulary 2 subtask; and 2.7 (Equateur) to 3.9 (Katanga) items correct on the Vocabulary 3 subtask.

Table 14.   Grade 3 (French): Vocabulary

Province	All Scores Included			Only Non-Zero Scores Included		
	Mean score	Mean number of items attempted	Percent correct of attempted items	Mean score	Mean number of items attempted	Percent correct of attempted items
Vocabulary 1 (8 items)						
Equateur	3.2	8	40.0	3.5	8	44.1
Kasai Occidental	3.1	8	38.8	3.9	8	49.0
Kasai Oriental	5.0	8	62.2	5.0	8	62.3
Katanga	4.0	8	50.0	4.1	8	51.4
Vocabulary 2 (6 items)						
Equateur	2.1	6	35.0	2.7	6	44.6
Kasai Occidental	1.2	6	20.1	2.5	6	40.8
Kasai Oriental	2.1	6	35.0	2.7	6	45.4
Katanga	2.5	6	40.9	3.0	6	49.7
Vocabulary 3 (8 items)						
Equateur	2.3	8	28.4	2.7	8	34.2
Kasai Occidental	2.4	8	29.5	3.2	8	39.9
Kasai Oriental	3.2	8	40.2	3.3	8	41.6
Katanga	3.8	8	47.6	3.9	8	49.2

3.1.4 Gender Differences

Only one differences between the performance of girls and that of boys emerged. On the mother tongue Vocabulary 3 subtask, boys significantly outperformed girls ($p < 0.01$): girls = 3.4 items correct; boys = 3.9 items correct.

3.1.5 Summary and Conclusion for EGRA Findings

Overall, pupil performance across the four provinces was low on all subtasks. On the vocabulary subtasks (mother tongue and French) and letter sound identification, the majority of pupils were able to correctly respond to at least one item. However, even though percentages of zero scores on these subtasks were low, so was actual performance. Regarding the mother tongue vocabulary items, on which subtasks the children should have been able to respond correctly to all items, only in Kasai Occidental and Kasai Oriental were pupils able to respond correctly to more than 90% of items attempted. On the Letter Sound Identification subtask, the highest mean score for letters correctly identified in the mother tongue, even after removing

zero scores, was 18 letters in one minute. Performance on isolated word reading was even lower. The highest mean score for words read correctly, including zero scores, was 4 words in one minute. When excluding the large number of pupils with zero scores from the analysis, this average number increased to 14 words per minute. This finding suggests that pupils have not yet reached a level of fluency in word reading and word decoding that is needed to be able to read for meaning, a conclusion supported by the low proficiency demonstrated on the Oral Reading Fluency and Reading Comprehension subtasks.

As depicted in *Figure 12*, these results indicate that the majority of pupils in all provinces were non-readers. Between 12% and 15% performed at the word production level. Fewer than 5% of pupils across the provinces demonstrated an ability to read with some level of comprehension.

Figure 12.   EGRA Grade 3: Percentages of pupils in reading categories
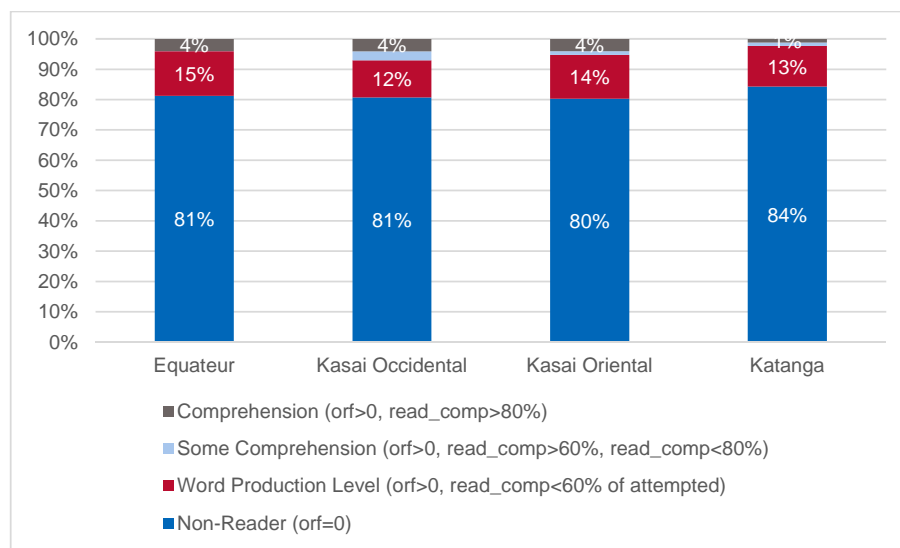
Regarding gender, girls and boys performed comparably across the subtasks, with one exception: on the mother tongue Vocabulary 3 subtask, boys significantly outperformed girls.

The demographic questions asked of pupils can help to explain these findings. Overall, pupils reported not having support at home to read or to do homework, most pupils reported not having attended kindergarten, and many pupils reported classroom strategies that were punitive rather than supportive of learning. Even more critically, for most if not all pupils in three of the provinces (Kasai Occidental, Kasai Oriental, Katanga), the home language of the pupils was not the language of assessment. It is likely that this language gap is a partial cause of low pupil scores on the word and passage-reading subtasks. While learning opportunities in prior grades were not explored in this EGRA administration, home support for learning and positive, constructive teacher feedback to pupils during the learning process have both been associated with improved pupil learning performance. It is possible that the lack of support at home and in the classroom may have contributed to a lack of learning over time.

3.2 EGMA Results – Grade 3, Katanga

3.2.1 EGMA Design

EGMA was designed to provide information about the fundamental competencies of mathematics, which should generally be mastered in the early primary grade years. Subtasks selected for EGMA were based on extensive research on early mathematics learning and assessment and were constructed by a panel of experts on mathematics education and cognition. The conceptual framework for mathematical development is grounded in extensive research that has been conducted over the past 60 years (e.g., Baroody, Lai, and Mix, 2006; Chard et al., 2005; Clements and Samara, 2007). To develop the EGMA protocol, developers systematically sampled early numeracy skills, particularly those underlying number sense. These abilities and skills are key in the progression toward the ability to solve more advanced problems and the acquisition of more advanced mathematics skills (Baroody et al., 2006; Clements and Samara, 2007; Foegen, Jiban, and Deno, 2007).

3.2.2 Overview of EGMA Trends

The EGMA portion of the pupil assessment was administered in Kiswahili or French, or a combination of the two. Correct answers were accepted no matter the language the child used to respond. The EGMA instrument used in Katanga consisted of five subtasks. The overall results are summarized in *Table 15* and *Figure 13*.

Table 15. Overall performance on EGMA, by subtask

Subtask	Number correct per minute	Percent correct of items attempted	Percent correct	Percent of zero scores
Number Identification*	16.35	71.70%	-	0.8%
Addition*	6.20	68.20%	-	8.8%
Subtraction*	2.86	37.60%	-	46.9%
Quantity Discrimination	-	-	58.64%	2.6%
Missing Number	-	-	26.57%	8.8%
Word Problems	-	-	48.94%	21.8%

* Subtasks noted with an asterisk were timed, and the means reported for these subtasks are the mean number of correct responses in terms of the number of items attempted. For all other subtasks, the means reported represent the number of correct responses in relation to the number of items.

Figure 13.   Overall performance on EGMA, by subtask
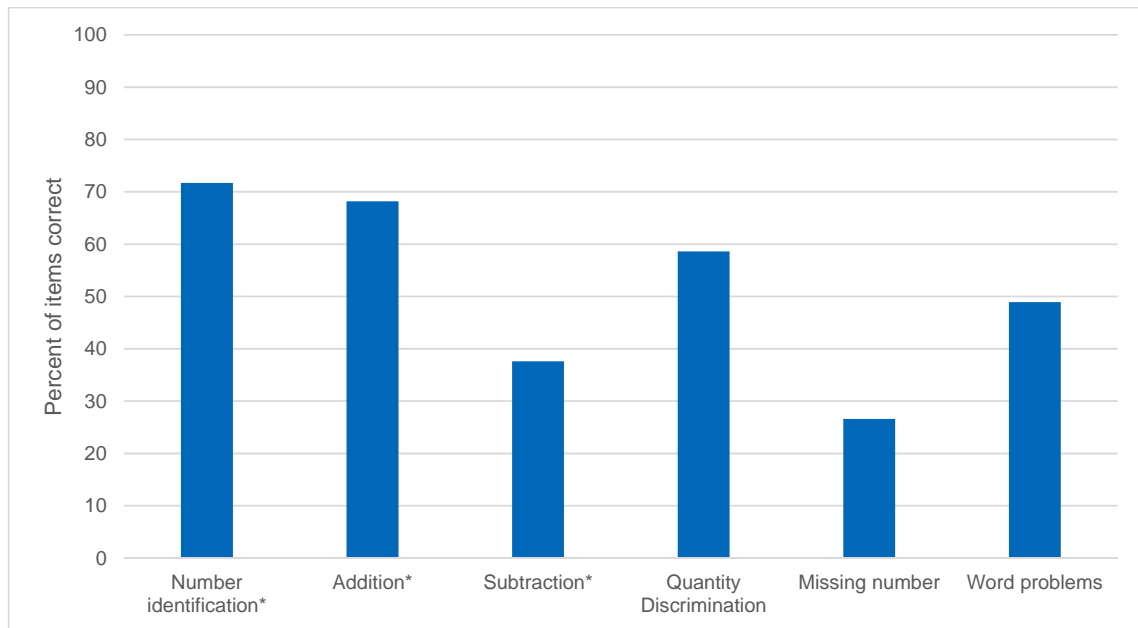
* Subtasks noted with an asterisk were timed, and the means reported for these subtasks are the mean number of correct responses in terms of the number of items attempted. For all other subtasks, the means reported represent the number of correct responses in relation to the number of items.

Overall, pupils performed reasonably well on the more procedural subtasks of Number Identification and Addition, but struggled with the Subtraction subtask, with nearly 50% unable to answer a single subtraction problem correctly. For the more conceptual subtasks, pupils performed reasonably well on Quantity Discrimination and Word Problems, but there was a sharp drop in performance for the Missing Number subtask. Performance on the procedural subtasks was more successful, suggesting that pupils view mathematics as the memorization of facts and procedures and not necessarily the application of a strategy to solve a problem. Procedural concepts are often able to be answered based on memorization and recall, whereas conceptual concepts require the application of a strategy to solve the problem. While it may appear pupils are successfully learning math based on number identification and simple addition problems, the need to apply strategies for solving higher level mathematical concepts means that pupils who lack conceptual skills will have limited success when attempting more complex mathematical problems.

3.2.3 Zero Scores

Zero scores provide information on the percentage of pupils who were unable to answer a single item correctly in the respective subtasks. Zero score trends matched the overall results of the subtasks, with a higher percentage of zero scores in the conceptual subtasks and Subtraction, and a lower percentage of zero scores in the procedural subtasks, as seen in *Figure 14*. Pupils had the most difficulty providing a single correct answer in the Subtraction subtask.

Figure 14.   EGMA: Zero scores, by subtask
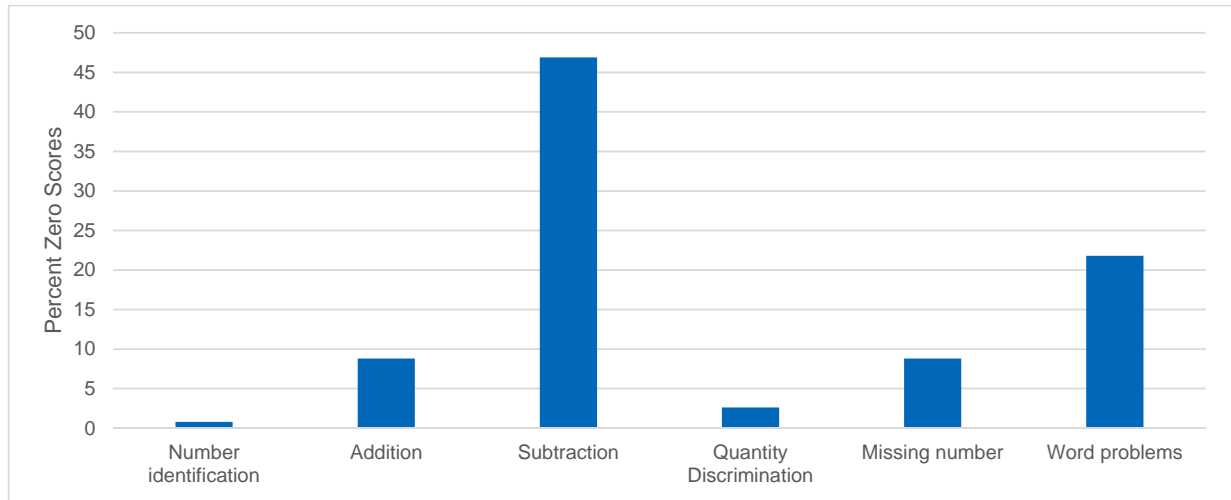
3.2.4 Language of Response

During the EGMA portion of the pupil assessment, pupils were allowed to respond in the language they felt most comfortable using, and a correct response in any language was accepted by the assessors. Assessors were trained to administer EGMA in either Kiswahili or French in order to ensure that the EGMA portion of the assessment was testing the mathematical capabilities of the pupil, without language of administration acting as a barrier to an accurate representation of the pupil's skills. The pupils' language of response was recorded for each subtask. Because pupils could switch languages throughout their response, assessors could select more than one language. Even though Addition and Subtraction are separate subtasks, a single language of response question applied to both subtasks. *Table 16* shows the percentage of pupils who responded in each language, by subtask.

Table 16.   EGMA: Language of response, by subtask

Subtask	% French	% Kiswahili	% Lingala	% Other
Number Identification	99.87	2.58	0.00	0.01
Quantity discrimination	96.16	11.11	0.07	0.03
Missing number	99.18	5.75	0.00	0.39
Addition/subtraction	98.27	7.76	0.00	0.37
Word problems	86.31	34.33	0.07	0.41

Pupils almost always used French to respond to the EGMA subtasks. Interestingly, the lowest percentage of pupils responding in French occured in the Word Problem subtask, during which only 86% of pupils responded in French. However, 34% of pupils used at least some Kiswahili when responding to the word problems, more than twice the percentage of those who responded using Kiswahili in any other subtask. French appears to be the default language when solving math problems, although the increase in Kiswahili responses to the word problems may signify that Kiswahili is the language pupils use when going through daily life activities and when using math in more informal settings.

3.2.5 EGMA Results by Subtask

Number Identification

Number identification is the basic building block of mathematics. If a pupil is unable to identify numbers, they cannot progress in other aspects of mathematics. The pupil was asked to correctly identify the names of 20 numbers in this timed subtask. (*Figure 15* presents an example of the types of items used in this subtask.)

Figure 16 illustrates the item-level performance on the Number

Figure 15. Example of Number Identification items

4	6	0	12	19
25	28	30	44	57
63	71	85	96	99
108	268	342	510	1 000

Identification subtask. Overall results showed pupils performing well on this subtask. When analyzing the individual items, pupils performed very well on numbers less than 30, but as the numbers increased (higher on the number scale), fewer pupils were able to correctly identify the numbers, with less than 50% of pupils who attempted the numbers 268 and 342 being able to correctly identify those two numbers.

The challenges in identifying numbers is likely due to the curricular expectations for number knowledge. Drawing from the Grade 2 curriculum, pupils should be familiar with at least numbers 0 to 100.[21] The objectives of the Grade 2 curriculum were used to draw benchmarks because these pupils were assessed at the beginning of their Grade 3 school year and thus would not have achieved the Grade 3 curriculum objectives at this point in their school year.

Figure 16. Item-level performance on the Number Identification subtask

Number identification item	4	6	0	12	19	25	28	30	44	57	63	71	85	96	99	108	268	342	510	1000
% Correct if attempted	96.6	95.8	96.6	87	71.4	80.1	80	82.8	65.3	67.4	66	60.8	63.5	65.5	66.2	62	42.9	48.5	58.9	68.8

Y-axis: Percent of students responding correctly (Attempted)

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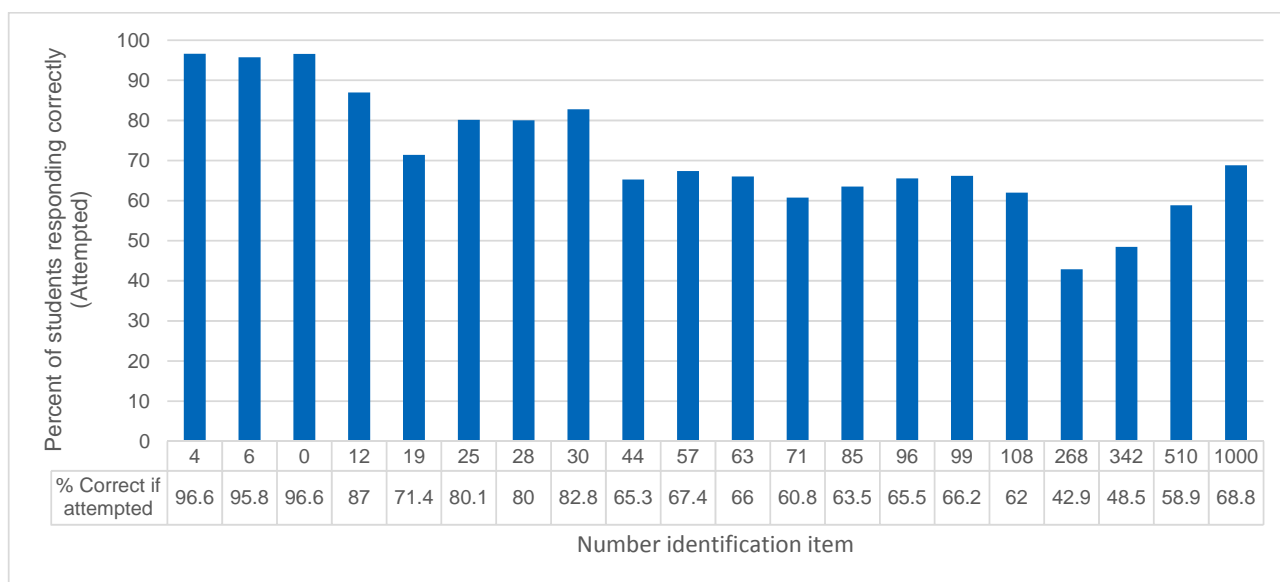
[21] *Programme National de l'Enseignement Primaire*. (2009). Retrieved from http://www.eduquepsp.cd/programmes_scolaire/2_enseignement_primaire/ENSEIGNEMENT_PRIMAIRE_DEGRE_ELEMENTAIRE.pdf.

Addition and Subtraction

Addition and subtraction are the fundamentals of math and provide a basis for higher level mathematical concepts such as multiplication, division, algebra, geometry, and statistics. Daily life involves addition and subtraction as one purchases goods or trades with neighbors, or reasons out other problems.

For these subtasks, pupils had 60 seconds to attempt as many of the 20 addition problems as they could, and then an additional 60 seconds to complete as many of the 20 subtraction problems as they could. They were provided a pencil and paper as well as counters to assist their calculations. They did not have to use these methods, but the option was available for them if they chose. If they did not know an answer, the assessor would mark the problem as incorrect, and the pupil would proceed to the next problem.

The Addition subtask tested pupils' ability to solve simple addition problems that did not involve carrying the tens digit. This set of addition problems represented the foundational skills that help when adding larger numbers.

On average, pupils attempted 8.4 addition problems within the 60 seconds. The mean percent score of only the items a pupil attempted was 68.3%. The median percent score of only the items a pupil attempted was 83.3%, meaning that pupils who can add are reasonably accurate with their addition.

Figure 17 illustrates the item-level performance on the Addition subtask. The following trends are evident:

- Pupils performed best (between 64% and 85% of pupils responded correctly) on items involving addition of a single-digit number to a single-digit number.

- 86% of pupils responded correctly to the one item that involved adding two single-digit numbers to equal 10, i.e., "completing the 10."

- 79% of pupils responded correctly to items involving adding a single-digit number to 10, i.e., "adding to 10."

- Pupils performed least well (between 26% and 79% of pupils responded correctly) to items that involved adding a single-digit number to a two-digit number, with a sum less than 20. Less than 1% of pupils even attempted the two final items in the Addition subtask (13 + 5 = _____ and 15 + 4 = _____), suggesting fluency in solving addition problems is a challenge.

- Between 59% and 80% of pupils responded correctly to items involving the addition of two single-digit numbers with a sum greater than 10.

Figure 17. Item-level performance on the Addition subtask

% correct if attempted	2 + 2	1 + 3	4 + 1	2 + 7	4 + 5	2 + 4	5 + 3	3 + 4	9 + 1	10 + 5	3 + 10	12 + 5	3 + 11	8 + 11	13 + 5	15 + 4	3 + 9	9 + 6	7 + 4	6 + 7
	84.54	74.9	74.05	73.09	69.89	69.82	65.34	64.51	86.24	79.35	78.52	79.32	75.45	72.03	37.17	26.76	79.61	76.91	64.96	59.09
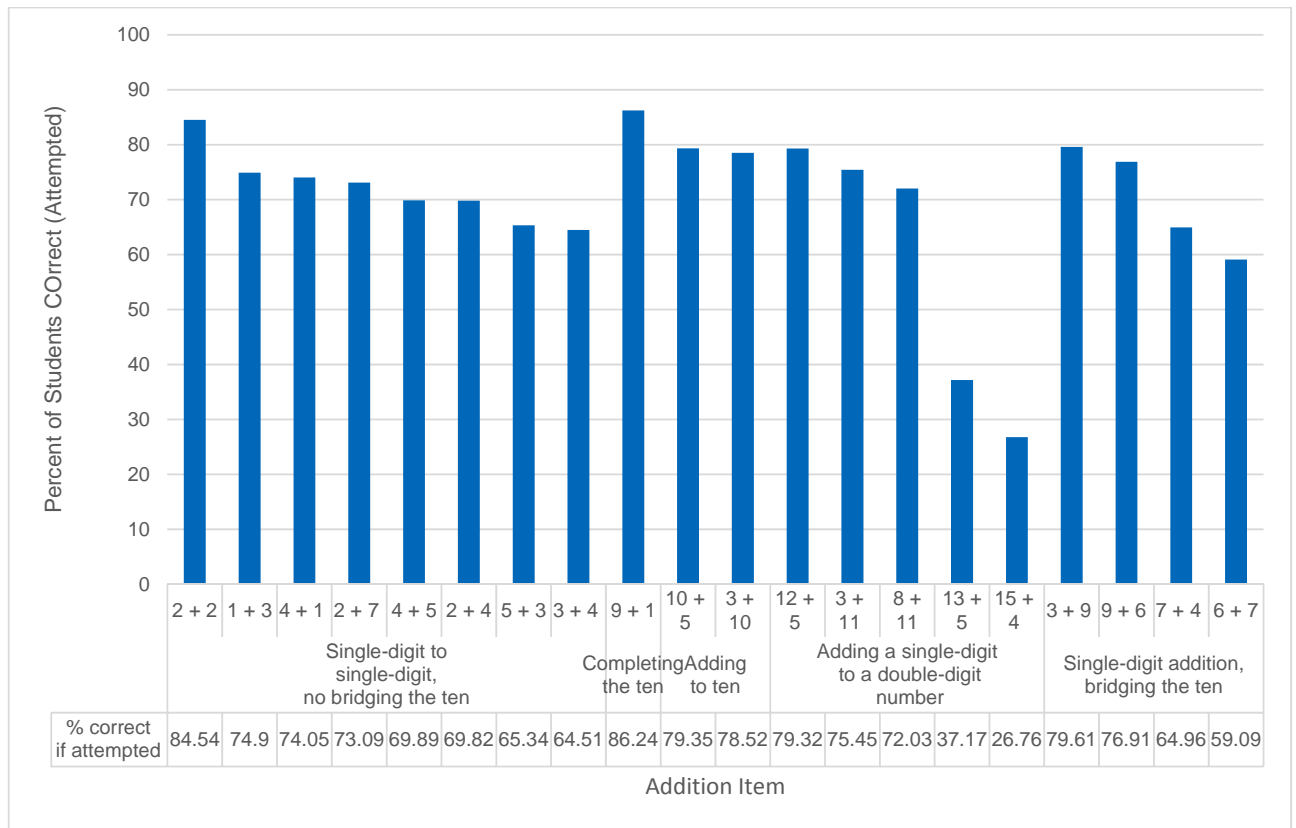
Addition Item

Overall, subtraction provided much more of a challenge for pupils than addition, with 46.8% zero scores and an average of just 5.9 problems attempted. The mean percent score of only the items a pupil attempted was 37.6%. The median percent score of only the items a pupil attempted was 20%, indicating that pupils struggled with accuracy in subtraction.

Figure 18 illustrates the item-level performance of questions attempted on the Subtraction subtask. The following trends are evident:

- Between 36% and 64% of pupils responded correctly to items involving subtracting a single-digit number from a single-digit number.

- 86% of pupils responded correctly to the one item that involved subtracting a single-digit from 10.

- Between 0% and 58% of pupils responded correctly to items involving subtracting a single-digit number from a two-digit number less than 20, without bridging the ten. No pupils responded correctly to the item 19 - 15 = __, and only 0.2% of pupils attempted this item.

- Between 38% and 43% of pupils responded correctly to items involving subtracting a single-digit number from a two-digit number less than 20 involving bridging the ten.

- 80% of pupils responded correctly to the one item requiring subtracting to the answer of 10, i.e., 13 - 3 = ___.

Figure 18.   Item-level performance on the Subtraction subtask

	7 - 4	9 - 7	9 - 4	8 - 3	4 - 2	4 - 3	5 – 1	6 - 4	10 - 9	14 - 11	15 - 10	19 - 11	17 - 12	18 - 13	19 - 15	11 - 7	13 – 6	12 - 9	15 - 9	13 - 3
% correct if attempted	63.87	60.72	60.68	55.38	45.48	43.52	42.15	35.81	86.23	57.84	38.98	31.59	7.74	7.74	0	43.29	40.03	38.86	37.91	80.62
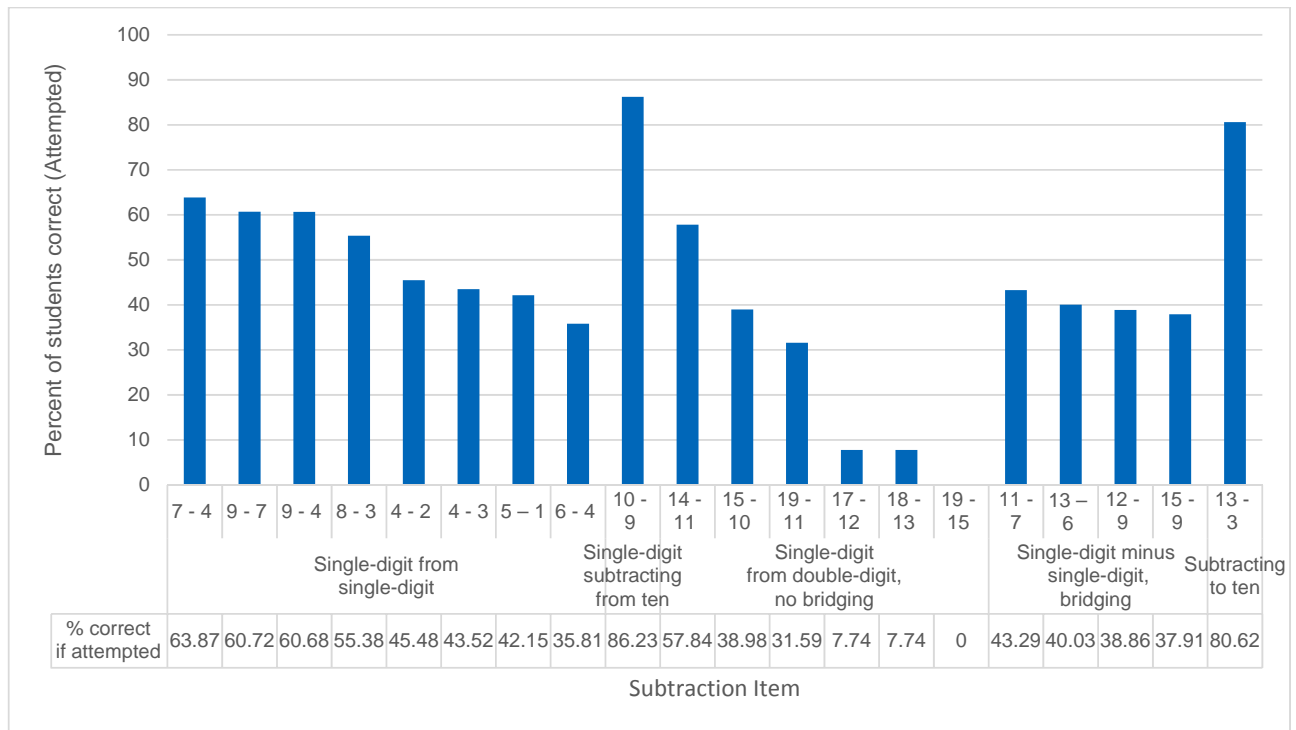
It is generally expected, and is part of the DRC Grade 2 curriculum, that pupils should have an understanding of addition and subtraction and be able to quickly and accurately respond to the items in the Addition and Subtraction subtasks. Pupils responded to the Addition subtask at a correct item-per-minute rate of 6.20, and responded to the Subtraction subtask at a correct item-per-minute rate of 2.86.

Although the accuracy for attempted items was fairly positive, particularly for addition, the fluency efforts were less than satisfactory. The substantial difference between addition and subtraction accuracy and fluency scores suggest that more time and effort is being spent on addition than on subtraction in classes. Additionally, it suggests that little time is being spent on number relationships and exploring the interrelatedness of addition and subtraction. While at this level of addition and subtraction, it is possible to memorize answers, in order to succeed at more complicated concepts, it is necessary for pupils to build the knowledge of how these operations work.

Quantity Discrimination

Quantity discrimination proposes a pair of numbers, and the pupil must identify which of the pair is larger. Pupils completed two practice items before beginning this subtask to ensure they understood the assessor's instructions. This subtask was untimed, and there were 10 items for the pupils to respond to.

Quantity discrimination is meant to measure pupils' abilities to compare quantities and to determine if they have a sense of the magnitude of various numbers. In early grades, this concept of magnitude and estimation serves to provide a test of reasonableness when answering problems. For example, the knowledge that addition results in a larger number and subtraction in a number smaller than at least one of the original numbers can be a helpful skill when progressing to math problems

with larger and larger numbers and more complex operations, such as multiplication and division.

Figure 19 illustrates the performance on the Quantity Discrimination items. About 90% of pupils correctly identified the larger number when both numbers were under 10. Between 45% and 59% of pupils could correctly determine the larger number when both numbers were under 100. Discriminating between three-digit numbers was more of a challenge for pupils, with between 33% and 45% of pupils correctly identifying the larger number. This variation is likely because of a lower familiarity and less class time spent on larger number ranges.

Figure 19.   Item-level performance on the Quantity Discrimination subtask

	(5 3)	(7 8)	(14 17)	(69 49)	(73 75)	(83 76)	(98 89)	(146 153)	(250 150)	(304 340)
% correct	94.98	89.86	67.23	58.97	60.6	57.4	44.88	32.5	45.21	35.41

Quantity Discrimination Item
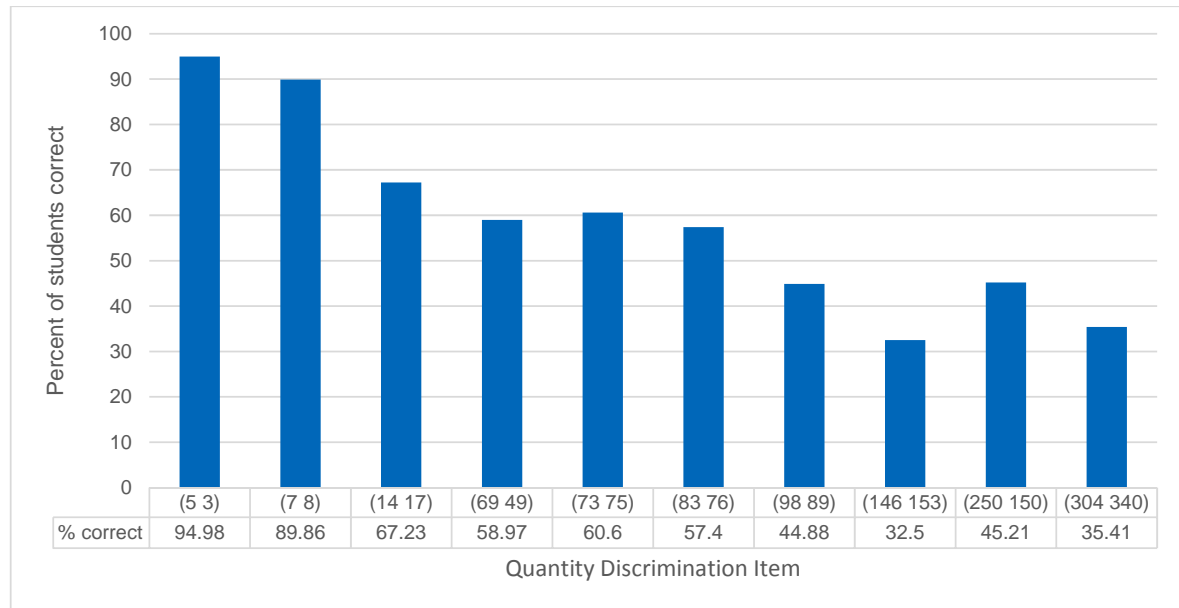
Missing Number

Figure 20.   Example of Missing Number items
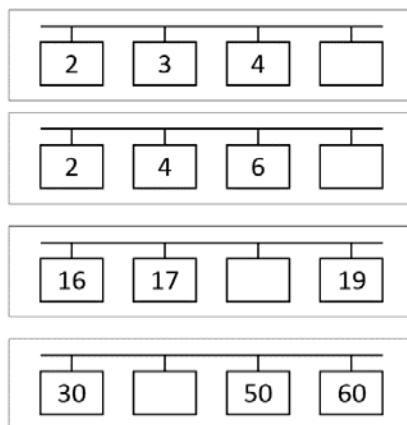
The Missing Number subtask asks pupils to complete a number pattern, and items range from simple patterns, such as increasing by one, to more challenging patterns, such as counting by fives. Being able to recognize patterns in counting by ones, tens, hundreds, or fives and twos lays the foundation for more complicated mathematical concepts such as multiplication and division.

For this subtask, 8.75% of pupils scored a zero. More than 50% of pupils were correctly able to identify patterns that increased by one for numbers under 20 (as seen in 2 3 4 ____ and 16 17 __ 19, illustrated in *Figure 20*). Around 36% of pupils were able to identify patterns that involved counting by tens or hundreds, recognizing the pattern of 3 4 5 ____ is similar to

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30 __ 50 60. However, only 14% of pupils recognized a similar pattern of counting by ten when the numbers started with 340 350 360 __.

Pupils found this subtask especially challenging—even when looking at the scores of only those items attempted, pupils scored on average 31.6% correct. Pupils performed well on most procedural items that could be memorized but struggled with more conceptual items that required a deeper understanding and application of mathematical skills (*Figure 21*).

Figure 21.   Item-level performance on Missing Number subtask

Missing Number Item	2 3 4 _	16 17 _ 19	_ 300 400 500	30 _ 50 60	2 4 6 _	340 350 360 _	30 35 _ 45	_ 70 71 72	36 _ 32 30	2 7 _ 17
	85.15	55.05	36.23	35.35	16.84	14.35	12.26	8.17	2.07	0.64

Percent of students correct (y-axis, 0–100)
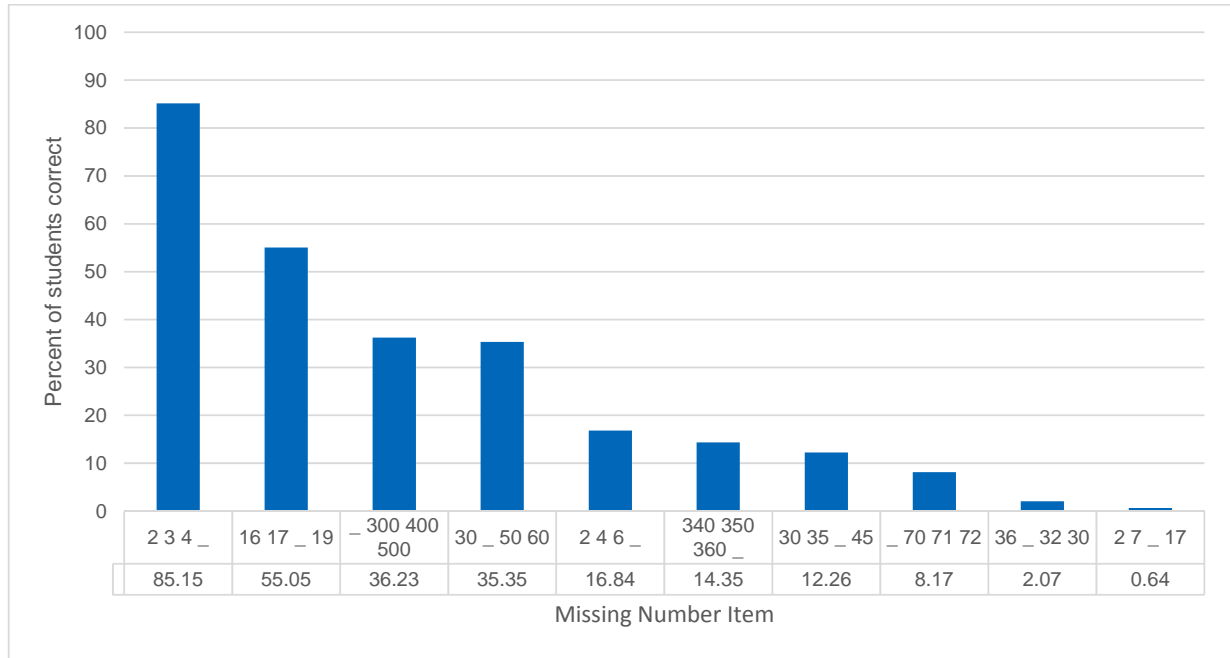
Word Problems

Three word problems were asked to the pupil, each with a different underlying mathematical concept. Comprehension of word problems allows pupils to take a real-life situation and apply mathematical concepts to figure out the relationship between elements. Additionally, word problems demonstrate how math can be found outside of the classroom and allows pupils to practice using math wherever they are. The addition word problem was easiest for the pupils, with 65% of pupils providing the correct answer, similar to the successful responses seen in the Addition subtask. The other two word problems involved subtraction and division, and were more challenging for pupils, with only 42% (subtraction) and 39% (division) correctly answering (see *Figure 22*). Pupils likely were more successful on the subtraction word problem because they could visualize something within their daily life and have likely used that skill, even if they were unaware that it was subtraction.

Figure 22.   Item-level performance on Word Problems subtask

Percent of students correct

Kalombo has 4 mangos.
His father gives him 5 more.
How many mangos does he have now?

Kasongo has 8 mangos. 3 of them are ripe.
The others are not ripe.
How many of his mangos are not ripe?

Safi has 6 mangos.
He must share them equally between his 3 friends.
How many mangos will each child have?
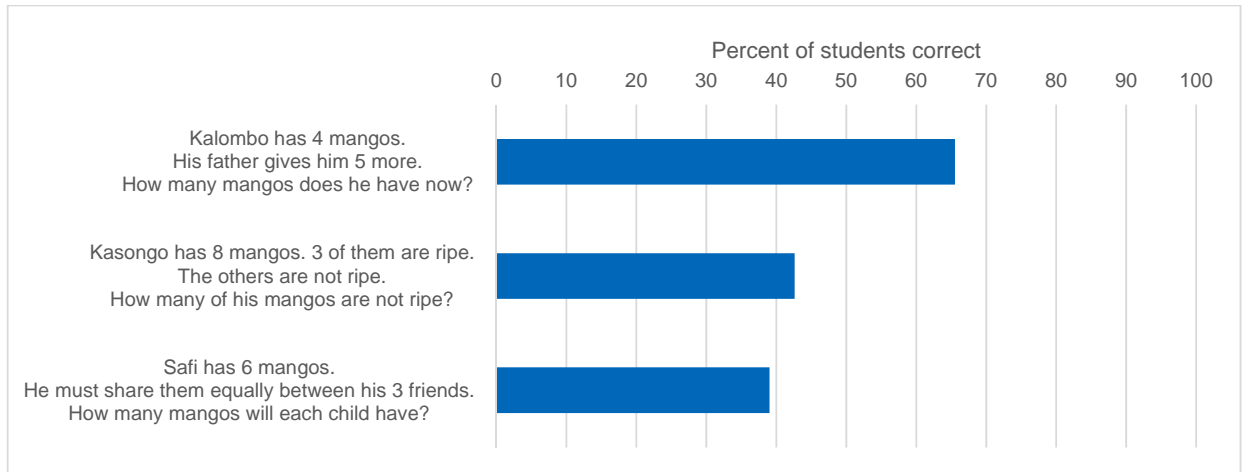
3.2.6 EGMA Results by Gender

Even though it appears that boys performed slightly better than girls across the subtasks (see *Figure 23*), the differences are not statistically significant.

Figure 23   Performance on EGMA subtasks, by gender
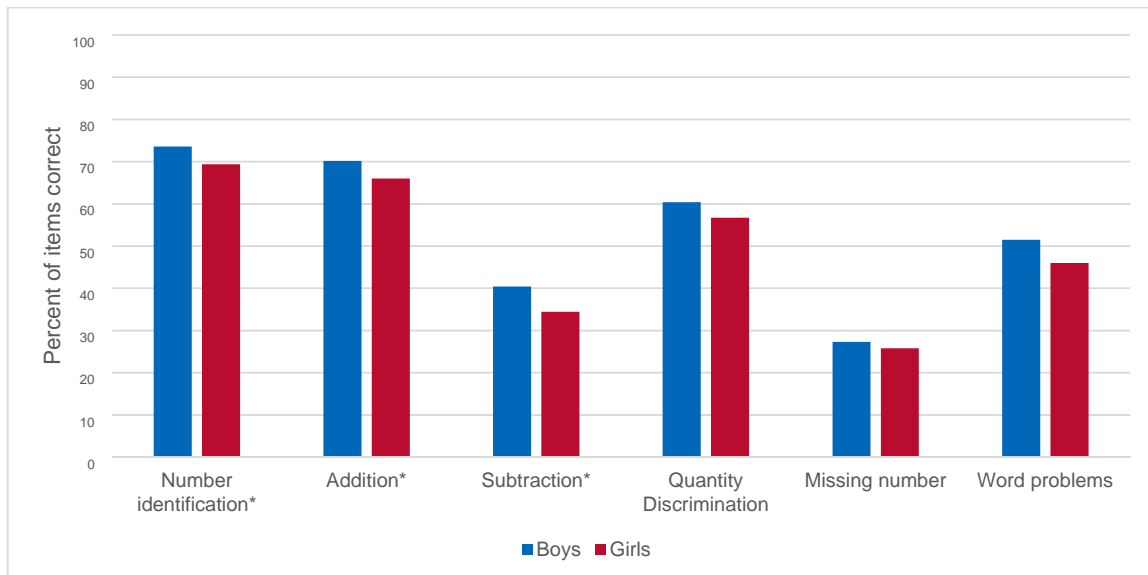
Percent of items correct

Number identification*   Addition*   Subtraction*   Quantity Discrimination   Missing number   Word problems

■ Boys ■ Girls

* Subtasks noted with an asterisk were timed, and the means reported for these subtasks are the mean number of correct responses in terms of the number of items attempted. For all other subtasks, the means reported represent the number of correct responses in relation to the number of items.

3.2.7 Mathematics Student Questionnaire

A short mathematics questionnaire was administered at the end of the EGMA portion of the pupil assessment to provide some context about the pupils' experiences with math. Of the pupils questioned, 61.4% reported they had math class every day of the week, but only 20.6% of pupils reported having a math textbook for their use. While it appears that math is indeed a focus during the daily school curriculum, the lack of

appropriate materials makes the situation more challenging for both pupils and teachers. Teachers have an additional burden in providing adequate mathematics lessons without appropriate tools for their pupils. A large majority (73.3%) of pupils reported that their teachers assigned them homework, but only 39.8% of pupils reported that someone at home helped them with their homework from time to time. On a positive note to encourage further strengthening of the math curriculum and tools, 88.8% of pupils responded that they do indeed like mathematics, perhaps indicating an interest in continuing to develop their math skills. Strengthening support for teachers in their mathematics planning and providing sufficient and adequate materials could improve pupils' mathematics performance.

3.2.8 Conclusion for EGMA Findings

In summary, pupils in Katanga performed reasonably well on problems that involved numbers under 20, with strengths in number identification, addition, and quantity comparison. The more conceptual Missing Numbers subtask provided a challenge, and suggests that pupils may be relying on memorization of numbers instead of learning concepts and number relationships. These results suggest that pupils are learning basic numbers and procedural tasks but are not exploring the relationships between mathematical operations and number properties.

Despite subtraction being a clear part of the Grade 2 objectives and curriculum, pupils' performance in the Subtraction subtask suggest it may not be a focus in Grade 2 classrooms. Pupils are able to identify the larger number as seen in the Quantity Discrimination subtask. Contrasting their more successful performance on this subtask versus the Subtraction subtask, the results suggest the basis of the pupils' challenges may be related to an unfamiliarity with what the operation sign of subtraction actually signifies. Pupils' demonstrated knowledge of the operation of addition, and of the idea of quantity comparison, leads one to think they should also be able to perform subtraction.

Pupils demonstrated an interest in learning mathematics as well as an understanding of the most basic mathematical concepts. Strengthening the pedagogical support for teachers to develop and utilize more effective teaching methods could strengthen the math skills of Grade 3 pupils, and benefit the pupils as they progress in their studies.

3.3 Grade 3 SSME Findings

As described previously, school-, classroom-, and pupil-level instruments were employed on the days of the EGRA and EGMA assessments in order to more fully understand the context in which Grade 3 pupils are learning, as well as to identify priority areas for school and ministry leaders to focus on. This section presents and discusses these findings. The section is organized not by individual instruments, but by the following thematic areas that have been shown elsewhere to impact upon pupils' opportunities to learn: basic school inputs, pedagogical oversight and management, teaching and learning processes, time on task, and school safety.

3.3.1 Basic School Inputs

Basic school inputs are those things—people, resources, and infrastructure—that are necessary for the proper functioning of school systems. These can be categorized in terms of inputs at the pupil level, the classroom level, and at the school level.

Pupil-level inputs

Pupil-level inputs include the pupils themselves from the schools that were studied for this report, as well as their home environments and behaviors outside of the classroom.

In terms of pupils' home environments, living in a household where pupils can access books other than school textbooks and where others, particularly parents, can and do read regularly, is formative in developing an early familiarity and understanding of reading. Developing readers need opportunities to practice reading, and they need literate individuals to practice with. In this regard, most pupils reported that parental literacy is common: on average, 80% of mothers and 91% of fathers were literate. Parental literacy rates were decidedly higher in Katanga (89% for mothers and 96% for fathers) and lowest in Kasai Occidental (77% for mothers and 90% for fathers). Thus, most pupils theoretically have at least one person in the home with whom they could practice reading. However, most pupils did not report having any books at home (81%, 79%, 69%, and 84% in Equateur, Kasai Occidental, Kasai Oriental, and Katanga, respectively, did not have books). Unsurprisingly, then, most Grade 3 pupils did not report reading or being read to frequently at home. As shown in *Figure 24*, approximately two-thirds of Grade 3 pupils reported never reading aloud at home, and the same proportion reported never being read to at home. These findings did not differ markedly by province; across all provinces, a significant proportion of pupils appear to interact with literature very infrequently outside of school. This is problematic in that time spent reading outside of school is a strong predictor of reading success in school. Advocating for greater access to books and time spent reading at home with a literate family member would therefore go some way in helping pupils develop reading skills.

Figure 24.   Pupil reading at home
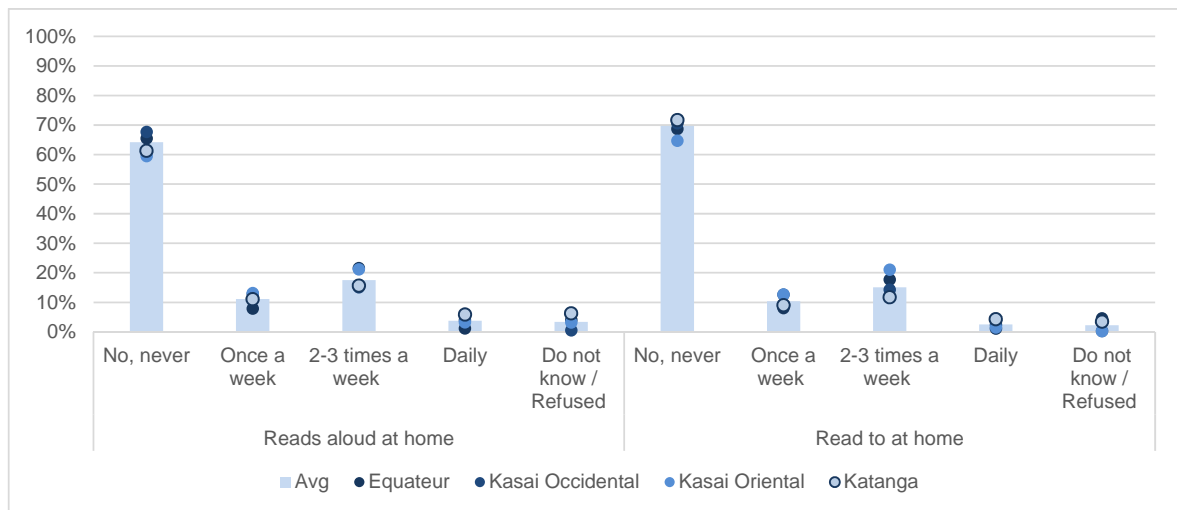
Grade 3 pupils were also asked if they had attended preschool, another significant predictor of early learning outcomes. As *Figure 25* illustrates, very few Grade 3 pupils attended preschool. Perhaps expectedly, preschool attendance was more common among pupils in Katanga and Equateur as compared with the other provinces. Nonetheless, there is certainly room, at least in terms of pupil population, for the expansion of preschool provision, and with many studies linking attendance at a high-quality preschool with early learning outcomes, there is also sufficient evidence to warrant such action.

Figure 25.   Preschool attendance
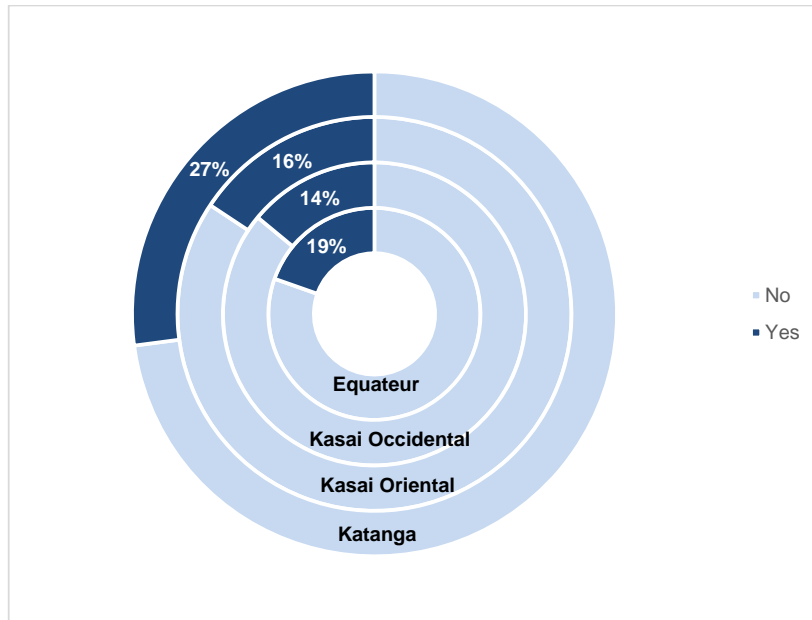
Classroom- and school-level inputs

Classroom- and school-level inputs include teachers (teacher numbers and teacher characteristics), teaching and learning materials, and school infrastructure. The supply of teachers in each school visited for this report varied widely, from 3 to 34. However, the raw number of teachers employed at a given school matters less than the ratio of pupils to teachers. While these ratios differ between and within countries, a ratio of 40 pupils per teacher is often used a reference point for countries seeking a reasonable development target that ensures classes do not become overcrowded and that pupils be afforded some individual interaction and instructional time with teachers.[22] Using numbers of pupils and numbers of teachers in schools, we calculated pupil-teacher ratios; these are presented in *Figure 26* for each province.

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[22] United Nations Educational, Scientific and Cultural Organisation (UNESCO). (2014). *Teaching and learning: Achieving quality for all. EFA Global Monitoring Report 2013/14*. Paris: UNESCO.

Figure 26.   Pupil-teacher ratios
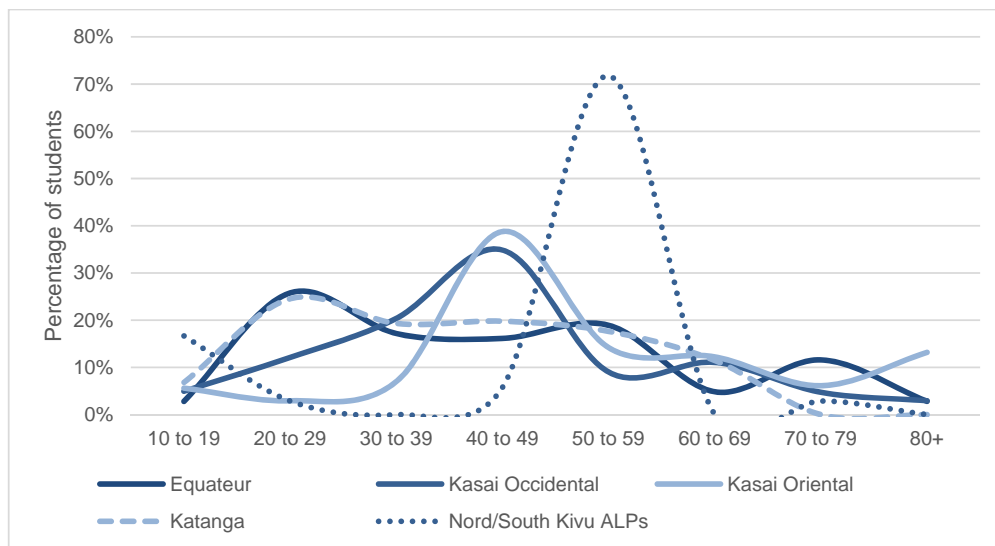
Although the overall average is not shown in the figure, approximately 59% of pupils were attending schools with pupil-teacher ratios higher than 40:1, and one in every three pupils attended a school where the ratio was higher than 50:1. High pupil-teacher ratios appeared to be the norm in the Kivus ALP schools (75% of pupils attended schools with ratios higher than 50:1) and Kasai Oriental (45% attended schools with ratios higher than 50:1).

While having sufficient numbers of teachers in schools to instruct pupils is surely and self-evidently important, teachers' academic backgrounds and skills are also significant. Prior schooling and training is often thought to be associated with teacher quality, and therefore most nations, including the DRC, set regulations that govern teachers' academic backgrounds as well as their pre- and in-service training. Through interviews with teachers, it was found that most pupils' teachers (85% on average) are holders of a Diploma of Secondary Education; higher degrees were found to be relatively uncommon.

Teachers were also asked about instructional training they had undertaken prior to and during their appointments as teachers. Specifically, they were asked whether they had taken content-based instructional training in reading or math before or during their teaching careers, and whether they had a practical classroom experience during training. These experiences were asked about because they presumably enhance teachers' abilities to teach specific content areas (i.e., early grade reading and math) by providing content-based instructional strategies. Results are displayed in *Figure 27*.

Figure 27.   Teacher training
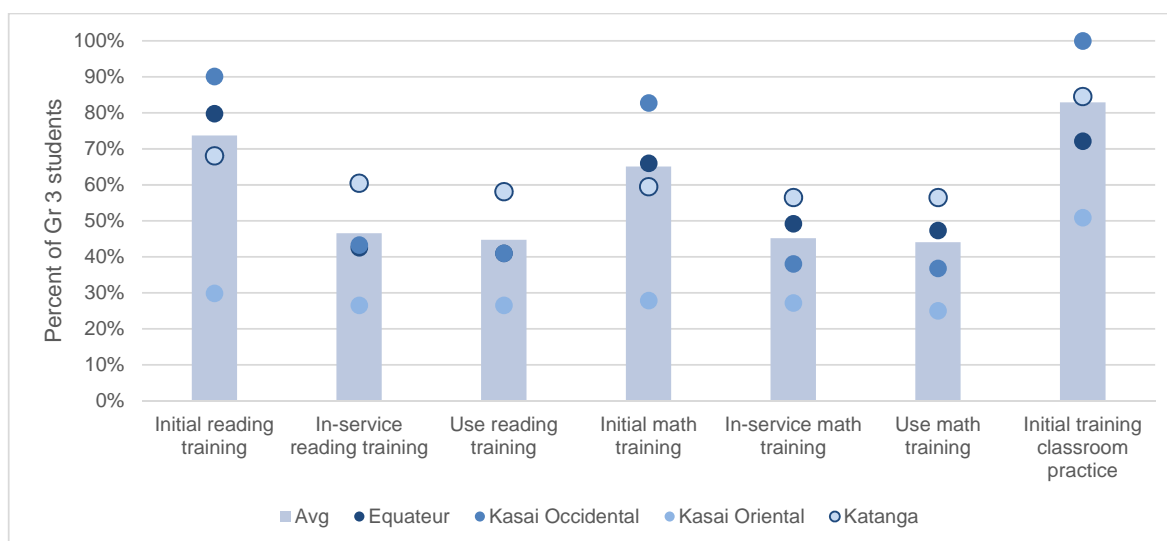
As the figure clearly shows, the most common pre-service training teachers reported having was practical classroom experience: 83% of Grade 3 pupils, on average, had teachers who had undergone practical training in a classroom prior to their teaching career, although this was decidedly less common in Kasai Oriental (51%) and Equateur (72%). Initial training in specific content areas was also relatively common: on average, 74% and 65% of pupils were taught by teachers who had undergone at least a modicum of pre-service training in reading and math, respectively. Training in math-specific pedagogy, however, was decidedly less common among pupils in Kasai Oriental (only 28% were taught by teachers with such training). In addition, continuous professional development tailored to specific content areas was less common: 47% and 45% of pupils were taught by teachers who have undertaken some amount of reading and math professional development, respectively. Again, in-service training was even less common in Kasai Oriental, where only 27% of Grade 3 pupils were taught by a teacher with reading- and math-specific continuing professional training. It is evident that levels of training in Kasai Oriental were quite low: less than one in three pupils was taught by a teacher who has been trained in content-specific pedagogy. Considering that pre-service training does not greatly influence teachers' approaches to classroom instruction and that effective teaching requires that teachers must constantly learn and practice more effective techniques in the classroom, the level of content-specific in-service training is worrying. Katanga has been more successful, relatively speaking, in providing continuing professional training for teachers and could serve as a model for other provinces.

Both school- and classroom-level instruments were used to ascertain the availability of specific teaching and learning materials and school infrastructure that are considered to be basic provisions. Some of these classroom- and school-level inputs are highlighted in *Figure 28*. In terms of classroom inputs, teachers were asked whether their classroom was sufficiently sheltered such that they could teach during inclement weather. At the time of this study, the majority of pupils (73%) were taught in classrooms that were not functional in poor weather; pupils in Katanga schools, however, enjoyed slightly better classroom infrastructure (45% could continue their classes in poor weather). Although sufficient light was not found to be problematic, most pupils (73% on average) were placed in classrooms with an inadequate supply of seats for the number of pupils. Classroom inventories revealed that most pupils' teachers had access to reading and mathematics reference manuals (73% and 64%,

respectively), but that teacher's guides for these subjects were less common (only 53% and 48% of Grade 3 pupils were taught by teachers with reading and math guides). There was significant inter-province variation in this regard: teachers in Katanga were much more likely to have access to the relevant teacher's guide than their counterparts in other provinces.

Figure 28.   School and classroom infrastructure and resources
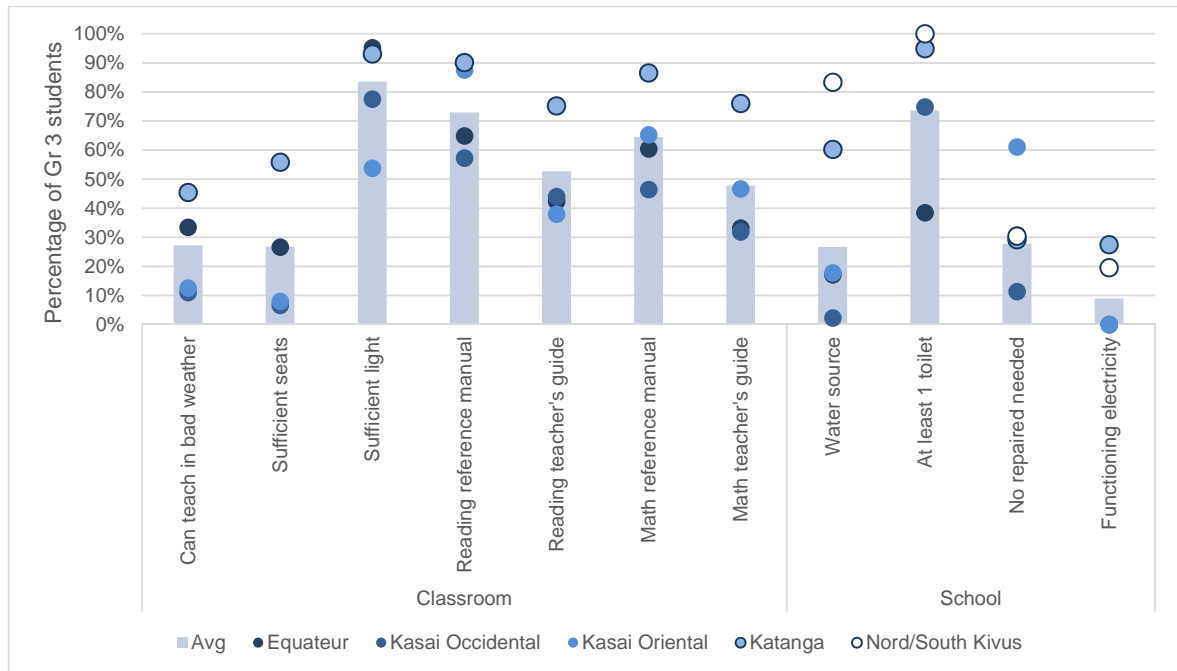
At the school level, most pupils in the Kasais and Equateur attended schools without functional access to water or electricity, and more than 60% of pupils in Equateur attended schools without any toilets. In addition, most children attended schools in which major repairs were needed. From the school inventory instrument, it was reported that 67% of children attended schools with inadequate furniture, 61% attended schools in need of ceiling repairs, 60% attended schools with broken classroom walls, 51% attended schools with broken windows, and 46% of children attended schools with crumbling exterior walls. The median school needed three distinct types of repairs, and nearly one in every three schools required more than five different types of infrastructural improvements. Very few pupils attended schools with functional libraries (8% on average). The highest proportion of pupils with access to a functional library was in Equateur (17%).

While many of the above-mentioned resources and infrastructure are important aspects of a functional school and classroom, access to appropriately leveled literature and reading materials is arguably indispensable for developing pupils' reading skills. With this in mind, several instruments obtained data on the availability of school textbooks and non-textbook reading materials in classrooms. To this end, head teachers were asked whether their school had the appropriate number of textbooks at the beginning of the school year and, if not, how long they had to wait before receiving them. As shown in *Table 17*, most schools were in fact in possession of the appropriate number of reading and mathematics textbooks at the beginning of the year (71% of pupils attended schools in this category), and this finding did not vary substantially by province. However, the minority of schools that

did not have adequate supplies of books typically had to wait a long time before receiving them, if they did at all. On average, 42% of Grade 5 pupils who did not have adequate book numbers at the start of the academic year never received them. Overall, **Table 17** suggests inefficiencies in materials distribution in most provinces that need to be addressed if all pupils are to have access to teaching and learning materials and, thereby, the curriculum.

Table 17. Books available in school (% of pupils)

	Equateur	Kasai Occidental	Kasai Oriental	Katanga	North/South Kivus	Average
Institution had appropriate number of books at beginning of year						
No	23	27	28	31	25	27
Yes	71	73	72	69	75	71
Do not know	6	0	0	0	0	1
If not, how long did they have to wait?						
Never received them	52	54	12	36	34	42
1 year	23	0	0	3	66	7
10–11 months	14	8	0	7	0	8
8–9 months	4	0	10	2	0	3
6–7 months	0	0	7	1	0	1
4–5 months	7	0	0	0	0	1
2–3 months	0	35	20	21	0	21
1 month	0	3	51	29	0	17

The classroom inventory similarly determined the amount of non-textbooks available in classes for pupils to read. Approximately three in four Grade 3 pupils in Katanga, one in two pupils in Kasai Oriental, and nine in ten pupils in Kasai Occidental were in classrooms that did not have *any* non-textbook reading material (see **Figure 29**). Many more Grade 3 pupils were taught in classrooms with only a handful of other reading materials. Given average pupil-teacher ratios mentioned previously (i.e., the large numbers of pupils in a single classroom), it is a reasonable conclusion that most pupils do not have access to sufficient reading materials other than textbooks.

Figure 29. Books available in class
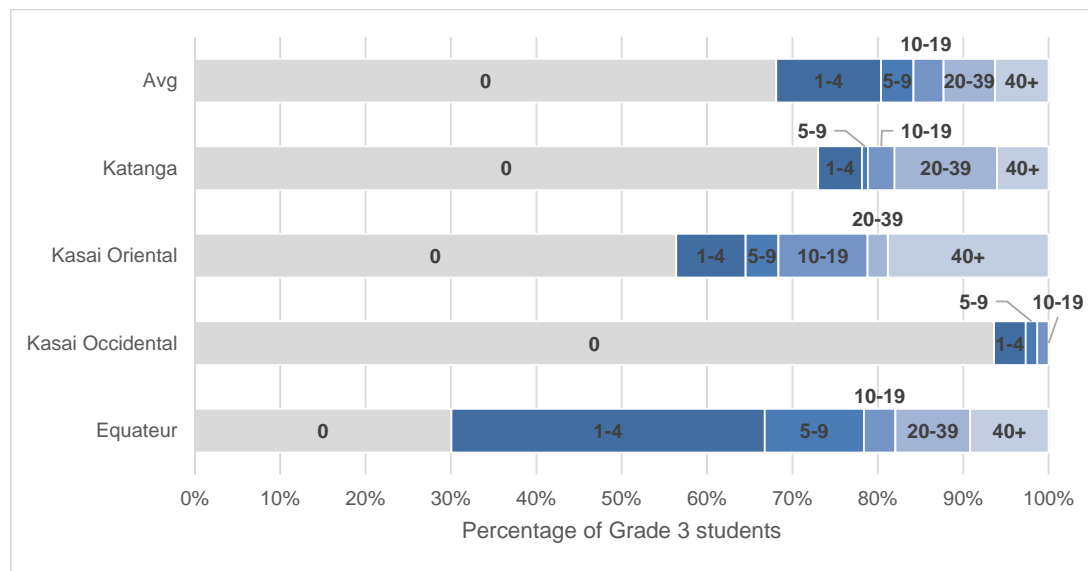
3.3.2 Pedagogical Oversight and Management

This section refers to how the school is managed and instructional leadership is shown by the head teacher, as well as the characteristics of school leaders such as years of experience and academic background. Part of the head teacher's role in the school is to create a safe teaching and learning environment conducive to pupil and professional growth and to help teachers develop enhanced pedagogical techniques.

With regard to characteristics of school management, head teachers were asked about their prior education, years of experience, and training. It was found that three in four pupils attended schools where head teachers hold either a certificate (15%) or a diploma (61%) of secondary education. Higher degrees were less common. In other words, head teachers tended not to have significantly higher levels of education than teachers in their charge. *Figure 30* displays the years of experience that head teachers had in four of the five studied provinces. The lines show the distribution of head teacher experience, and circles embedded within the lines indicate average years of experience for each province. As seen in the figure, head teacher experience was not extensive: more than half of pupils had head teachers with five years or less of experience in Kasai Oriental, six years or less in Kasai Occidental and Equateur, and eight years or less experience in Katanga. On the other end of the spectrum, nearly one in four Grade 5 pupils had head teachers with more than 20 years of experience in Equateur, Kasai Oriental, and Katanga. (Note that the figure below is not disaggregated by grade.)

Figure 30.   Head teacher years of experience
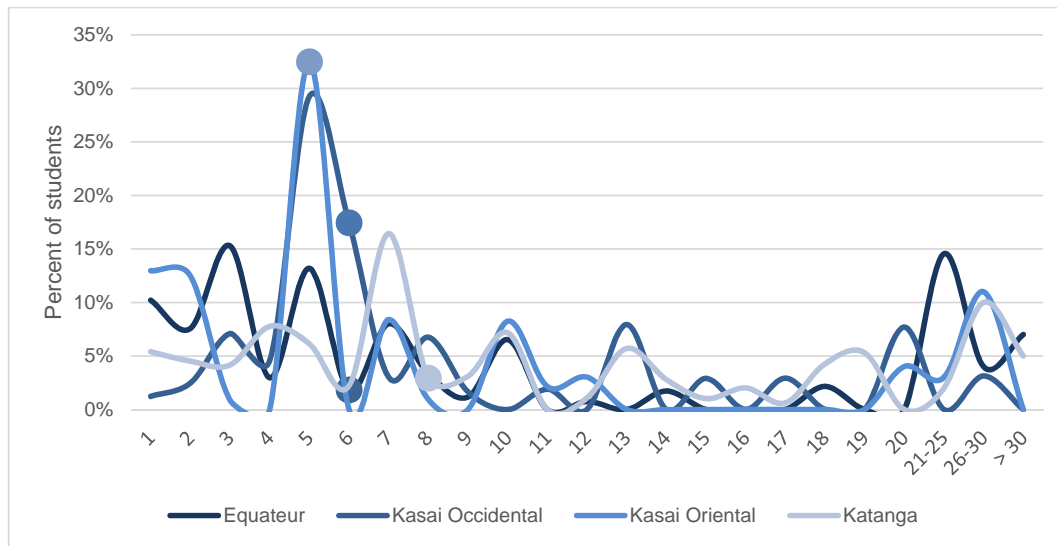
Head teachers were also asked whether they had undergone training specific to school-based management. Roughly equivalent proportions of Grade 5 children, on average, attended schools where head teachers had not undergone specific training related to school management (48%) as attended schools with head teachers who had received such training (52%). However, not all head teachers reported using what they had learned to aid them in managing their school: 10% admitted this during interviews. School management training appears to share an association with pupil reading achievement (to be discussed below), as measured by EGRA oral reading fluency scores, but only when head teachers use what they have learned. As such, the school management training appears to be instrumental, but only if head teachers actively employ it to more effectively manage their schools.

As instructional leaders, head teachers are also responsible for helping teachers enhance their classroom pedagogical practices. At a concrete level, this often involves checking teachers' lesson plans, observing classroom teaching, and providing feedback to teachers on the pedagogical moves teachers exhibit in classrooms. Teachers were asked about the frequency with which head teachers engaged in these types of instructional leadership behaviors, and results are tabulated in *Table 18*.

Table 18.   Pedagogical oversight at school

	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average
How often does the head teacher check lesson plans?					
Does not check	3%	1%	1%	2%	2%
Yearly	0%	0%	0%	0%	0%
Every 2–3 months	7%	1%	0%	5%	4%
Monthly	0%	1%	0%	0%	0%
Every 2 weeks	4%	4%	0%	2%	3%
Weekly	6%	11%	16%	13%	11%
Every day	78%	82%	81%	78%	80%
How often does the head teacher observe you teach?					
Never	7%	2%	0%	14%	7%
Yearly	0%	0%	0%	0%	0%
Every 6 months	1%	0%	9%	3%	2%
Every 2–3 months	21%	4%	50%	23%	19%
Monthly	13%	9%	7%	21%	14%
Every 2 weeks	10%	5%	0%	3%	5%
Weekly	35%	59%	3%	24%	36%
Every day	12%	21%	32%	10%	17%
How often does a departmental inspector visit your classroom?					
Never	22%	24%	52%	13%	23%
Yearly	31%	37%	21%	47%	37%
Every 6 months	17%	24%	22%	23%	22%
Every 2–3 months	21%	11%	4%	9%	12%
Monthly	4%	1%	1%	3%	2%
Every 2 weeks	0%	1%	0%	0%	0%
Weekly	2%	0%	0%	1%	1%

As shown in *Table 18*, most pupils had head teachers who frequently engaged in behaviors associated with pedagogical leadership: nearly all teachers' lessons were checked by the head teacher on a daily or weekly basis, and more than half of pupils were taught by teachers who were observed at least every two weeks. Particularly in

Kasai Oriental and Katanga, a significant proportion of pupils were taught by teachers who were observed less frequently (i.e., every one to three months). The frequency with which many teachers were observed is encouraging, but only if this observation is used as an opportunity for professional learning and if the head teacher helps teachers understand how they can improve as teachers. In this regard, most pupils (95%) had teachers who received instructional guidance from head teachers after classroom observations, and the majority of these teachers (92%) reported this guidance to be "very helpful." At least in terms of teachers' perceptions, head teachers appeared to be providing some level of instructional guidance.

As instructional leaders, head teachers are also responsible for ensuring that pupils in their charge are achieving appropriate learning metrics and benchmarks. As shown in *Figure 31*, head teachers claimed to employ a variety of methods to keep track of pupil academic progress, and the use of methods varied across provinces. Observation and oral assessments were more common among schools in Kasai Occidental, while head teachers in Equateur relied, in part, on end-of-term exams and teacher reports more so than their counterparts in other provinces. In some provinces studied for this report, more than half of pupils attended schools in which head teachers used more than one method for keeping track of pupil progress (70% of pupils in Equateur, 76% in Kasai Occidental). This is a positive finding: pupil learning is best captured through multiple measures as opposed to relying on a single metric. In other provinces, however, such as Kasai Oriental and Katanga and in the Kivus' ALP schools, head teachers of most pupils employed only one method for monitoring pupil performance (namely, some type of achievement test).

Figure 31.   How head teacher follows pupil progress
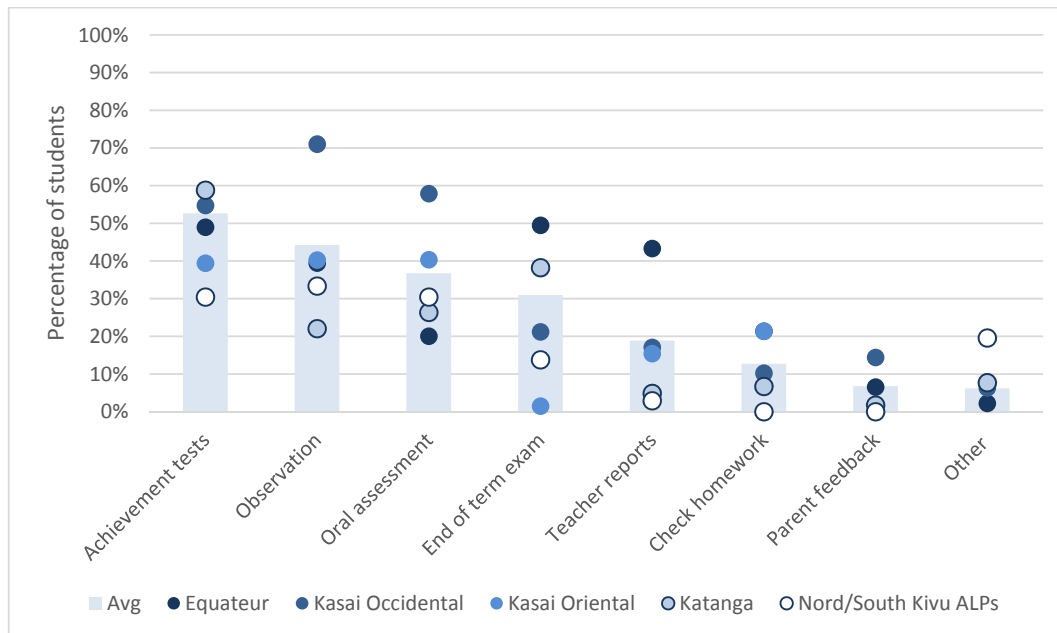
Another theme over which head teachers might have little direct control, but which is nonetheless important for the functioning of the school, is the financing of teacher salaries and school fees. Nonpayment of teacher salaries (because teachers are not recognized by the government or because of lack of funds) and institutionalized school fees are problems that have characterized many schools in the DRC. Because the government, until very recently, had allocated little of the governmental budget to education, schools often found themselves with insufficient funds to operate and, in some cases, pay their teachers. Governmental spending on

education has increased dramatically in the past few years, from 6.5% to 13.8%, but as much as three-quarters of education spending still comes from individual households.[23] Formal fees (which often include hidden costs for uniforms and other education services) can average more than $40 per child per year, which is a substantial amount considering the average national income is less than $400 annually. The GDRC, in its IEP 2012–2014, recently committed to incrementally rolling back school fees and had planned to provide fee-free schooling for Grades 1-3 starting in 2010–2011 and in Grade 4 in 2011–2012. Against this background, the Head Teacher Questionnaire inquired about school fee practices in schools. Teachers were also asked about the timeliness of salary payments and their status as employees.

In terms of teachers' pay status, teachers reported whether they were mechanized (formally recognized by the government as part of the teaching corps) but not paid, mechanized and paid, or not mechanized and not paid (see *Figure 32*). Overall, most teachers were both mechanized and paid across all provinces, but there remained substantial numbers of teachers who were either unpaid or not mechanized (or both). Indeed, 41% of pupils in Equateur were taught by teachers who were either not mechanized or not paid. Although these phenomena were less common in other provinces studied for this report, between one in four and one in three pupils were taught by such teachers. Non-payment of teachers was a significant problem, and informal conversations with teachers revealed extensive and long-standing non-payment of salaries in some locations. When asked, head teachers of most pupils' schools (55%) asserted that the mechanization of teachers (where teachers were indeed mechanized) has had a positive impact on teacher morale, particularly in Katanga (77%). However, head teachers of schools in Kasai Occidental and in the Kivus' ALP schools expressed less optimism about the mechanization of teachers and tended to report more negative impressions (45% and 14% in Kasai Occidental and in the Kivus' ALPs, respectively) and neutral impressions (23% and 28% in Kasai Occidental and in the Kivus' ALPs, respectively).

Figure 32.   Teacher pay status
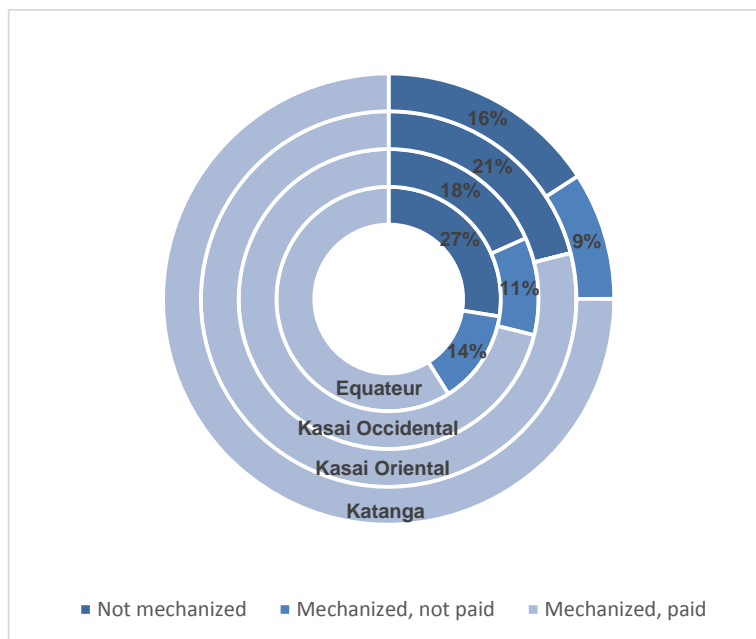
Even when teachers were both mechanized and paid, salary payments were often late (see ***Figure 33***). Less than 40% of teachers reported receiving their pay on time on a regular basis, and nearly 25% reported that their salary was "almost never" or "never" on time. The remainder of mechanized, paid teachers reported variable and unpredictable salary payment. In sum, many schools clearly did not have the capacity to pay teachers, and many pupils were taught by non-recognized or unpaid staff. Such economic shortfalls and inefficiencies often lead to reliance on local financing mechanisms (i.e., school fees and teacher encouragement payments).

Figure 33.   Timeliness of teacher pay
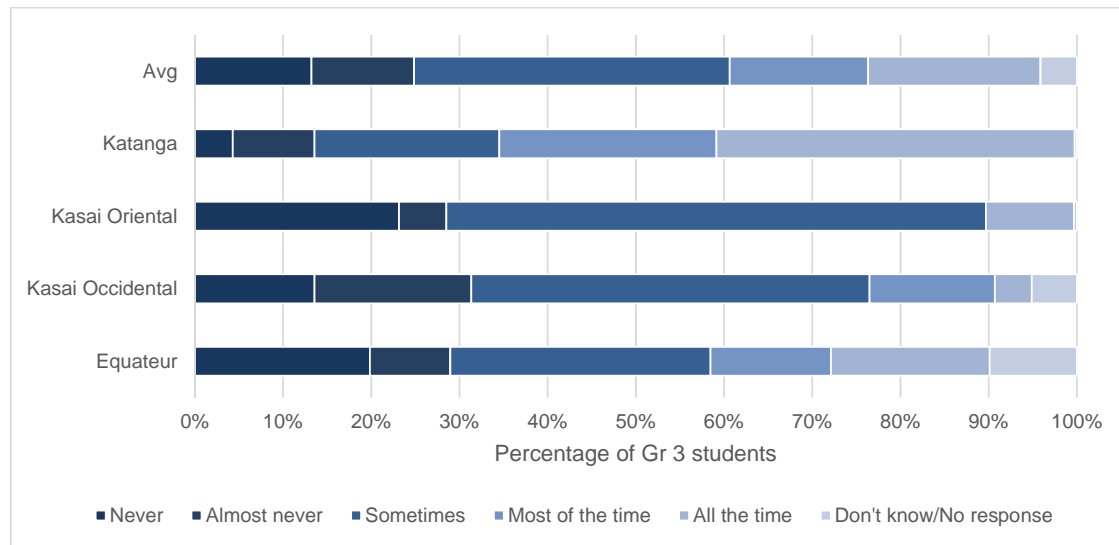
Head teachers were asked if pupils at their schools paid fees and, in the case of non-payment, what actions head teachers took to enforce compliance. Results are shown in ***Figure 34***. Clearly, and despite the government's commitment to providing fee-free schooling for at least Grades 1–4, the vast majority of pupils (80%) were attending schools that still charged fees. Fees appeared to be less common in the Kivus' ALP schools; nevertheless, more than half of pupils in these schools attended fee-paying schools (56%). Head teachers were still likely to enforce fee payment and tended to use two strategies when doing so: contacting parents or sending children home. Other punitive actions (e.g., withholding grades, scolding children) were uncommon.

Figure 34.   School fees (and enforcement strategies)
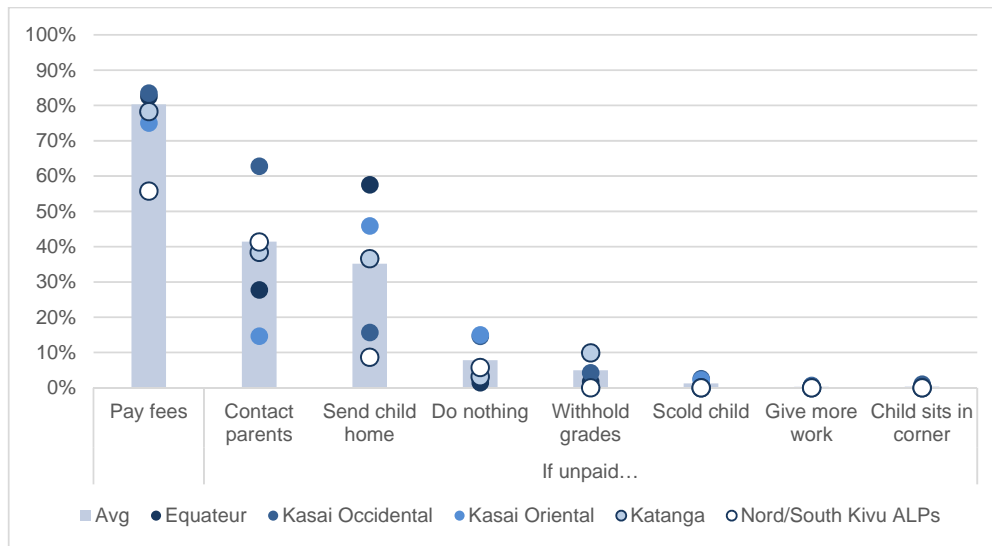
Viewed together, these findings on school finance reveal that many head teachers continued to struggle to obtain necessary funding to run the school and pay staff. This, unsurprisingly, leads to continued reliance on school fees, despite the fact that government has made fee-free provision of education a top development priority. Evidence presented here suggests precisely the opposite: actions taken thus far have not made much of an impact on the imposition and collection of regressive school financing.

3.3.3 Teaching and Learning Process

This section describes the teaching and learning processes that take the basic school inputs discussed above and translate them into actions of and interactions between teachers and pupils around curricular content in classrooms and schools in the DRC, as reported by pupils and teachers and as observed during classroom instruction. Specifically, this section discusses pupil work around content, teacher feedback to pupils, teachers' instructional responses to certain classroom situations ("pedagogical moves"), teachers' formal and information evaluation practices, and teaching behavior during observed reading and mathematics lessons.

During the pupil interview, Grade 3 pupils were asked whether they had their language exercise book with them and, if so, whether the assessor could look at the number of pages that had pupil work on them. *Figure 35* shows these findings for four of the provinces studied for this report. It is clear that many pupils (64% on average) did not have language exercise books on the day of the assessment, and that the distribution of such exercise books differed among provinces. This suggests severe inefficiencies in distribution that could be addressed. The majority of pupils who did have language exercise books on the day of the assessment had completed or had worked on approximately one-quarter of the pages. More pages with pupil work on them was uncommon. This is likely due to the timing of data collection— relatively shortly after the commencement of the school year.

Figure 35. Pupil work in language exercise books
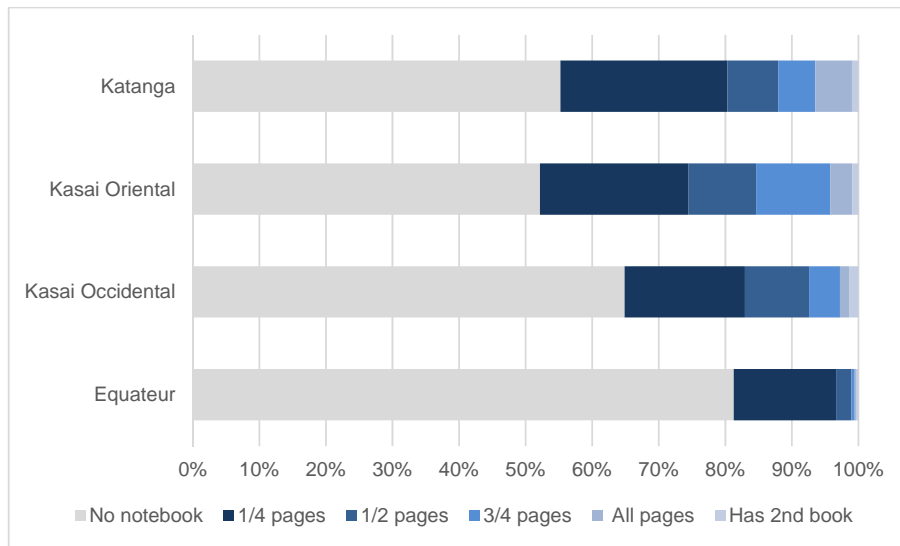
Also in terms of pupil work, most pupils (51% on average) reported that their teachers had assigned them homework to complete during the previous week. This practice appeared to be particularly common in Equateur (64%) and Katanga (55%). While homework itself is not a clear indicator of quality teaching, it may be beneficial for providing pupils with extra opportunities to practice and therefore concretize what they have learned in school. However, this logic may hold true only insofar as teachers for their part grade, provide feedback on, and discuss errors in pupils' homework. To this end, assessors also determined the proportion of completed exercise book pages with teacher marking and feedback. Overall, it was found that pupils who did have a language exercise book on the day of the assessment tended to have teachers who did not provide formal feedback on their work. Approximately one-half of pupils who had a language exercise book and who had completed at least some work did not receive any feedback (or marks) from their teacher. On average, only 20% of pupils received some sort of feedback from their teachers in this way.

During the pupil interview, pupils were asked about regular classroom interactions with their teachers. Specifically, they were asked how their teacher tended to respond when a pupil answered a question correctly, when a pupil answered incorrectly, when a pupil misbehaved in class, and when a pupil was late. These interactions were chosen because they provide differing opportunities for teachers to react to classroom stimuli in active and constructive ways that promote pupil engagement in learning and the classroom. *Table 19* displays the proportion of pupils taught by teachers who tended to respond in an active destructive (directly engaging with the issue but in a discouraging manner), passive destructive (not directly engaging with the issue and in a discouraging manner), passive constructive (not directly engaging with the issue but in a generally encouraging manner), or active constructive (actively engaging with the issue and in an encouraging manner) way. Either of the constructive (active or passive) ways of responding to classroom situations are better, in terms of pupil engagement and instructional quality, and tend to encourage pupil motivation and learning.

DRC 2015 EGRA, EGMA, and SSME Grade 3 Report of Findings

Table 19. Teacher pedagogic moves in the classroom

Behavior category	Pedagogical move	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average
What does the teacher normally do when…?						
…a pupil answers a question correctly?						
Passive destructive	Does nothing	14.6	9.8	2.7	4.6	8.5
Passive constructive	Gives pupil a reward	4.4	15.3	29.8	4.3	11.1
	Allows pupil to skip chore or duty	0.3	0.8	0.1	0.1	0.4
Active constructive	Praises pupil	71.3	71.0	66.7	84.0	74.6
	Other	0.1	5.0	0.2	1.2	2.1
	Do not know / refused	9.4	3.2	2.9	8.1	6.1
...a pupil does not answer a question correctly?						
Active destructive	Scolds the pupil	11.1	8.1	8.9	16.4	11.5
	Hits pupil	28.6	19.3	18.4	25.2	23.2
	Makes pupil kneel	1.2	1.4	3.1	1.0	1.4
Passive destructive	Asks another pupil	12.7	27.0	23.8	14.1	19.2
	Removes pupil from class	0.4	0.8	0.5	0.2	0.5
Passive constructive	Asks again	3.7	17.2	13.3	4.5	9.6
Active constructive	Reformulates question or explains	11.2	15.9	21.9	11.9	14.3
	Encourages pupil to try again	16.3	7.6	5.4	9.5	9.9
	Corrects pupil but does not scold	3.4	4.0	0.5	4.5	3.6
	Other	3.8	9.2	7.5	11.9	8.6
	Do not know / refused	11.8	2.4	5.8	8.2	6.8
…when a pupil misbehaves in class?						
Active destructive	Scolds pupil	4.9	13.2	15.8	10.8	10.8
	Hits pupil	69.6	70.5	65.0	72.8	70.4
	Makes pupil kneel	6.4	1.2	0.4	4.3	3.3

Behavior category	Pedagogical move	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average
Passive destructive	Nothing	7.2	13.3	2.4	2.9	7.3
	Removes pupil from class	4.4	4.0	15.5	2.9	5.1
	Sends pupil to corner	1.6	0.9	1.0	2.5	1.6
Passive constructive	Corrects pupil but does not scold	3.1	1.0	5.1	2.5	2.4
	Other	0.9	0.2	0.3	1.2	0.7
	Do not know / refused	6.2	1.3	1.1	4.5	3.4
…when a pupil is late?						
Active destructive	Scolds pupil	2.4	15.3	15.3	8.5	10.1
	Hits pupil	50.8	49.9	51.8	40.7	47.5
	Asks pupils to kneel	11.9	6.7	4.7	12.1	9.4
Passive destructive	Nothing	11.8	14.4	5.4	6.1	10.1
	Removes pupil from class	10.6	2.7	9.8	10.7	7.9
	Sends pupil to corner	3.9%	1.7	6.3	5.1	3.8
Active constructive	Talks to pupil but does not scold	1.8%	3.4	2.6	1.9	2.5
	Other	2.5%	5.5	3.3	11.6	6.4
	Do not know / refused	4.4%	0.6	0.8	3.3	2.3

At least two distinct patterns emerge from *Table 19*. First, teachers tended to react constructively, either passively or actively, during positive classroom interactions with pupils. For example, teachers were reportedly more likely to either praise pupils or give them rewards when pupils had answered a question correctly. These reactions are of course more appropriate than destructive responses, but they are, relatively speaking, "easy" pedagogical moves to make because the situation at hand is already positive and constructive. More challenging pedagogical moves, however, are when the situation in the classroom is not positive but negative; these situations present teachers with difficult but important choices in keeping pupils motivated to learn and in promoting their continued engagement with lesson content. To cite an example from *Table 19*, when a pupil answers a question incorrectly, a teacher can choose to respond in an active destructive manner by scolding the pupil. This communicates to the pupil that the response was indeed wrong, but it does not promote continued engagement (it does not keep the pupil thinking about why the response was wrong or how it could be corrected) and does not motivate the pupil to respond in the future. The second pattern that emerges from *Table 19* is that most pupils were taught by teachers that deployed destructive pedagogical moves in response to challenging classroom situations. On average, 57% of Grade 3 pupils reported destructive teacher responses to incorrect answers given in class

(compared with 37% constructive), 99% destructive responses to pupil misbehavior (compared with 2% constructive), and 83% destructive responses to pupil tardiness (compared with 3% constructive). There are indeed differences by province, but overall these patterns indicate pedagogical moves that demotivate and discourage pupil engagement.

In addition to classroom interactions, teachers were asked about how they assess pupil learning in class and how they use the results of this assessment. Pupils assessed for this report tended to be taught by teachers who used more than one method to determine pupil comprehension, such as formal tests (written and oral), questions, and homework (see *Figure 36*). While teachers tended to employ different assessment methods with differing frequencies across provinces, the median teacher used at least two ways of assessing their pupils, and one in three pupils was taught by a teacher who used at least three means of assessment. Such practices can provide a more holistic view of pupil learning than reliance on written exams alone. However, when asked how teachers use the results of these assessments, the vast majority of teachers reported using these findings exclusively for grading pupils (81% of pupils were taught by such teachers). Virtually no pupils were taught by teachers that used assessment results to either plan or adapt instruction to more appropriate levels. As such, teachers appeared to assess pupils more to differentiate them (i.e., give them grades) than to enhance their understanding of content.

Figure 36.   Teachers' evaluation practices
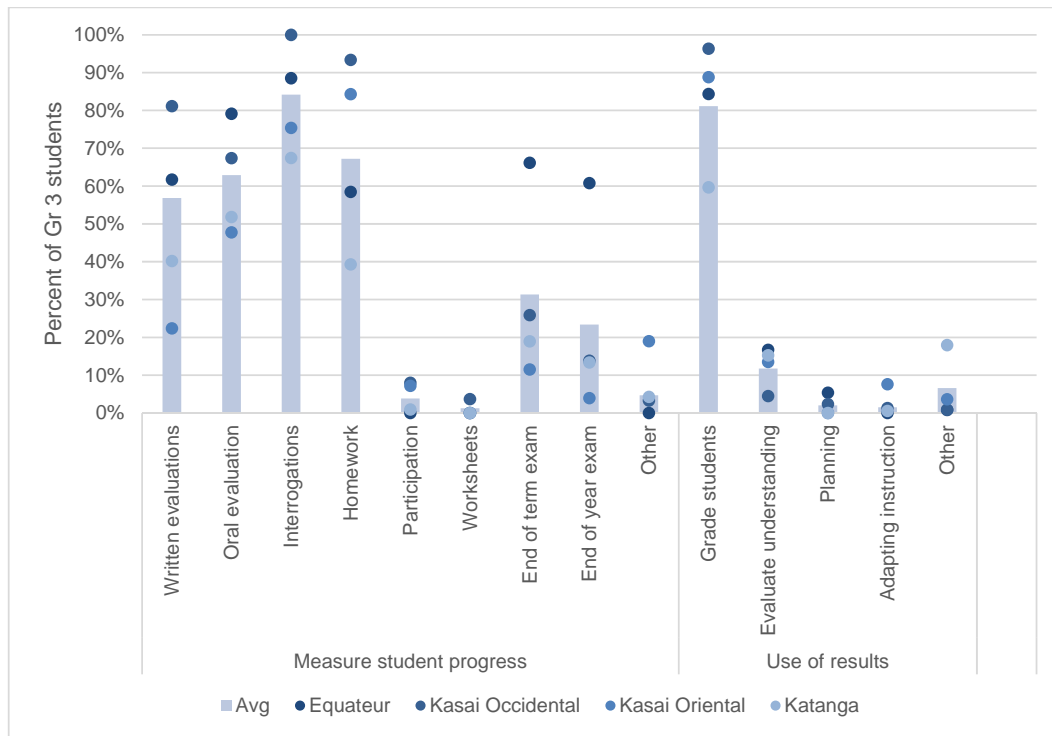
Teaching and learning processes were also directly observed during reading lessons in all provinces and in mathematics lessons in Katanga. Assessors conducting the observations spent at least 30 minutes recording teacher actions and the language of instruction. These observations were then aggregated to determine the proportion of the lesson during which teachers exhibited certain actions and the language used to teach in class (see *Table 20*).

Table 20.   Teacher action and language of instruction in observed lessons (% of observed lesson segments)

		Reading					Math
		Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average	Katanga
Teacher action	Speaking/talking	27.4	20.1	24.2	16.2	21.0	17.2
	Writing on board	11.8	15.0	14.9	11.6	13.2	15.0
	Giving an example	0.8	1.9	0.0	2.2	1.5	2.6
	Leading choral repetition (class)	11.9	34.7	39.0	21.3	25.9	7.3
	Asking, answering questions	3.0	14.1	11.7	23.8	14.3	21.1
	Assisting pupils	0.8	0.6	2.2	0.6	0.8	0.7
	Monitoring/ evaluating	38.0	5.5	4.8	16.0	16.1	32.6
	Listening to pupil reading	2.5	6.2	1.4	4.8	4.3	0.1
	Other	3.8	1.9	2.0	3.7	2.9	3.3
Language used	French	11.8	5.1	2.6	96.7	35.0	97.0
	Kiswahili	0.0	0.0	0.0	2.2	0.7	2.7
	Lingala	88.2	0.4	0.0	0.0	20.3	0.0
	Tshiluba	0.0	94.0	96.3	0.0	43.4	0.0
	Other	0.0	0.5	1.1	1.1	0.6	0.3

From *Table 20*, it is evident that the language of instruction changed based on province, and that the language used was uniform within the province (although Equateur had a mix of French and Lingala). Teacher actions, however, varied widely. On average in reading lessons, the most frequently observed teacher action was leading choral repetition (observed 26% of the time), followed by talking to pupils (observed 21% of the time). Other relatively common activities were monitoring pupil work (16% of the time) and posing questions to pupils (14% of the time). Averaged across all provinces, teachers were seen either talking or writing on the board in more than one-third of observation segments. These findings, however, varied across provinces. Teacher talk was more commonly exhibited by teachers in Equateur (27% of the time) and Kasai Oriental (24% of the time), and leading choral repetition was employed more often in Kasai Occidental (35% of the time) and Kasai Oriental (39% of the time). Teachers in Equateur and Katanga were much more likely than their peers in the Kasais to be observed monitoring or evaluating pupils (38% and 16% in Equateur and Katanga, respectively). Teachers in Equateur did not ask pupils questions very often at all (3% of the time). On aggregate, however, these teacher actions suggest that much of the time in reading lessons is being devoted to

non-reading activities and do not allow for extended periods of pupil engagement with text, such as reading practice.

Although math lessons were observed only in Katanga, it is instrumental to compare exhibited teacher actions in reading and mathematics in this province. Mathematics teachers in Katanga were less likely to employ choral repetition than reading teachers; instead, they tended to spend more time monitoring and evaluating pupils (i.e., giving pupils time to practice doing mathematics), as well as posing questions to pupils. However, they were also slightly more likely to spend more time on teacher-centric actions, such as talking to pupils and writing on the board, which are not condusive to pupils practicing mathematics.

3.3.4 Time on Task

The amount of time spent reading and doing mathematics (time "on task") matters greatly for pupil learning. Pupils need structured time to practice emerging reading skills in order to become more familiar with and to learn to decipher meaning from written text. Likewise, pupils need time to learn to think logically and mathematically, and to use mathematics to solve problems. Time away from school (i.e., absent or tardy) and time wasted during class inherently reduces the time spent on task honing these emergent skills.

During interviews, teachers were asked how many pupils were either absent or late on a typical day. These figures were then compared with total number of pupils enrolled in class to determine rates of absenteeism and tardiness in classes; these are reported in *Table 21*. As seen in the table, the median pupil in Equateur, Kasai Occidental, Kasai Oriental, and Katanga was taught in a class with 21%–25% absenteeism rates, 11%–15% absenteeism, 16%–20% absenteeism, and 6%–10% absenteeism, respectively. Given average class enrollment of 64, 51, 67, and 58 pupils in these four provinces, each class had approximately 15, 7, 12, and 5 pupils absent on a given day in Equateur, Kasai Occidental, Kasai Oriental, and Katanga, respectively. When pupils were asked if they had been absent at all during the previous week, 14%, 17%, 15%, and 8% of pupils indicated that they had missed at least one day during the previous week. This amounts to a great deal of lost class time. Pupil tardiness appears to be somewhat less of a concern, with many pupils' classes having less than a 10% rate.

Table 21.   Pupil absence and tardiness

	% of pupils	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average
Absent	0	8%	26%	2%	19%	10%
	1 to 5	3%	2%	3%	6%	2%
	6 to 10	11%	13%	17%	28%	12%
	11 to 15	0%	19%	11%	24%	10%
	16 to 20	9%	8%	37%	0%	6%
	21 to 25	30%	13%	9%	8%	9%
	26 to 30	0%	0%	0%	11%	3%
	31 to 35	7%	6%	15%	0%	3%
	36 to 40	21%	5%	0%	0%	4%
	41 to 45	0%	0%	0%	0%	0%
	46 to 50	0%	2%	0%	0%	0%
	> 50	7%	2%	7%	2%	2%
Late	0	17%	21%	4%	28%	17%
	1 to 10	41%	52%	36%	46%	38%
	11 to 20	38%	23%	38%	27%	24%
	21 to 30	4%	1%	22%	0%	3%
	> 30	0%	3%	0%	0%	0%

Teacher absenteeism and lateness was reportedly (according to head teachers) less common: most pupils were taught by teachers who regularly showed up to work and who were on time (see *Table 22*). Only approximately one-third of pupils attended classes for which teacher absenteeism and lateness rates were above 10%.

Table 22.   Teacher absence and tardiness (% of pupils affected)

	% of pupils affected	Equateur	Kasai Occidental	Kasai Oriental	Katanga	Kivus	Average
Absent	None	63%	52%	84%	68%	100%	64%
	1 to 5	0%	5%	0%	5%	0%	3%
	6 to 10	5%	10%	0%	7%	0%	7%
	11 to 15	9%	13%	6%	8%	0%	10%
	16 to 20	15%	14%	1%	5%	0%	10%
	21 to 25	0%	0%	0%	1%	0%	0%
	25+	8%	6%	9%	6%	0%	7%
Late	None	52%	57%	58%	70%	61%	60%
	1 to 5	0%	0%	5%	2%	0%	1%
	6 to 10	13%	7%	4%	8%	14%	8%
	11 to 15	6%	8%	29%	12%	0%	11%
	16 to 20	8%	15%	4%	2%	3%	8%
	21 to 25	6%	1%	0%	1%	0%	2%
	25+	14%	12%	0%	4%	22%	9%

During observed reading and mathematics lessons, assessors recorded the content area covered by teachers as well as whether most pupils were on task and paying attention. These findings are displayed in *Table 23*. In terms of pupil attention, the vast majority of pupils (96%) were in classes where at least half of the class was paying attention to the lesson at hand. While this proportion fluctuated slightly throughout observed lessons, with the number of pupils in "on-task" classes dropping below 90% in some cases, pupil attention was generally observed to be high and relatively constant. In terms of content in reading lessons, assessors distinguished between reading (aloud or silently), pupil writing, penmanship, oral comprehension, pupil discussion, work on grammar, and vocabulary. From *Table 23*, it is clear that most classes were engaged in either reading (mostly reading aloud) or oral comprehension, activities that would seem to have a clear link to the lesson objective (i.e., reading instruction) and to offer opportunities for pupils to engage with text. Recall, however, that teachers were observed a great deal of the time talking to pupils, writing on the board, or leading choral repetition—actions that decidedly do not provide pupils much opportunity to engage with text or practice reading for themselves. Thus, although the content during observed reading lessons was related to what teachers were supposed to be teaching, much of the pupils' time was spent engaging in other types of activities (e.g., watching the teacher, listening to the teacher, repeating after the teacher).

Table 23.   Content area activities and pupil attention during observed lessons

		Equateur	Kasai Occidental	Kasai Oriental	Katanga	Average
Content (reading)	Reading aloud	39.9	43.5	43.0	29.4	38.2
	Reading silently	2.0	0.5	0.1	3.4	1.7
	Writing	15.5	16.9	14.3	13.3	15.2
	Penmanship	0.0	0.0	0.4	0.0	0.0
	Listening comprehension	35.2	28.3	32.9	28.0	30.3
	Pupil discussion	0.8	1.8	1.5	0.6	1.1
	Grammar	0.0	6.8	2.9	14.3	7.1
	Vocabulary	0.7	0.1	0.0	8.5	2.8
	Other	5.9	2.1	4.9	2.6	3.5
Content (math)	Whole numbers, counting				16.0	
	Whole numbers, operations				56.4	
	Decimals, counting				1.3	
	Decimals, operations				0.0	
	Fractions				1.5	
	Geometry				13.4	
	Money				0.7	
	Word problems				7.1	
	Other				3.4	
Pupil attention	Most following the lesson	97.5	97.8	96.5	94.0	96.4
	Most not following	2.5	2.2	3.5	6.0	3.6

3.3.5 School Safety

Pupil safety at school is a primary concern for pupils, teachers, and head teachers in the DRC. Learning is compromised if pupils perceive that they are not safe, and teachers are less likely to provide quality instruction if they themselves perceive the school to be an unsafe place for either themselves or their pupils. Because the

perception of safety is a primary need—one that imposes itself on the minds of pupils, teachers, and head teachers—assessors asked (during all three types of interviews) whether interviewees felt safe and, in cases where they did not, why that was the case. During Teacher and Head Teacher Interviews, assessors also inquired as to their perceptions of pupil safety. Results are shown in *Figure 37*.

Figure 37.   Perceptions of school safety
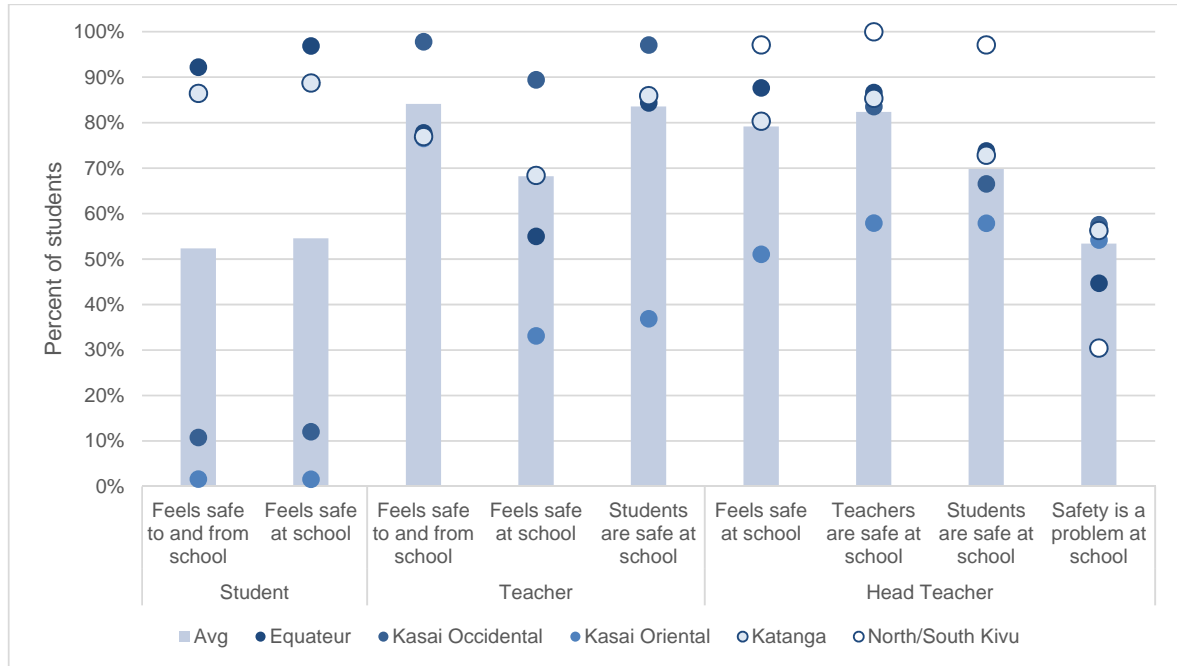
Overall, more than half of pupils asserted that they felt safe at school as well as going to and from school, and most pupils attended schools where teachers and head teachers felt the same way. There were extreme differences among provinces, however—perceptions of safety were very low in both Kasai Occidental and Kasai Oriental, while perceived safety was high in Katanga and Equateur. It is worth mentioning that pupils' perceptions of safety in the Kasais differed widely from those of their teachers and head teachers, particularly in Kasai Occidental. Such differing perceptions are problematic and suggest that teachers and head teachers are not in tune with pupil concerns.

Some teachers expressed perceptions of insecurity for themselves at school (32% of pupils are taught by teachers who do not feel safe themselves in school) while only 16% of pupils had teachers who felt that their pupils were not safe. When prompted about reasons for fearing for their own safety, teachers mentioned the overall financial situation at school (precarious), the lack and lateness of salaries, sanitation, and poor infrastructure when they considered their own safety. In other words, they held a more inclusive view of school safety that considered their position as professionals and the school as a financial institution. When teachers believed pupils were not safe in school, they tended to mention specific parts of school infrastructure such as the lack of exterior walls and broken or dilapidated buildings.

Interestingly, while approximately 70% of pupils, on average, attended schools where the head teacher asserted that pupils were safe, a higher proportion of head teachers admitted that safety was indeed a problem at their school. Head teachers, when discussing problems of school safety, tended to mention infrastructure issues such

as the lack of an exterior wall or guard (49%), theft and crime at school (30%), and the area surrounding the school (15%).

Beyond perceptions of safety, most pupils in fact were attending schools that were not enclosed by an exterior wall (78%), and the walls that did exist tended not to be constructed with durable materials. The exception to this was in the Kivus' ALP schools, where 39% of Grade 3 pupils attended schools that were enclosed with a permanent wall. More than one-half of pupils in Equateur, Kasai Oriental, and Kasai Occidental attended schools without a school guard. These safety features, lacking in many schools, appeared to weigh heavily on the minds of some pupils, teachers, and head teachers.

4 Links Between the School Context and Pupil Learning

With the above discussion as background, it is also worthwhile exploring relationships between pupil learning, as measured by the EGRA, and the school context. Specifically, it would be worthwhile to learn whether any aspects of the school context, such as teacher characteristics (e.g., training) or teaching and learning processes (e.g., pedagogical moves) show a statistically significant relationship with pupil outcomes. If so, and variation in some aspects of the teaching and learning context predicts variation in pupil reading and math outcomes, these aspects might be areas to focus attention on for school leaders and Ministry officials.

To this end, we created a regression model that attempts to explain some of the variation seen in pupil outcomes by controlling for a number of variables. The outcome variable used was ORF in the EGRA. As seen above, the distribution of pupil scores (i.e., many zero scores) was such that the outcome variable was binary for both Grade 3 and Grade 5. For Grade 3, the outcome was either a pupil scored a zero or did not, and for Grade 5, the outcome was either a pupil performed lower than the top 25% or did not. A single model was fitted for both Grade 3 and Grade 5 pupil results rather than separate models for each grade because this resulted in better model-fit statistics.

After pupil ORF scores were recoded as binary for Grade 3 (zero score = 0, non-zero score = 1) and Grade 5 (bottom 75% of scores = 0, top 25% of scores = 1), a base model of control variables was fitted to the outcome variable. After testing various demographic variables, the final base model retained pupil grade (Grade 3 or 5), sex, age, a wealth index (socioeconomic status [SES]), and maternal literacy as control variables.[24] The final base model is shown in **Table 24**.

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[24] Provinces were not statistically significant in the base model and therefore not retained as control variables. This is due to the way the cut-points for the Grade 5 outcome variable were determined. For each province, the cut point was placed just below the top 25% of ORF scores. Thus, province does not predict any variation in group membership (top 25% or not) because children across provinces have an equal chance of being in the top 25% (namely, 25% chance).

Table 24.   Base model of pupil reading performance

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
\+ = marginally non-significant

Binary (or logistic regression) results can be read as odds ratios. Essentially, odds ratios describe the increase in likelihood in group membership associated with an increase in the independent variable. In this case, it is the likelihood of getting a non-zero score (for Grade 3 pupils) and scoring the top 25% of readers (for Grade 5 pupils). Odds ratios higher than 1.00 indicate a higher likelihood of being in the higher-performing group, and a lower odds ratio indicates precisely the opposite. A statistically significant relationship between the outcome and independent variables is calculated by the p-test, which describes the likelihood that the result was obtained by random chance. If p-test results (p-values) are lower than 0.05, the relationship between two variables is said to be statistically significant. Statistical significance is denoted with symbols as described below the table. As seen from the base model, pupils in Grade 5 were 1.8 times more likely to be in the higher-performing group. This is logical since the binary outcomes were different for each grade (non-zero score or not for Grade 3 and top 25% or not for Grade 5), and there were more top 25% pupils in Grade 5 than there were non-zero scores in Grade 3. Thus, it is important to control for this variable in the model. Females were significantly less likely than their male counterparts to be in the higher-performing groups. Pupils with literate mothers were 1.5 times more likely than their peers with non-literate mothers to be among the higher-performing group. These controls represent predictive relationships between pupil reading outcomes and demographic variables that are, for the most part, outside of school control. Thus, they are held constant in future models.

Once the base model was set, we tested six subsequent models that relate to the school context sections discussed above, and that test relationships between certain variables and pupil reading performance: (1) teacher characteristics (basic school inputs), (2) school and class resources (basic school inputs), (3) teacher actions (teaching and learning process), (4) reading time (time on task), (5) school management (pedagogical oversight and management), and (6) school safety (school safety). For each of these models, several variables were added to the base model to determine whether these independent variables were able to explain any variation in pupil outcomes.

Model 1 (see *Table 25*) tested whether teachers' initial or continued content-specific pedagogical training, practical in-service teaching, pupil-teacher ratios, or teacher absenteeism helped to explain some of the variation seen in pupil reading outcomes, as measured by EGRA ORF. These variables (more teacher training, fewer pupils per teacher, and teachers showing up to work) are often expected to lead to enhanced classroom instruction. Of all of these teacher characteristic variables, however, only the pupil-teacher ratio showed a statistically significant relationship with pupil reading fluency. However, the relationship was not in the direction one would expect: pupils in classes with higher pupil-teacher ratios were very slightly (1.01 times) more likely to be in the higher-performing reading group. This is a counterintuitive finding, but the relationship to pupil outcomes is weak. Overall, this model suggests that teacher characteristics such as numbers of teachers and pre-service training (even content-specific training) does not help to explain any of the variation seen in pupil outcomes. This is not the same as stating that these characteristics do not matter; perhaps the road from pre-service training to pupil learning is rather long and indirect.

Table 25.   Model 1: Teacher characteristics

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Initial reading training	No (ref)	1.00		
	Yes	0.95	0.785	-0.27
Continued reading training	No (ref)	1.00		
	Yes	1.01	0.966	0.04
Pre-service classroom teaching	No (ref)	1.00		
	Yes	1.13	0.516	0.65
Pupil-teacher ratio		1.01**	0.010	2.61
Percent of teachers absent		0.96	0.954	-0.06

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

The second model tested whether pupils in schools with more resources (less repairs needed, language exercise books, adequate numbers of books at the beginning of the year, sufficient seats, and ratios of textbooks to pupils) were more likely to perform well on EGRA ORF. As seen in *Table 26*, the only resources that helped to explain pupil reading outcomes were language exercise books (and pupil work within them) and the ratio of textbooks to pupils. In terms of the former, pupils who had an exercise book on the day of the assessment and who had worked on more pages (three-quarters or all pages) than their peers were more likely to be in the higher-performing reading group. In other words, pupils who had exercise books and who used them frequently were more likely to read more fluently than their peers. Marginally significant was the ratio of math textbooks to pupils, an indicator of classroom resources. Most pupils found themselves in classrooms that had less than one textbook for every pupil; pupils had to share textbooks with their classmates. However, pupils in classes with higher proportions of textbooks were more than 1.5 times more likely to be in the higher-performing reading group. Taken together, these findings suggest that the availability and frequent use of classroom-level resources may matter for pupil reading fluency, whereas other school-level resources do not explain variation in pupil reading (e.g., pupils in schools that are in need of repairs or that have inadequate seats are not at a disadvantage compared with their peers).

Table 26.   Model 2: School and classroom resources

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Repairs needed		1.02	0.462	0.74
Language book and pupil work	Does not have (ref)	1.00		
	¼ pages with work	1.13	0.355	0.93
	½ pages with work	1.31	0.177	1.35
	¾ pages with work	1.92*	0.014	2.48
	All pages with work	1.64*	0.048	1.99
	Pupil has second book	1.39	0.532	0.63
Adequate books	Yes (ref)	1.00		
	No	1.14	0.542	0.61
Sufficient seats	No (ref)	1.00		
	Yes	0.98	0.929	-0.09
Ratio of reading textbooks to pupils		1.48	0.138	1.49
Ratio of math textbooks to pupils		1.50+	0.099	1.66

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

The third model tested whether certain teacher actions—namely the use of in-class assessment and resultant data, pedagogical moves in class, feedback to pupils, and assigning homework—were associated with higher reading performance. It can be theorized that teachers who use more than one means of assessing pupils and have more than one use of assessment data (other than just grading pupils) might be more sophisticated, pedagogically speaking, and therefore might be more likely to engage in ambitious instructional practices. Likewise, providing pupils with feedback (comments in language book) on their work might signal to pupils that their work matters and might give them information on how they are doing. As discussed above, teachers' reactions to positive or negative situations in class can be categorized as destructive (passive or active) or constructive (passive or active); the latter pedagogical moves are more likely to encourage pupil motivation and engagement in the lesson.

Findings from this third model (**Table 27**) suggest that teachers' pedagogical moves were in fact associated with pupil reading outcomes: pupils with teachers who tended to react in either neutral or constructive ways to classroom situations were approximately 1.5 times more likely to be in the higher-performing reading group. This indicates that the pedagogical decisions and moves made by teachers in the class were associated with pupil learning. In addition, pupils who were assigned homework during the previous week by their teachers were 1.6 times more likely to be in the higher-performing reading groups. This finding is interesting given that there has been no confirmed link, across many studies, between homework assigned at the primary level and pupil achievement, but the link here might be due to the fact that homework is less common in the DRC than in other contexts.

Table 27.   Model 3: Teacher actions

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Ways teacher uses evaluation results		1.15	0.452	0.75
Ways teacher measures learning		1.02	0.798	0.26
Teachers' pedagogical moves	Destructive (ref)	1.00		
	Neutral	1.59**	0.002	3.09
	Constructive	1.51**	0.008	2.68
Teacher comments in language book	No language book (ref)	1.00		
	None	1.17	0.296	1.05
	Some (every few pages)	1.25	0.101	1.64
	Many (on most pages)	2.09+	0.052	1.95
	On all pages	0.97	0.948	-0.07
Homework last week	No (ref)	1.00		
	Yes***	1.60***	0.000	4.19

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

DRC 2015 EGRA, EGMA, and SSME Grade 3 Report of Findings

The fourth model tested whether more time spent reading at home and at school was associated with pupil learning. **Table 28** shows these results, and they are uniformly associated with higher reading performance. Pupils with access to reading books at home were 1.8 times more likely than peers without such access to be in the higher-performing group. Pupils who read aloud at home were also more likely than pupils who never read aloud to be in the higher-performing group—pupils who read even one time per week were 1.8 times more likely to be in the higher-performing group, those that read two to three times per week were 2.1 times more likely to be in the higher-performing group, and those that read daily were 3.6 times more likely to be in the higher-performing reading group. Finally, pupil absenteeism was associated with lower reading outcomes—pupils who were absent in the previous week were more likely to be in the lower-performing reading groups, all else held constant. In sum, time spent reading (both at home and at school) was unsurprisingly related to pupil reading performance.

Table 28. Model 4: Reading time

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Reading books at home	No (ref)	1.00		
	Yes***	1.75***	0.000	4.34
Read aloud at home	No, never (ref)	1.00		
	Once a week ***	1.81***	0.000	3.63
	2-3 times a week ***	2.13***	0.000	5.03
	Daily ***	3.57***	0.000	6.23
Absent last week	No (ref)	1.00		
	Yes*	0.77*	0.028	-2.21

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

Model 5 tested whether aspects of school management, such as head teacher experience, degrees, and training, as well as oversight of teachers' lesson plans and classroom observation were associated with pupil reading performance. The

implication is that more experienced and highly trained head teachers could be better placed to serve as instructional leaders in their schools, and this in turn may aid teachers to teach more effectively. However, **Table 29** shows that instructional leadership, such as looking at teacher lesson plans and the frequency of classroom observation by head teachers, was not at all associated with pupil reading performance. Higher degrees were found to be associated with pupil reading performance, but the numbers of head teachers with this degree classification were too small and resulted in an unstable estimate. The only head teacher characteristic that was associated with pupil reading achievement was whether the head teacher had received management training and professed to using that training in school. Pupils with such head teachers were 1.5 times more likely to be in the higher-performing reading group. Interestingly, pupils with head teachers who had received similar training but did not use what they had learned in the school setting were not more likely to be in the higher-performing group.

Table 29.   Model 5: School management

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Head teacher experience		1.02	0.089	1.71
Head teacher degree	Diploma Secondary (ref)	1.00		
	Certificate of Secondary	1.46	0.083	1.74
	Graduate	0.80	0.335	-0.97
	Higher degree **	0.45**	0.001	-3.24
	Other	1.10	0.841	0.20
Management training	No (ref)	1.00		
	Yes, but do not use	0.70	0.051	-1.96
	Yes, I use what I learned*	1.53*	0.047	1.99
School fees	Yes (ref)	1.00		
	No	0.75	0.145	-1.46

Variable	Sub-category	Odds ratio	p-test	T-test
Head teacher looks at plans	Once a year (ref)	1.00		
	Once every 2 to 3 months	0.95	0.956	-0.05
	Once a month	4.45	0.060	1.89
	Once every two weeks	3.33	0.186	1.33
	Once a week	2.18	0.309	1.02
	Every day	2.88	0.142	1.47
Head teacher observes teaching	Never (ref)	1.00		
	Once a year	0.69	0.669	-0.43
	Once every six months	0.73	0.695	-0.39
	Once every 2 to 3 months	0.61	0.535	-0.62
	Once a month	0.57	0.473	-0.72
	Once every two weeks	0.57	0.521	-0.64
	Weekly	0.66	0.595	-0.53
	Every day	0.68	0.625	-0.49

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

The final and sixth model fitted on ORF attempted to test whether factors of school safety—both perceptions and observable school characteristics—were associated with pupil learning (***Table 30***). We could hypothesize that pupil reading performance might be adversely effected by the presence of violence and fear. While many teachers and head teachers focused on exterior walls and school guards as important aspects of school safety, these factors were not found to be associated with pupil reading performance. Perceptions of safety, either pupils' or teachers', were also not found to be associated with reading outcomes. Rather, the only aspect of school safety found to be associated with pupil reading performance was the incidence of violence in schools. Pupils in schools where violent incidences took place were less likely to be in the higher-performing reading group as compared with pupils in schools with no observed violent incidences.[25]

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[25] Although more frequent violent incidences (more than once per week) were not associated with lower pupil performance, this may be because relatively few teachers indicated such frequencies of violent behavior between pupils.

Table 30.   Model 6: School safety

Variable	Sub-category	Odds ratio	p-test	T-test
Grade	Grade 3 (ref)	1.00		
	Grade 5	1.76***	0.000	5.36
Sex	male (ref)	1.00		
	female	0.53***	0.001	-3.53
Age	Overage (ref)	1.00		
	Not overage	1.32+	0.059	1.90
SES		1.21+	0.075	1.79
Mother's literacy		1.48**	0.004	2.94
Exterior wall	No (ref)	1.00		
	Yes, but not durable	1.36	0.265	1.12
	Yes, durable	2.37	0.072	1.81
Sentinel (guard)	No (ref)	1.00		
	Yes	0.65	0.138	-1.49
Pupil feels safe to and from school	No (ref)	1.00		
	Yes	0.87	0.358	-0.92
Pupil feels safe at school	No (ref)	1.00		
	Yes	0.96	0.815	-0.23
Teacher thinks pupils safe at school	No (ref)	1.00		
	Yes	1.06	0.695	0.39
Teacher sees violence between pupils	0 times (ref)	1.00		
	Once*	0.59*	0.015	-2.46
	2-3 times	0.73	0.126	-1.53
	Once a day	1.10	0.816	0.23
	> once a day	0.55	0.099	-1.66

* = significant at 0.05 level, ** = significant at 0.01 level, *** = significant at 0.001 level,
+ = marginally non-significant

Overall, the models found that many of the variables that are often believed to be associated with enhanced classroom instruction and pupil learning were, in fact, not. The majority of teacher and head teacher characteristics—such as content-specific

training, degrees, and experience—were not found to predict variation in pupil outcomes. However, the models showed that several other variables, including teachers' pedagogical moves in classrooms (specifically responding to situations in constructive ways), head teachers' use of learned management techniques, time spent reading, and fewer incidences of school violence, were all strongly associated with the likelihood of pupils reading at a higher level. These findings could inform a renewed focus on those aspects of the school environment that are shown to be associated with learning outcomes, as opposed to those that routinely are not (e.g., teacher and head teacher characteristics).

5 Conclusions and Recommendations

After data analysis was completed, a national level findings workshop was held in Kinshasa May 3 –4, 2016. Participants in this workshop included staff from the ACCELERE! and EAGLE projects, and representatives from USAID and MEPSP. Subsequentregional findings workshops were held in Lubumbashi, Kananga, Mbuji Mayi, Gome, Bukavu and Mbandaka in May and June and included representatives from the provincial-level MEPSP, public shool coordinators, PROVED, and civil society organizations.

The final activity of each of the workshops was structured such that participants were able to to make recommendations for future progress in reading and arithmetic for children in lower primary grades. Participants were organized into groups where they discussed issues emerging from the findings and generated the following recommendations:

- **Language of Instruction**: Conduct further investigation on the language spoken at home as compared with the language of instruction to inform strategies that be taken to mimimize the impact on performance outcomes when the language spoken at home is not the same as the language of instruction.

- **Teacher Training, Support, and Development:** Recommendations to improve the quality of instruction included the following:
    - Prepare teacher trainings that apply positive classroom discipline
    - Focus efforts on in-service teacher trainings, irrespective of teacher qualifications and experience
    - Closely monitor teacher practices and provide feedback on a routine basis (by principals, inspectors, and committees of parents)
    - Provide refresher teacher training
    - Organize exchanges between teachers from different provinces to share best practices
    - Establish an ongoing program of interscholastic competition with prizes to encourage teachers to improve the quality of their performance
    - Restore teaching units and SERNAFOR

- **Family Support:** Recommendations to increase family support included the following:
    - Encourage parental involvement in assistance with or review of homework

- Train members of parent committees to conduct school monitoring visits
- Ensure every student has additional reading materials at home.
- **School Environments:** Recommendations to promote better leraning outcomes in schools included:
  - Reduce class sizes to a manageable number of students per class
  - Implement free primary education in all schools
  - Create and build more public schools
  - Equip teachers with sufficient teaching materials, posters, and training manuals
  - Provide better salaries for teachers
  - Ensure every student has reading textbooks in class.

Appendix 1. Details on Results of Classroom Observations

Figure A-1. Teacher action, lesson content, pupil attention, and language of instruction in observed reading lessons, Equateur
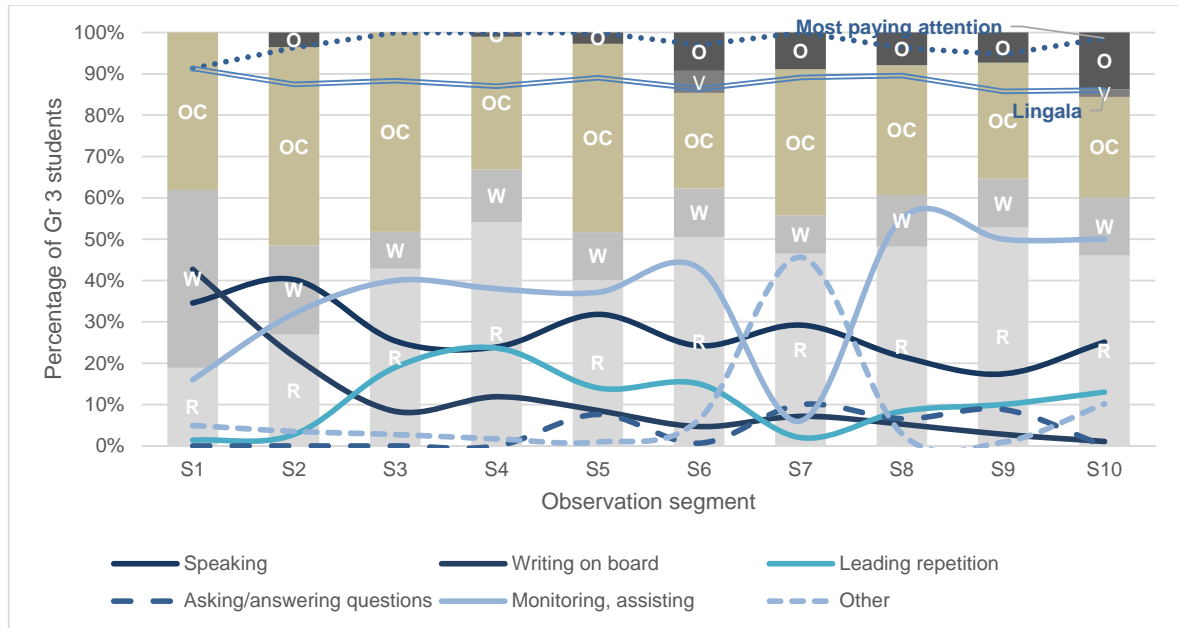

Figure A-2. Teacher action, lesson content, pupil attention, and language of instruction in observed reading lessons, Kasai Occidental
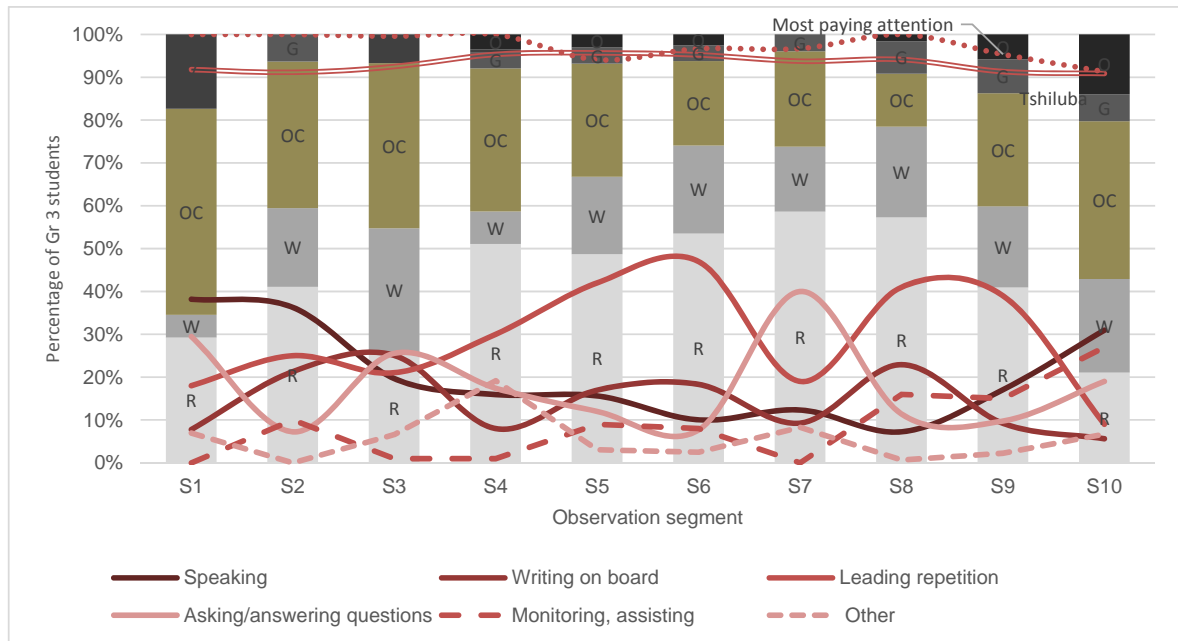
Figure A-3. Teacher action, lesson content, pupil attention, and language of instruction in observed reading lessons, Kasai Oriental
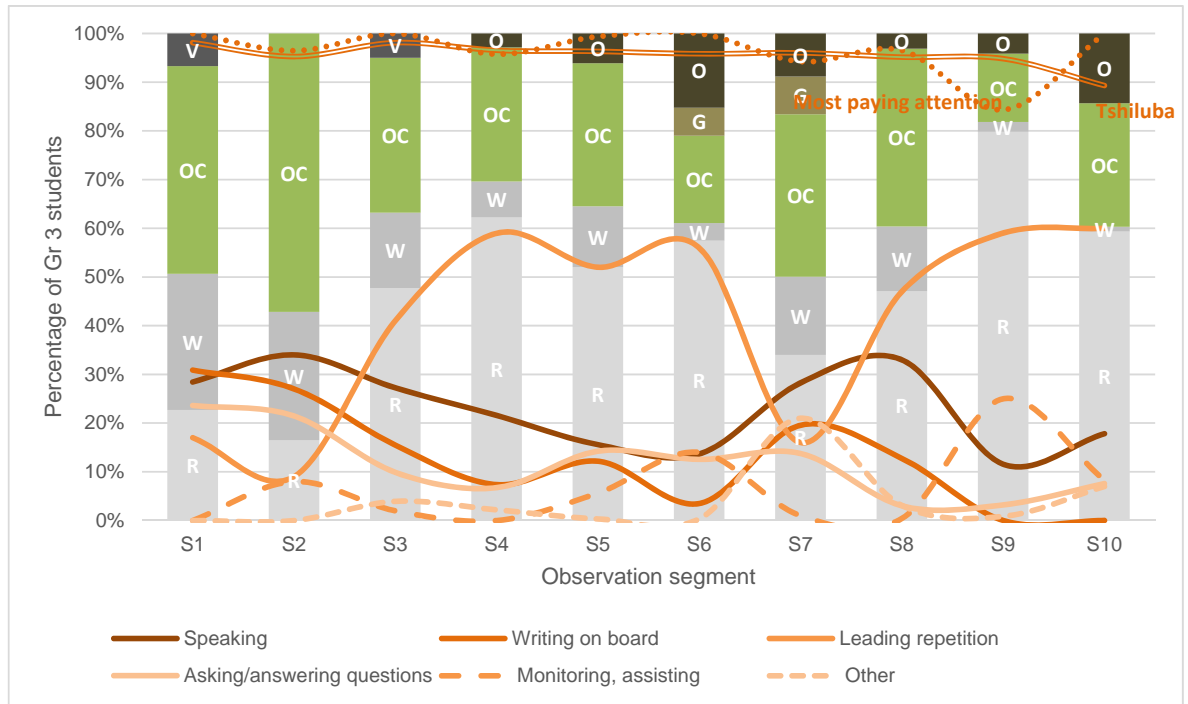

Figure A-4. Teacher action, lesson content, pupil attention, and language of instruction in observed reading lessons, Katanga
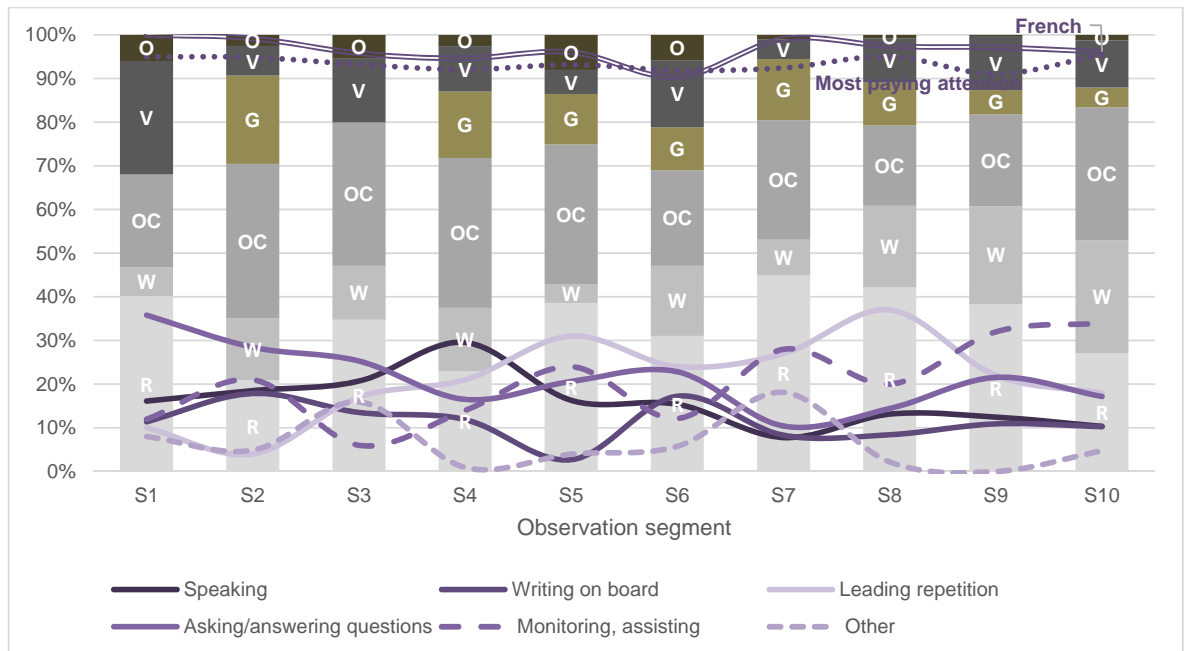
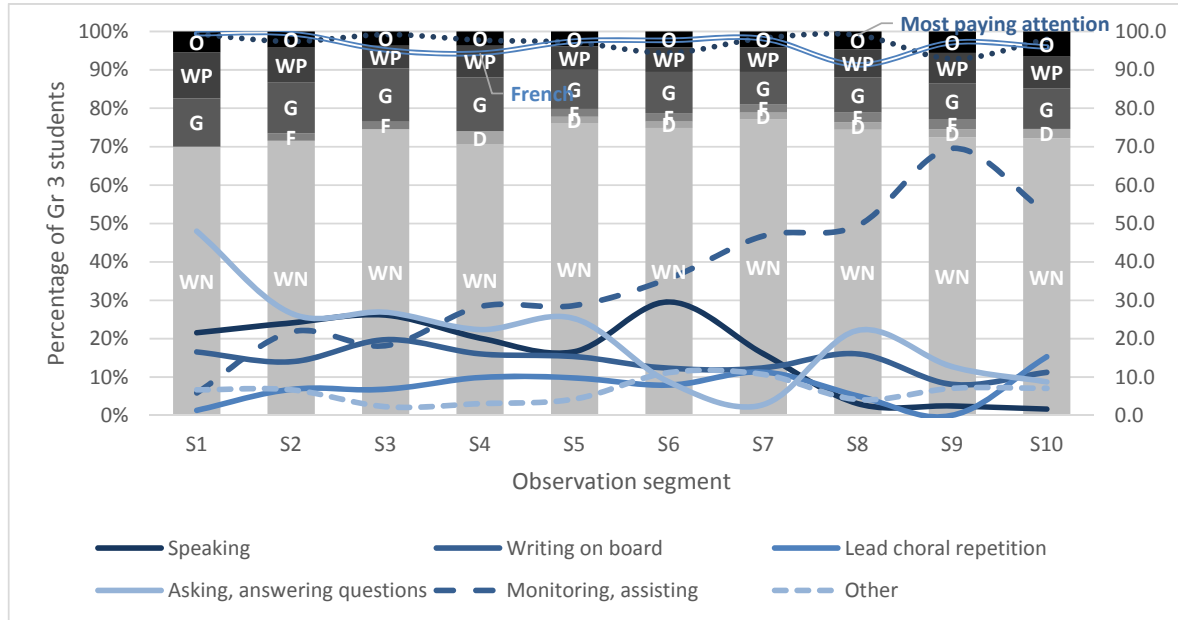*DRC 2015 EGRA, EGMA, and SSME Grade 3 Report of Findings*

Figure A-5. Teacher action, lesson content, pupil attention, and language of instruction in observed mathematics lessons, Katanga

Appendix 2. Instruments

For the first submission, the instruments will be attached separately.