The development of teaching and learning materials to ensure improved literacy outcomes among primary school learners and to initiate a system of periodic assessments to determine progress against specified benchmarks among early grade learners in South Sudan

Reference: RtLNAT006-Montrose

South Sudan Early Grade Reading and Mathematics Assessment Report

Submitted: 6th September 2016

This programme is co-funded by GPE

This programme is co-funded by GPE

This programme is implemented by Montrose

This programme is managed by UNICEF

CONTENTS

ACRONYMS

EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
GPEP	Global Partnership for Education Programme
LoI	Language of Instruction
LTM	Learning and Teaching Materials
MoGEI	Ministry of General Education and Instruction
NL	National Language (local languages)
PoC	Point of Civilian Contact Camp
RtL	Room to Learn
SIL	Summer Institute of Linguistics
SMoE	State Ministry of Education
TLM	Teaching and Learning Material
TTC	Teacher Training College
UNICEF	United Nations International Children's Emergency Fund

EXECUTIVE SUMMARY

This report presents the findings of the Early Grade Reading Assessments (EGRA) and Early Grade Mathematics Assessments (EGMA) conducted as one of four components in 'The Development of Teaching and Learning Materials to Ensure Improved Literacy and Numeracy Outcomes Among Primary School Learners and to Initiate a System of Periodic Assessments to Determine Progress Against Specified Benchmarks Among Early Grade Learners in South Sudan' Project.

The Improving Learning Outcomes Project was implemented by the South Sudan Ministry of General Education and Instruction (MoGEI) in partnership with the Global Partnership for Education Programme (GPEP), UNICEF and the Room to Learn (RtL) Programme. The EGMA and EGRA were administered in five national languages (Bari, Dinka, Ŋatoposa, Nuer and Zande) and English in 25 purposively sampled primary schools where the aforementioned national languages were reported as Languages of Instruction (LoIs) in P1 – P3. Due to RtL Programme's focus on literacy in their areas of operation, EGMA data was not collected from Bari and Ŋatoposa speaking children.

The EGRA and EGMA were conducted and used diagnostically to inform and contribute to a set of additional project components, namely:

- A National P1–4 Literacy and Numeracy Strategy document to set standards and benchmarks for teaching literacy and numeracy in the early grades;
- The development of Supplementary teaching and learning support kits to support the implementation of the strategy; and
- The development and delivery of a training course for teacher trainers to support the training of teachers on the early grade standards, benchmarks and developed kits.

In each of the 25 schools, 10 P3 learners underwent an English and National Language EGRA and EGMA (with the exception of the Bari and Ŋatoposa learners who did not undergo the EGMA). Due to delays in the project delivery, 70 of the learners (50 Dinka and 20 Nuer) were assessed in late 2015 as they completed P3 and the remaining 180 learners (30 Nuer learners and 50 learners from Zande, Bari and Ŋatoposa respectively) were tested in early 2016 when they had just started P4 having completed P3. This report presents an analysis of the consolidated data collected on learner performance in these five national languages. The data was aggregated to prevent comparisons on learner performance along ethnic lines. However, where the data is not contentious, it is presented specific to the different national languages.

Standard EGRA and EGMA tests were adapted to the South Sudanese context and the five specific languages. Montrose trained a team of South Sudanese enumerators in EGRA and EGMA, use of tablets to collect the assessment data, and on undertaking lesson observations and conducting teacher and pupil interviews. During the data collection, assessors used a standard process to select ten learners who had completed P3 in each of the schools using a randomised selection process. The selected learners were each subjected to both a National Language and English EGRA, an interview, as well as the EGMA tests where applicable. In addition, lesson observations and teacher interviews were conducted in each of the sampled schools.

The sample size is small and schools were selected purposively. Therefore, findings from these EGRA and EGMA results cannot be the basis for drawing any generalizable conclusions in relation to the national education system, or even related to the states where the samples were drawn. The assessments provide some diagnostic and indicative results, which may be used tentatively in informing the national debate on the teaching of and through the national language in the early grades, where they resonate with other findings and practitioners' experience. Some indicative findings that emerged from data collection are summarised below:

- Learners in the sample schools are not being effectively taught to read in English or their national language. At the end of P3, most learners cannot identify a single word in their national languages or English. The low reading levels could be attributed to the teacher-centred pedagogical practices observed during lesson observations.
- Learners who performed better than average in literacy were in most cases being taught by teachers supported by NGOs. As a result, they had access to Teaching and Learning Materials (TLMs) and made use of them in the classroom. They also generally practised child-centred teaching methods in comparison to the predominance of teacher-centred pedagogy in the other schools.
- Results from the EGMA showed that South Sudanese children generally perform better and closer to the levels expected at the end of P3 in numeracy, than they do in literacy.
- As found in other recent studies in South Sudan the levels of use of Learning and Teaching Materials (LTMs) including textbooks is exceptionally low. This is particularly worrying where so many of the teachers are untrained.

Without basic literacy skills, it is expected that South Sudanese learners will struggle to engage with other subjects on the curriculum. In fact, there is an increased risk that a high number will drop out of school if they are unable to succeed in the increasingly complex literacy and numeracy demands put on them in the later grades. This trend is likely to worsen when the new outcomes based national curriculum comes into effect in 2017, as it will demand even more linguistic application and engagement by learners. This report closes with a set of recommendations related to the MoGEI concerning national language policy and its implementation, to schools and teacher training colleges in respect of implementing the policy. The recommendations specifically suggest that:

- A review of the implementation and resourcing of the LoI Policy for the early grades and ensuring that teachers are trained to teach in their NL and in English;
- Training and resourcing early grade teachers who are already serving or currently enrolled in Teacher Training Colleges (TTCs) to teach reading effectively in both national languages and English;
- Consideration of the languages used in national and state assessment and the challenges such assessments present;
- Supporting and resourcing teachers to use more child-centred pedagogies and effective teacher-centred methods at the school level;
- Consideration of a P1 – P3 class teacher model in which one teacher teaches all subjects to one class.

While this report provides a snapshot of what is happening in early grade classrooms in South Sudan, it is by no means a comprehensive analysis of the all the factors contributing to the poor literacy levels in National Language and English. However, the findings and recommendations in it should be considered and if found to be significant prioritised by policy makers in the MoGEI as well as the broader education community in South Sudan.

1. INTRODUCTION

This consultancy for 'The Development of Teaching and Learning Materials to Ensure Improved Literacy and Numeracy Outcomes Among Primary School Learners and to Initiate a System of Periodic Assessments to Determine Progress Against Specified Benchmarks Among Early Grade Learners in South Sudan', aims to contribute to improving learning outcomes in early grade learners in South Sudan through the development and delivery of:

- Component 1: A set of diagnostic literacy and numeracy assessments in national languages, alongside a broader system of diagnostics to support the longer term development of a national examination mechanism;
- Component 2: A set of learning standards and benchmarks for literacy and numeracy in the foundation phase grades;
- Component 3: A set of literacy and numeracy kits aimed at enhancing teachers' performance and improving learning outcomes; and
- Component 4: An effective Training of Trainers (ToT) to ensure a broader roll-out of the project deliverables across the country. This includes the development of a strategy to roll out the kits and assessments, along with the standards and benchmarks;

The last three components of the project require a thorough understanding of the state of teaching and learning in early grade classrooms where national languages are being used as LoIs. As a result, the Early Grade Reading Assessment (EGRA) and the Early Grade Mathematics Assessment (EGMA) tools were selected to provide information on how learners are taught in South Sudanese classrooms and what literacy and numeracy capabilities children have acquired (in Bari, Dinka, Ŋatoposa, Nuer and Zande) after at least three years in school.

The five languages selected for this project followed careful consideration of conflict sensitivity issues and were approved by the MoGEI upon the review of the project's Conflict Sensitivity Note on Language Selection. It is important to note that under the GPEP, the RtL Programme focuses on literacy interventions in Bari and Ŋatoposa speaking areas. As such, RtL funded EGRA data collection for Bari and Ŋatoposa while UNICEF funded both EGRA and EGMA data collection in Dinka, Nuer and Zande speaking areas.

Systems strengthening and staff capacity development within the MoGEI was integrated in each component to ensure sustainability and scale-up beyond the project. For example, the EGRA and EGMA were selected to expose the members of the MoGEI's Examinations Secretariat and Curriculum Departments to a possible assessment mechanism which could potentially be used to monitor and evaluate policy implementation at the primary school level. Wherever possible, learning and direction for national level scale-up was built into the various project activities.

1.1 General Overview of Basic Education in South Sudan

The South Sudanese early grade education system is faced with challenges which it will need to address as it begins to enforce the education in national languages policy. The latest National Education Statistical Booklet of the Republic of South Sudan (2015) reports that most schools begin to use English as the main teaching language in P2[1]. This coincides with the lowest promotion rates being recorded from P1-P2: 61.9% as compared to a promotion rate of 72% for P3-4. However, promotion rates drop from P4 onwards (with the P4 to P5 promotion rate standing at 68.4% and the P7 to P8 rate standing at 64.4%). In addition, the highest repetition rates are reported in P4, with a national average of 9.4%. P1 repetition rates are the second highest standing at 8.4%[2].

One of the factors that may be contributing to the low retention rate for learners is the low level of training and qualifications that teachers in South Sudan acquire prior to and during their employment. It is reported that one in three teachers in South Sudan have not received any training. For those that have received training, only 7.3%, 14.5% and 16.6% have received diploma, pre-service and in-service training respectively[3]. In addition to the shortage of well trained teachers, another factor contributing to poor learner performance is the availability and access to learning and teaching materials. In South Sudan, there are generally less educational materials in the lower primary school grades as compared to the higher primary school grades. Pupil: Textbook ratios range from 1.6 to 1.4 in P1 to P4 whereas ratios for P5 - P8 fall between 2.8 and 4.3. There are slightly less English textbooks available than Mathematics ones[4].

The Government of the Republic of South Sudan (GRSS) developed the 'General Education Strategic Plan 2012-2017' (GESP) which aims to "introduce a series of reforms to improve quality, access to and funding for general education as well as tackle the issue of illiteracy in the country and low institutional and human capacity in the general education sub-sector". The present project is part of the MoGEI's on-going work to deliver against the GESP, with aspiration to impact access to and quality of education with a focus on improving literacy levels in South Sudan. It is expected that this will be achieved through improving the instruction that learners receive in the first four years of their primary education. Similar to many African education systems, South Sudan's education policy requires that the early grades of schooling be taught in the learners' national language. This national language policy will be reinforced as the new curriculum is rolled out over the next few years. However, while there is an increased emphasis on early grade literacy in national languages, the reality is that few early grade teachers are trained (many being 'voluntary' teachers) and even fewer have ever been trained to teach in their national language. In addition, there is currently limited availability and usage of TLMs in South Sudan. This will further inhibit effective learning in the classrooms. These are all challenges that the Improving Learning Outcomes Project hopes to address in the components following these assessments.

[1] Ministry of Education, Science and Technology. (2015). National Education Statistical Booklet of the Republic of South Sudan. Juba. p.69

[2] Ministry of Education, Science and Technology. (2015). National Education Statistical Booklet of the Republic of South Sudan. Juba. p.73-74

[3] Ministry of Education, Science and Technology. (2015). National Education Statistical Booklet of the Republic of South Sudan. Juba. p.62

[4] Ministry of Education, Science and Technology. (2015). National Education Statistical Booklet of the Republic of South Sudan. Juba. p.68

1.2 Purpose of the South Sudan EGRA and EGMA

EGRA and EGMA are composed of a number of subtests which examine instruction and uptake of different early grade literacy and numeracy skills. EGRA and EGMA were proposed for this project as their subtests are able to provide specific data on how teachers are teaching the three focus subjects of National Language Literacy, English literacy and Numeracy. EGRA is designed to look at the fundamental skills of reading, starting at the most basic letter recognition through to the more complex tasks of reading with comprehension, with intermediate steps of vocabulary recognition, phonemic awareness, and reading words both familiar and unfamiliar. Similarly, EGMA tests concepts of number identification, discriminating between quantities, and pattern recognition before moving into testing of addition, subtraction, and word problems which involve all four basic operations as well as some pre-algebraic skills. Typically, the goal of EGRA and EGMA is to determine where on the spectrum between nascent and fluent an entire education system lies in the aforementioned skills. While the test is performed on individual learners, analysing the data in aggregate can provide insights on the strengths and weaknesses of a school, county and even an entire national system.

Unlike most projects in which EGRA and EGMA are used to test a representative sample of the entire educational system, on this project the tools were used to understand the range of abilities learners present in reading and understanding national languages and English, and in conducting basic numeracy operations. The findings from the assessments would then be used to assist the MoGEI and its partners to target their support and professional development where it is most needed and design and deliver interventions that would fit within the South Sudanese context. In this case, the tools were in fact used as a diagnostic to inform the development of standards and benchmarks for literacy (in the five national languages and English) and numeracy. In addition, the EGRA and EGMA tools were used to serve as a model for the MOGEI Examinations Secretariat to consider for future system monitoring. Consequently, the study was not based on a random sample of schools with a sample size that could be generalized to the population as a whole. Where possible, and in conjunction with other recent studies done of early grade reading and mathematics in South Sudan, broad trends are tentatively identified. However, as learners were only drawn from select schools in those states where it is safe to operate, such aspirations are well beyond the scope of this project and are not the primary purpose of this study.

The main objectives of using the EGRA and EGMA on this project can thus be summarised as follows:

- To determine what a small sample of learners can do in their National Language, English and Mathematics after a minimum of three years in school;
- To disaggregate that data to further understand what skills learners are acquiring and to identify the gaps in their knowledge and skills which may hamper their chances of becoming fully literate in a national language and English;
- To use the analysis to inform a set of learning benchmarks and standards which will assist teachers in determining what they should be teaching and to what level, and the MoGEI in monitoring learning achievement in the early grades where national languages are used as the LoI;
- To model EGRA and EGMA (in its traditional or in a modified form) as a possible component in a broadened national assessment regime, which will assist the MoGEI in monitoring the teaching and learning which is going on in primary schools.

The data collected and analysed from the EGRA and EGMA tools adapted to the five national languages is presented in the following sections of this report.

2. METHODOLOGY

This chapter describes the determination of the sample for the diagnostic EGRA and EGMA data collection. In addition, it describes the content of the tools that were adapted; the assessment tool adaption process; how data was collected and the limitations of the study. It is important to recognise the roles that various MoGEI Departments played in the design and roll out of the EGRA and EGMA data collection for this project. It is recommended that these departments be consulted in any scale-up of EGRA and EGMA activities. Each MoGEI department that played a role in this exercise is mentioned in the activities described below.

2.1. Sampling

Given the specific purpose in administering EGRA and EGMA in this project, the study was not based on a random sample of schools with a sample size that could be generalised to the population as a whole. 50 learners were assessed for each of the five national languages (Bari, Ŋatoposa Dinka, Nuer, and Zande). The data collection was conducted in the states where each of these languages is dominant, except for the Nuer data collection which was conducted within refugee camps in Juba and Bentiu. School selection for the data collection was done purposively: only schools where the national languages was reliably reported as being used as the LoI in early grade classes were visited.

EGRA data was collected from 250 P3 learners and EGMA data was collected from 150 P3 learners. 70 learners (50 in the Dinka schools and 20 in the Nuer schools) were assessed in an initial data collection process in October 2015, and a further 180 P3 learners (50 in Bari schools; 50 in Zande schools; 50 in Ŋatoposa schools and 30 in Nuer schools) were included in the second data collection process conducted in early 2016.

2.1.1. Sampling Methodology for Schools

The schools to be included in this study were selected by RtL, MoGEI and UNICEF. These were selected on the basis of where RtL and UNICEF are conducting Global Partnership for Education Programme (GPEP) activities. Priority was given to the languages that are spoken in the areas where GPEP activities are being rolled out. Consequently, the schools were also selected on the basis of their usage of one of these languages as a Language of Instruction (LoI) in P1 – P3. The EGRA and EGMA instruments developed in the various national languages were then administered in the selected

In addition to the usage of the various languages as LoIs, schools were selected in both rural and urban settings to minimize the occurrence of skewed data. In fact, as a result of the need to reduce rural-urban bias in the analyses, additional data was collected using the Nuer EGRA and EGMA tools. This followed the review of the findings from the first data collection in which Nuer EGRA and EGMA data was collected from two schools in the Point of Civilian Contact (PoC) Camps in Juba. In order to make up for what could potentially be seen as an urban bias, three additional schools in Bentiu were selected for the second round of data collection. Although there had been plans to conduct assessments in at least one primary school in Malakal, fighting broke out shortly before the deployment of the second Nuer data collection team, so the plan was cancelled.

As typically occurs during EGRA and EGMA data collection, many circumstances and factors play into whether data is collected at a selected school. Some data collection teams found schools that had been selected for the data collection closed. In cases where it was not possible to access a school, the data collectors promptly contacted the respective State Ministry of Education (SMoE) and the RtL and UNICEF representatives in the area in order to identify and access an alternative school. It is important to note that despite the reassurances received from the schools and the SMoEs about the enforcement of the national languages policy in schools, the reality on the ground during the data collection activities was that many schools do not teach in national languages. In the few that do, it was also found in many instances that no more than one lesson of national language literacy was being taught per day and that English was in fact the LoI for all lessons.

2.1.2. Sampling Methodology for Learners

Within the schools selected, the sampling frame for learners stratified the learners by sex. This ensured full representation from both sexes in the data collected but weighted the learners based on their sex with respect to their actual proportion in relation to the overall population of P3 children in each of the schools. By weighting the responses using this method, it could be guaranteed that the data are the closest possible estimate to that of a hypothetical school census of all P3 pupils in these schools. If there were, for example, more boys than girls in a particular class, this inequality would be taken into account in the final results by weighting the boys' results proportionally to those of the girls. To put the gender stratified sampling in practice, assessors were trained and required to follow a step-by-step procedure in the selection of learners who they would administer the test on. This step-by-step procedure was practised during the Assessor Training Pilots and included in each assessor's EGRA and EGMA Protocol. A summary of what was covered in the protocol can be found in Annex 3.

2.2 The Improving Learning Outcomes Project Assessment Tools

The assessment tools that were used to determine learning outcomes and what influences them included:

- The Early Grade Reading and Mathematics Assessment (EGRA and EGMA) Tools
- A Lesson Observation Tool
- A Teacher Interview Tool
- A Pupil Context Interview Tool

The sections below summarize what each assessment tool contained. It is important to note that EGMA data were only collected for Dinka, Nuer and Zande learners since RtL funded EGRA (and not EGMA) data collection for Bari and Ŋatoposa learners.

2.2.1 The Grade Reading and Mathematics Assessment (EGRA and EGMA) Tools

EGRA and EGMA is delivered through a series of subtests. The decision on the subtasks to be included was deliberated on by the EGRA and EGMA team and presented to the project's Reference Group (RG) for approval during the Inception Phase. The MoGEI Examinations Secretariat was involved in the approval of the subtasks to be incorporated in the EGRA and EGMA given its participation in the project's RG. The final subtasks selected for this project are presented below. Descriptions on how each subtask on the assessment is conducted and how it was adapted can be found in Annex 1.

English and National Language Early Grade Reading Assessment (EGRA)

- Vocabulary Words (this subtask was only assessed in the English EGRA).
- Orientation of Script
- Letter Names and Letter Sounds (for the national languages only one test was used once it was established that in all five NLs letter sounds and names are the same).
- Familiar Word Identification
- Oral Reading Passage
- Reading Comprehension Questions
- Listening Comprehension

Early Grade Mathematics Assessment (EGMA)

The standard subtests in the core EGMA instrument were kept largely intact so only slight modifications were made. For the Zande, Nuer and Dinka EGMA data collection, pupils were given the option to respond in any language they preferred to use. The following subtasks were used for the EGMA data collection:

- Number Identification
- Quantitative Comparison
- Numerical Pattern Recognition
- Addition Level 1
- Addition Level 2
- Subtraction Level 1
- Subtraction Level 2
- Word Problems

The EGRA and EGMA tool adaptation process was undertaken in September 2015 (for Dinka and Nuer) and February 2016 (for Bari, Ŋatoposa, Otuho[5] and Zande) for this project. Details on how the different EGMA subtasks were modified, how the National Language EGRA was adapted and the Adaptation Workshop challenges are summarised in Annex 2. Complementary assessment tools are described in detail below.

2.2.2 Pupil Context Interview

At the end of one of the tests the sampled learners were given a short interview which could be administered in any language that the learner spoke so long as the enumerator could also speak that language. The questions in this interview are used to establish the socio-economic status of the learner's family. This interview is a standard addition to EGRA tests and has been shown internationally to provide some insight into the profile of the community the learners come from. More information on the type of questions asked during the interview can be found in Annex 1.

2.2.3 Lesson Observation Tool

In order to have a full contextual understanding of what happens in classrooms, it was recommended that lesson observations be undertaken in each sampled school. In the end, it was determined that a maximum of five lesson observations would be conducted in the sample schools in the following lessons:

[5] The project was requested to add Otuho to the pilot National Language EGRA and EGMA. However, due to a number of issues that came out during the Adaption Workshop in May, Otuho activities had to be discontinued. Please see Annex 2 for a summary of the challenges encountered in piloting Otuho EGRA and EGMA.

- P1 National Language Literacy
- P1 Numeracy
- P3 Numeracy,
- P3 National Language Literacy, and
- P3 English.

The differences between the tools prepared for observing the different subjects mainly centred on a section which asked for observations specific to the subject that was taught and the use of varied teaching and learning materials appropriate to that subject. More details on what was to be observed during lessons can be found in Annex 1.

2.2.4 Teacher Interview Tool

A teacher interview tool was developed to further elaborate on findings from the lesson observation. It was decided that each of the P3 teachers observed was to also be interviewed along with a number of P1 and P3 teachers where possible, using the teacher interview tool. More information on the type of questions asked during the interview can be found in Annex 1.

2.3 EGRA and EGMA Tool Adaptation for South Sudan

Prior to EGRA and EGMA being conducted in a new context (whether that is in a country where it has not been administered or in a new language) the subtests need to be reviewed and adapted to this new environment. Generally, the EGMA subtests need little adaptation, with the exception of the word problems, which must be culturally acceptable and accessible.

The EGRA subtests in English drew on subtests which Montrose had already adapted for various projects in South Sudan. Minor letter and word grid adjustments were made and new text material and comprehension questions were developed by the adaptation team for this project.

In the circumstances when EGRA is to be administered in national languages, as was the case for this project, an adaptation workshop must be conducted to develop the literacy materials that learners will be tested on. For languages for which no known adaptation has ever taken place (such as Ŋatoposa, Nuer, Otuho and Zande), the process to ensure that the EGRA subtests are accessible to children who speak in national languages is quite considerable. Even in cases in which EGRA tools have been adapted to different national languages, it is important to consider the development of new subtest contents to ensure that test results are reliable; particularly in cases where a large number of learners have been tested.

Once the appropriate subtasks had been agreed upon and a conflict sensitivity assessment on the national languages to be piloted had been undertaken and approved by the project's RG and the Undersecretary of the MoGEI, the selected EGRA and EGMA subtasks were adapted to ensure that they were appropriate for the context in which they were to be administered. Two EGRA and EGMA Adaptation Workshops were conducted for this project: one in September 2015 for the Dinka and Nuer EGRA and EGMA tools and the second in February 2016 for the Bari, Ŋatoposa, Otuho and Zande EGRA and EGMA tools.

In addition to the EGRA and EGMA tool adaptation process, a Language Verification Workshop was conducted in October 2015 while a Translation Workshop ran concurrently with the February 2016 Adaptation Workshop. These activities ensured that an additional layer of linguistic review on the adapted tools had been conducted. All of the aforementioned activities were conducted in Juba. For more information on how the Adaptation Teams were selected, the proceedings of the Adaptation Workshop and the challenges that were encountered, please refer to Annex 2.

2.4 Data Collection

Forcier Consulting was subcontracted to conduct the EGRA and EGMA data collection given their past experience in conducting such assessments in South Sudan. Following the development and reviewing of the assessment tools, preparations were put in place for the tablet-based data collection process, namely the:

- Identification of enumerators
- Training and selection of enumerators
- Development of a Research Protocol and Process.

More detailed information on the preparation processes outlined above can be found in Annex 3 of this report. Following the assessor training, data was collected from the sampled schools for a two-week period. Over the two weeks of data collection, the assessors uploaded data through 'Tangerine'[6]. This data was then compiled into a single spreadsheet for an EGRA and EGMA data analyst to clean, analyse and report on.

3. LIMITATIONS

The limitations to this study can be summarised as follows:

- *Sample Size*. The sample size is small and purposively sampled. As such, findings from it cannot be the basis for drawing any generalizable conclusions in relation to the national education system, or even related to the states where the samples were drawn;
- *Use of EGRA and EGMA*. Although EGRA were used to gather diagnostic data, that is not the main purpose for which EGRA and EGMA were originally developed. While there is value in using these assessments diagnostically to inform national standards, it should be understood that this is not the use to which they are normally put. EGRA and EGMA are used predominantly to measure the literacy and numeracy levels of learners of a certain grade or age across a system or subsystem;
- *Experience of enumerators*. Few people in South Sudan with the requisite language skills have ever been trained in conducting EGRA and EGMA. To create a cadre of enumerators whose national language is one of the five that were piloted involved training almost a whole team with no prior experience of conducting such assessments.
- *Inclusion of English Letter Sounds Subtest*. The subtest was included even though it was known that it was likely to be a new concept for both the P3 learners and enumerators. This made it a more challenging task than letter names to administer. However, the enumerators were trained intensively in English letter sounds during their orientation and training. The inclusion of the subtest followed discussion with the MoGEI. The decision to include it came out of the need for further evidence that while P3 learners may know letter names they have almost no knowledge of the sounds letters make which is the basis for the learning English. There was a need for more data on how English is being taught and learners' phonemic awareness.

[6] Tangerine is a software programme that has been developed to electronically collect EGRA and EGMA data on smart devices.

- *Discrepancies in actual practice in schools:* It was found that many schools that report National Language instruction in P1 – P3 are not using the National Language of the children as a LoI. This was the case for the Bari and Zande schools that were recommended for the piloting processes in Juba, as well as many of the schools in which data was to be collected. While many of these schools teach one National Language class period per day, they use English as the LoI for the rest of the lessons. Many school officials chalked it up to the ethnic diversity of their school population and a few to the lack of learning and teaching materials in the various National Languages. For scale-up activities, careful verification of how much instruction is provided in National Languages needs to be undertaken prior to in-school activities.

- *Learner Attendance and Fluency in the National Languages:* At the time of the second round of EGRA and EGMA, learner attendance was still very low at the data collection schools that were visited although classes were officially in session. In addition to this, the assessors found that there were few learners in the testing window (P4) who were able to speak the language.

4. PRESENTATION AND ANALYSIS OF RESULTS

This chapter summarises the findings from the analyses conducted on the EGRA and EGMA data collected from the twenty-five sample schools. The detailed graphs for the English and national language subtests are presented in Annex 4 and 5. This chapter presents an overview of the data and a discussion of the results, which are not disaggregated by national language. This is deliberate as differentiation by language within the context of South Sudan has been seen to create ethnic comparison and potentially tension.

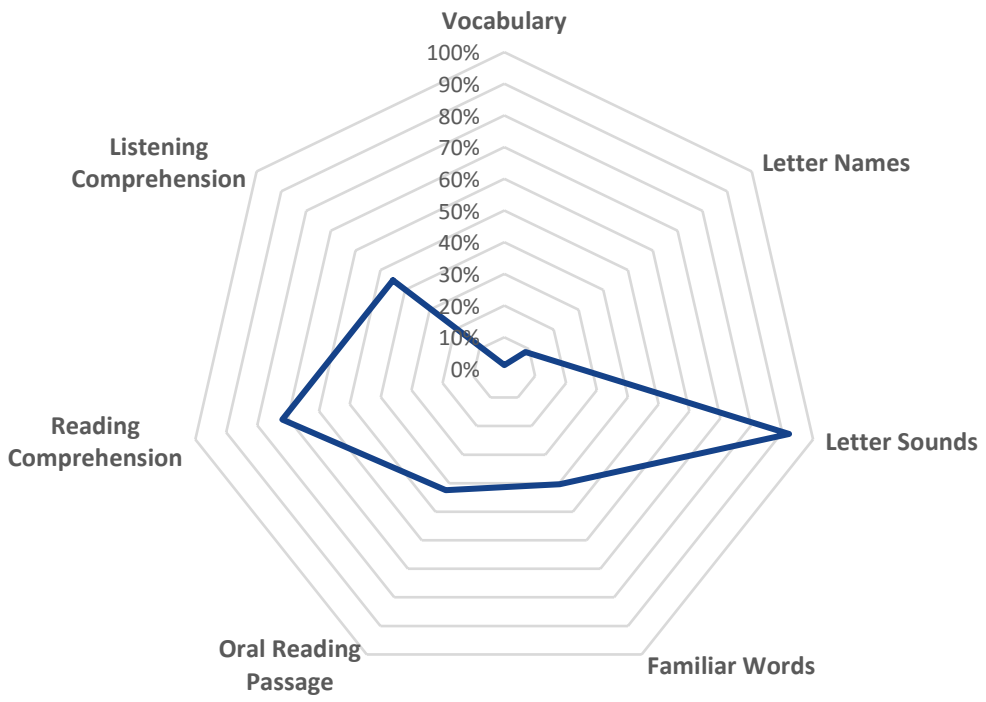
4.1. English and National Language EGRA Results

The three most used metrics for describing reading levels are:

- the proportion of learners who did not correctly identify any of the letters and words (zero score);
- the number of letters and words that learners correctly identified (score); and
- based on the score, the correct letters or words read per minute for timed tests (fluency).

Whereas a group of 'fluent' readers would have high score and fluency values, there would be a low proportion of learners in this group with zero items correct. To help quickly identify the difference, zero score charts will use radar or 'spider' plots (see Graphs 1 and 2 below). On the radar graphs a 'good' result will be nearest the centre and a 'poor' result will be on the furthest edge of the plot. For example, Graph 1 shows the zero scores for learners on the seven subtests of the English EGRA.

Graph 1: Proportion of Pupils Scoring Zero Items Correct in English Subtests

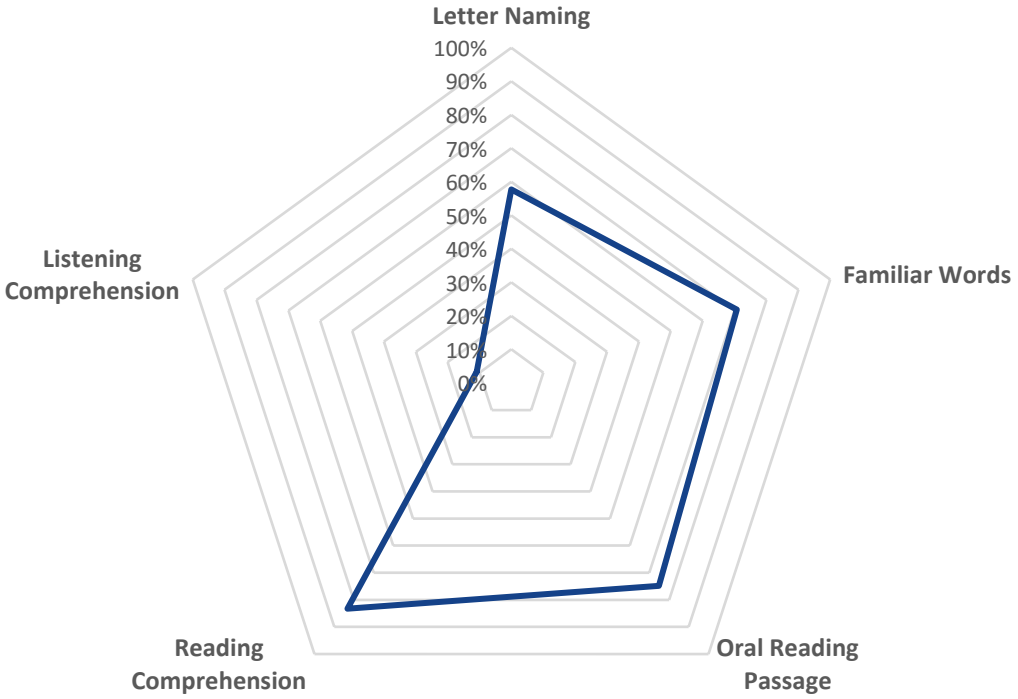


Fully 99% of the learners across the five ethnic groups were able to recognise at least one of the 20 vocabulary/instruction words in English, while 91% of the learners could identify at least one letter name in the English alphabet. However, 92% of the learners could not correctly sound out any of the letters in the English alphabet, and 40% could not read any of the fifty familiar English words presented to them. A similar proportion of learners (45%) could not correctly answer any of the five questions asked at the end of the listening comprehension passage, after the passage was read to each learner twice.

Similarly, over half of the learners could not recognise any letter name or sound in their national language (see Graph 2), while 71% could not read a single common word in their national language and 75% could not read any word from a passage they were asked to read. 83% of the learners could not answer any questions on the passage they had been asked to read. However, nearly 90% of the learners could answer at least one comprehension question on a passage that had been read to them in their national language.

The apparent implication of these national language and English EGRA results are that the sampled P3 learners are being taught mainly in English and so have greater ability to recognise and read letters and words in English than in their national language. However, when told a story in their national language they are able to comprehend and answer recall questions on that story.

Graph 2: Proportion of Pupils Scoring Zero Items Correct in National Language Subtests

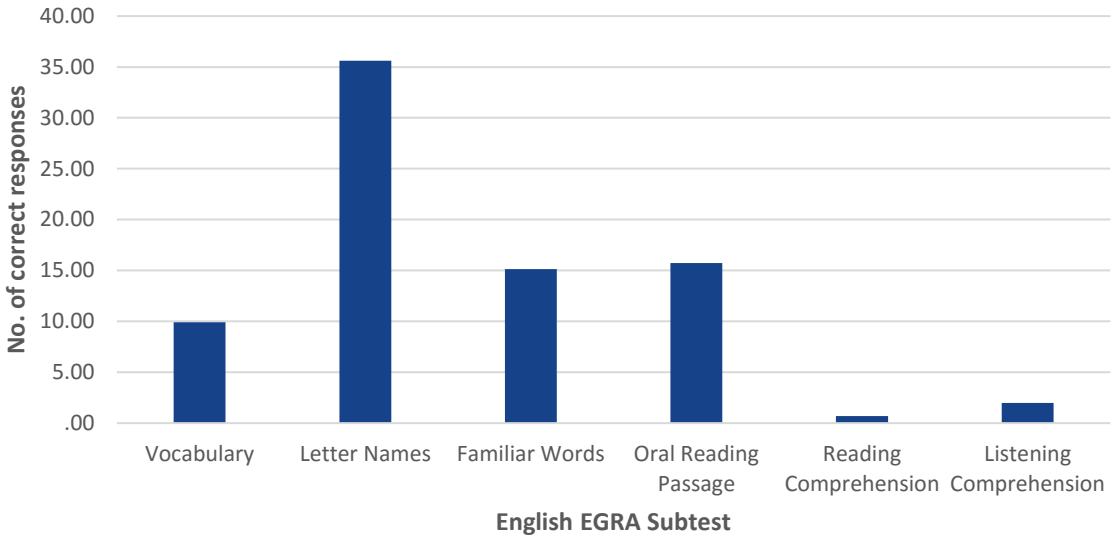


Looking at the English and National Language subtests (see Graphs 3 and 4) in more detail seems to confirm that generally the P3 learners show more fluency and higher levels of average correct responses in English than in their national language. This is the case for each of the subtests except for the listening comprehension in national language, which shows on average each learner could answer over 3 of the 5 comprehension questions in national language compared to 1.33 out of 5 questions in the English comprehension exercise.

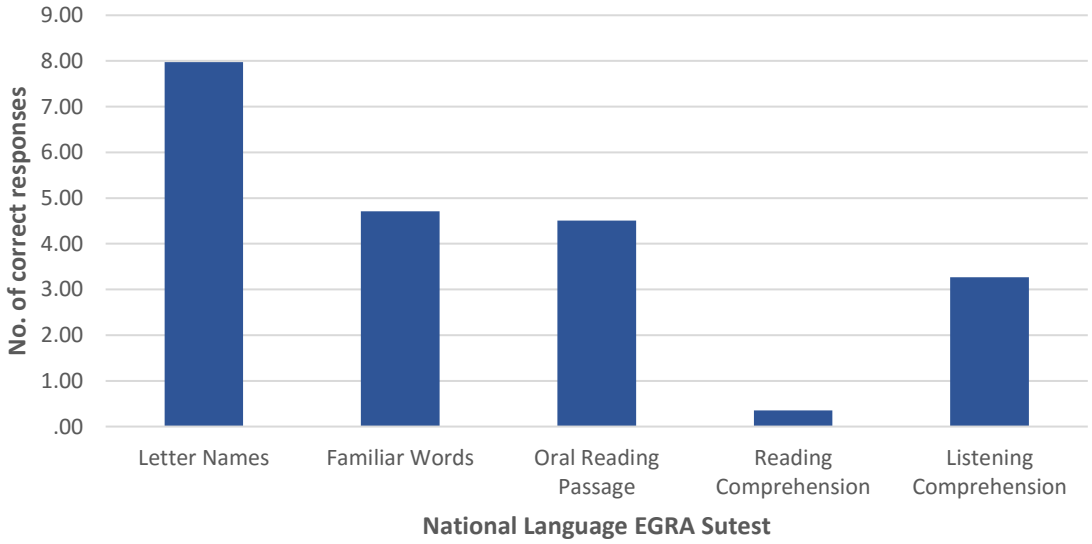
In the letter names subtest, the P3 learners were able to identify on average 37 letters on the grid of 100 letters, while in their national language they were only able to identify correctly an average of just under 8 letters in the grid. Similar results were found in the 'common' words subtests, with the P3 learners able to identify on average three times as many of the words in English as compared to their national languages. However, it is important to note that even in English they were only able to identify on average 12 words in one minute. Fluency in English, such that a reader can make sense of what they are reading, requires that a learner can read about 60 words a minute. In other languages this may be less, but will always be above 40 read in a minute. With an average of 4,7 words a minute read in their national language these learners are way below the threshold for fluency and reading with understanding.

It is therefore logical that their scores for comprehension based on the reading passages in both English and national language are very low, with each learner on average being able to answer 0.7 of the English comprehension questions while only 1 in every 3 of the learners could answer a single question correctly on their national language text.

Graph 3: English EGRA Subtests Average Correct Responses per Subtest

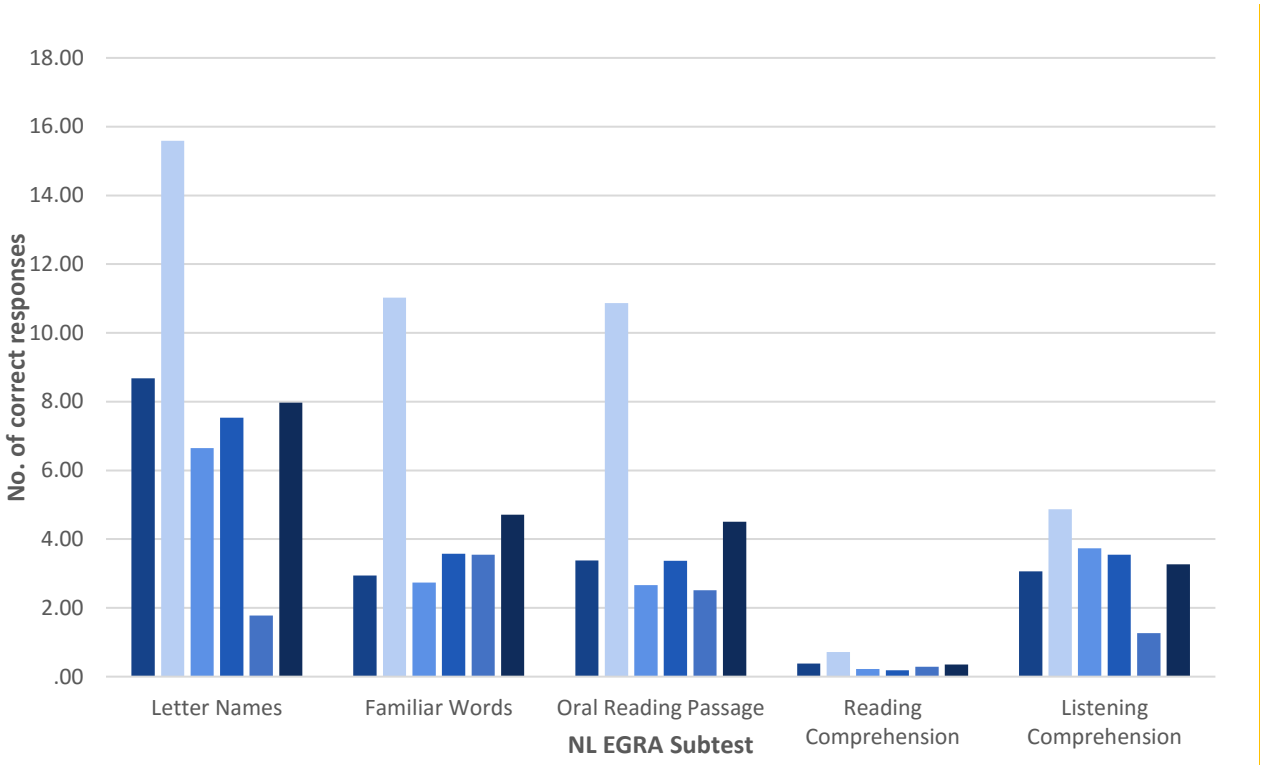


Graph 4: National Language EGRA Subtests Average Fluency Rates



The final consolidated graph below (Graph 5), indicates that between national language groups there was a considerable variation in responses. The first 5 columns for each subtest represents a different language group, while the last column shows the average across the languages for that subtest. The languages are deliberately not named, but the point being illustrated are clear. There are general trends across all the national language groups with all showing low levels of reading comprehension, and relatively high levels of listening comprehension (these are calculated out of 5), while the letter names, familiar words and oral reading varies somewhat between groups, with one language group, with access to NGO support and textbooks, far out-performing the others. However, even the 50 learners from this national language are not able to answer the reading comprehension questions as they also lack the necessary reading fluency for comprehension, at an average of just over 10 words per minute – far short of the 60 required at this stage in their education.

Graph 5: National Language EGRA Subtests Fluency Rates by Different National Language Groups

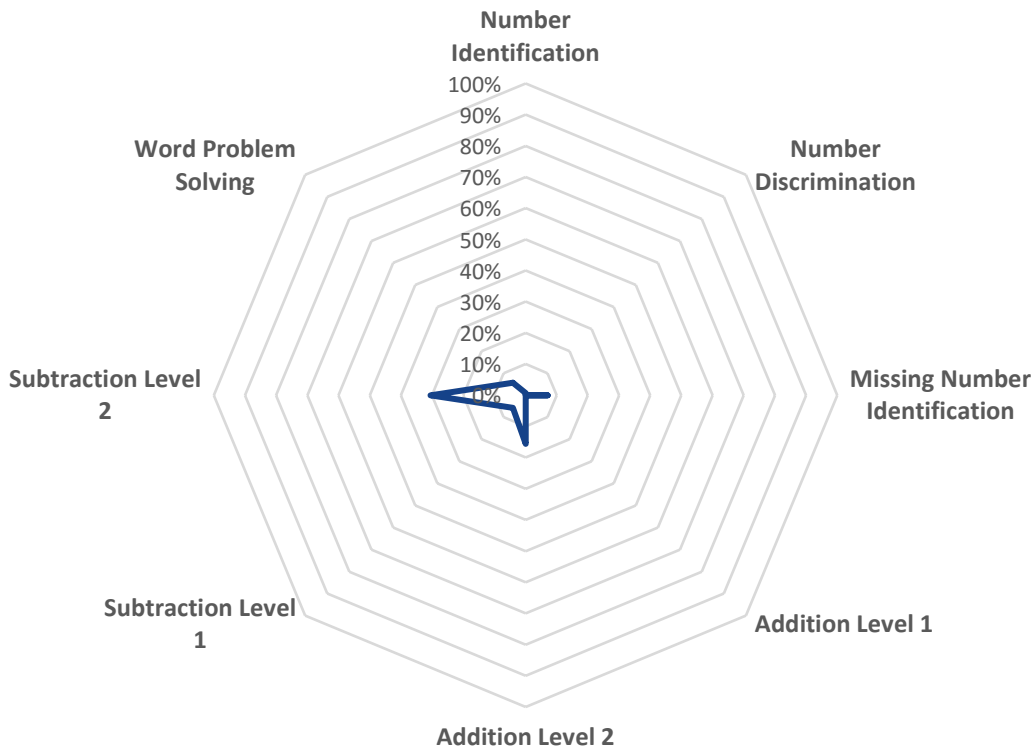


4.2. EGMA Results

The radar graph of zero scores (see Graph 6) indicates that fewer learners scored zero than for the literacy tests. Only in the more difficult subtests (addition and subtraction Level 2), which involve manipulating multi-digit numbers and an understanding of place value, did less than 90% of the sampled learners get at least one sum correct.

Generally, therefore the results on the numeracy tests were somewhat better than the literacy ones, in that they are more in line with the competence and automaticity (mathematical fluency) levels expected of children who have been in school for three years. All the numeracy tests can be administered in any language the learners choose. This means that language should not have created a barrier to the sampled learners understanding what was required of them in each subtest and performing that subtest.

Graph 6: Proportion of Pupils Scoring Zero Items Correct in Numeracy Subtests

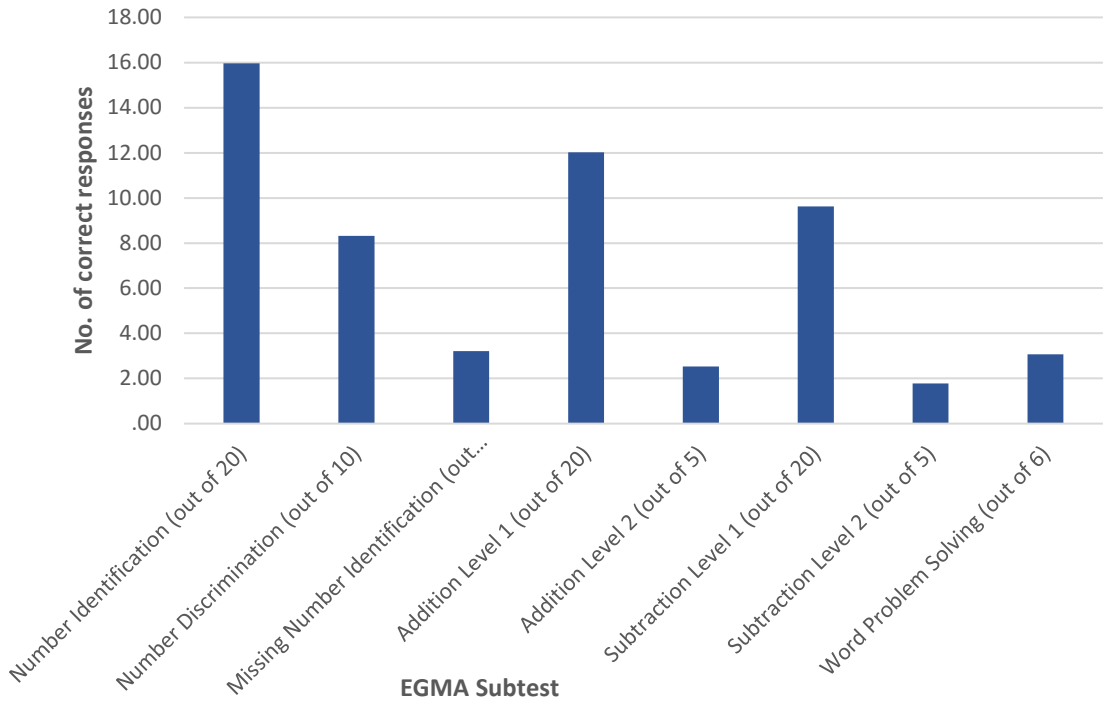


Number identification automaticity rates indicated that the learners on average identified each number in just under 2 seconds. As some of the numbers are hard to say quickly and accurately, such as 673 ("six hundred and seventy-three"), this result is positive. However, a faster speed would be expected at Grade 3 allowing the learners greater automaticity when it comes to harder algorithms. Only 1% (2 learners) of the sample could not identify any number on the grid.

Graph 7 indicates the number of items that the sampled learners were able to get correct in each subtest out of the total number of items in that subtest. Only the first subtest (number identification) is timed. In the other subtests learners can have as much time as they need. For the more advanced level 2 addition and subtraction problems, the learners are asked if they know of a faster method if they are calculating using counters or their fingers. If they do not know the set-up method or cannot perform the calculation in their heads, then the enumerator moves on to the next subtest. By P3 all learners should know how to set up multi-digit number calculations.

Graph 7 shows that on average the learners could answer most of the number discrimination questions. This subtest gets the learners to identify which is the larger between two numbers. As there are only two options higher scores are expected on this subtest. However, every learner got at least one correct, and a score of 8.33 out of 10 indicates that most learners understood the concept and could identify some correctly.

Graph 7: EGMA Subtests Average Automaticity Rates (average number of correct answers given by learners)



The learners struggled with the identification of missing numbers and with simple subtraction. Even in the simple addition subtest, on average only 12 out of the 20 sums were done correctly. Many of the incorrect answers offered relate to the dependence most learners had on slow and inefficient levels of calculating i.e. using their fingers and counters. In the final subtest (word problems) learners were encouraged to use counters. They had to answer a range of word problems asked in any language the learner preferred. These problems involved addition, subtraction, division, multiplication and simple algebra. On average the learners were able to answer half of them correctly (3 out of 6), which is commendable. However, the questions which involved a basic knowledge of algebra got lower 23% and 33% correct rates and just over half the sample struggled with those questions which required multiplication and division (see Annex 6).

While direct comparisons with other countries where EGMA is administered to Grade 3 learners is of little value, this series of assessment supports earlier assertions from studies conducted by DfID that while South Sudanese school children generally lag behind their peers in the region in EGRA, they are relatively strong in mathematics. In fact, the results indicate that with reasonable strong foundations teachers should be teaching multi-digit calculations and the set-up method earlier that seems to be the case at present in many of the sampled schools.

From earlier EGRA and EGMA data collection processes Montrose was aware that learner tests in South Sudan have a tendency of producing results which are hard to analyse from the data alone. For that reason, in the project design phase Montrose determined that the enumerators would not only test learners but also observe a sample of P3 and P1 lessons and interview the P3 teachers. Relevant findings from these additional data collection processes are presented below in sections 4.3 and 4.4.

4.3. Pupil Context Interview Findings

The pupil interviews, which were conducted with all 250 learners who were tested provide some evidence of the socio-economic realities of the families to which the learners belong and so put their assessment results into a broader context. Analyses conducted on the data from these interviews showed that most of the learners (57%) indicated they attended nursery school. Extended absence from school in the last year (at 35%) was fairly high and in terms of existence of a supportive learning environment at home, only a third of the learners (34%) reported that they have reading materials at home. Less than a third of the learners interviewed had mothers who are literate (could read and write) while 59% of the learners reported their fathers were literate.

Table 1: Learners' educational background

Variables	Proportion of pupils interviewed
Ate before school today	40%
Attended nursery school	57%
Absent last year > 1 week	35%
Reading materials at home	34%
Mother can read and write	31%
Father can read and write	59%

Overall, 72% of the learners reported that much of their learning was conducted in English. The use of the national language at school varied considerably across the different language groups and it was also found that Juba Arabic is still widely used in some schools. Overall, very few learners (3%) reported use of English at home. The majority were using their national language at home.

4.4. Lesson Observation Findings

Although trained on conducting lesson observations in their training, the enumerators' lesson observations are only used to assist in better understanding findings from the EGRA tests where there is a high level of consensus across the observations.

The enumerators managed to observe 72 lessons in the 25 schools. This is an average of just under three lessons per school, 34 of which were numeracy lessons and 38 were literacy lessons. Of the literacy lessons observed, 21 were national language literacy lessons while 17 were English literacy lessons. Various observations were made in the 72 lessons which were observed. The main ones were that:

- All the observed lessons were predominantly or entirely teacher-centred. Only 40% of the teachers had a lesson plan, 65 of the 72 teachers were assessed by the enumerators as understood by their learners. However, only 7 of the teachers had grouped the learners' desks and 10 used any form of group or pair work during the observed lessons. Only in 43% of the classes were pupils given written work that helped them practice the skills that they were meant to be learning (with most being in numeracy), while in about two thirds of the literacy lessons (63%) were the learners required to read during the literacy lesson. In only 29% of the English classes were learners observed using any English words in the lesson, except when responding to the teacher. This inevitably limits the time allocated for learners to practice the new literacy skills they should be learning in English. However, in 90% of the National Language Literacy lessons the learners are heard to communicate with each other in their national language during class.

- While English textbooks were available in most of the schools, only 38% of the Numeracy and National Language Literacy lessons had any textbooks or teaching aids in their national languages. Just under half (49%) of the 72 teachers had textbooks in the classroom but only one of the teachers (in a P3 numeracy lesson) distributed textbooks to the learners. This may support a finding in the DFID funded textbook provision evaluation[7], which is that without specific training in using textbooks in the classroom, many teachers in South Sudan lack the confidence and experience to use textbooks in the classroom during the lessons.

- There was surprisingly little code switching used in the English lessons, with only 7 out of 17 (41%) P3 English teachers using this method of reinforcement. Not surprisingly none of the English lessons in the Ŋatoposa schools saw any code switching; the teachers would appear not to share a national language with the learners, which is a prerequisite for code switching. In all 17 P3 and 5 of the 17 P1 Numeracy lessons, the lesson was delivered predominantly in English with 14 of the teachers reported to have used no other language in the lesson. This predominance of the use of English in numeracy lessons may reflect the lack of teaching aids in national languages, particularly in P3.

- The early grade learners are often taught by a variety of different teachers for numeracy, national language and English. This undermines the opportunity of learners to build a strong relationship with their class teacher. As a result, it would appear that the teachers cannot build up an overall integrated picture of each learner's skills. Therefore, the potential for learners to complete P3 without basic literacy and numeracy skills is magnified.

4.5. Teacher Interview Findings

A total of 37 teachers were interviewed in the 25 schools with the majority being males (84%) and with secondary education certificate (81%). Although the majority of teachers interviewed were teaching lower primary, less than 1 in 4 (24%) say they have been trained in teaching in a national language. Given that it is government policy in P3 to teach in national language we can assume this is likely to be under-reported. In contrast, 70% of the teachers reported that they had received some training to teach in English. Most of the training of the teachers for either teaching in national language or in the English language was done by NGOs. Perhaps not surprisingly, given the above responses, a third of the interviewed teachers (33%) reported that they were not confident teaching in the school's national language while 94% felt confident teaching in English.

Three quarters of the teachers reported they did not have any text books in their national language. This statistic varied greatly between language groups, with teachers in two thirds of the Bari schools saying that they have access to textbooks in Bari while none of the Ŋatoposa teachers claimed to have access to any national language textbooks. In contrast 83% of the teachers said they had English textbooks, across all the language groups. Only a half of the teachers reported using any textbooks at all during lesson delivery. Furthermore, only three quarters of teachers indicated that they use any teaching aids during lesson delivery.

[7] DfID (2016). Evaluation of South Sudan Textbook Project – Final Year: Survey Report. Unpublished.

5. CONCLUSIONS

The poor results for reading common words and connected text in both national language and English, and the low number of correct responses to the comprehension questions in all languages indicate that the sampled learners are likely to struggle with all literacy based tasks they face in school. This small study indicates that the vast majority of the purposive sample of learners who have reached the end of P3 lack reading automaticity in either national language or in English. This reflects similar results in relation to acquisition of reading skills in English to other EGRA and EGMA studies conducted in South Sudan[8]. The study further indicates that very few learners have gained the fluency in reading in English by the end of P3 that they need in order to manage the broader curriculum in P4.

As anticipated learners can answer questions about what they are read in their national language but most could not read a single common word in their national language after three years of schooling. This is a policy and pedagogical issue. Based on the test results, the lesson observations and teacher interviews, it appears that many of the teachers are not teaching in the national language as the LoI even in schools which claim to be doing so. However, even where teachers are using the relevant national language as the LoI the learner assessment results indicate that they are struggling to teach the national language and as well as teaching in it.

By testing learners in both English and national language, it is possible to establish a broader picture of what learners are taught on a daily basis, irrespective of what the teachers report. For example, whilst over 90% of the learners could correctly identify at least one letter name from the English alphabet, close to two thirds (58%) of the same learners could not correctly identify a single letter name in their respective languages. On the other hand, the zero score for the English Listening Comprehension was 45% while the equivalent for the national language was only 11%. This is to be expected as it indicates that the learners understand a story told to them in national language much better than in English. However, this was the only subtest which showed any reasonable level of competency on the National Language EGRA. It should be noted that this test, unlike the others, does not require any reading ability. Lacking any or many learning and teaching materials in national languages leaves these mainly untrained teachers limited teaching options. As a result, most fall back on a very limited teacher-centred approach which leaves the learners little or no time to read or in fact engage with any learning task.

The findings from the numeracy assessment are somewhat different. Almost all the sampled learners indicated some level of knowledge and application. The concern is that teachers do not seem to be pushing the learners hard enough so they can successfully attempt double and triple digit addition and subtraction questions and are not teaching learners structured ways of efficient calculation methods by the end of P3 (including the set-up method).

Before looking at recommendations we must reiterate the point made earlier that given the small size and partial nature of the sample, drawing any firm conclusions is not possible. However, as the study replicates findings from other studies that have been conducted in South Sudan, some confidence can be drawn from the points made below.

6. RECOMMENDATIONS FOR INTERVENTION

This report carries significant messages for the South Sudan education system, the institutions of learning which train teachers, and primary schools which deliver the curriculum to children directly. The results for the National Language EGRA tests are likely to generate considerable discussion since this is the first study in which EGRA data has been collected in most of these national languages in South Sudan. The most important recommendations are detailed below.

[8] See studies conducted by GESS, DfID and the MoGEI in 2014, 2015 and 2016.

6.1. Policy Level

- That a majority of learners in this sample could not read one word in their national language would seem to indicate that at school level little teaching is being conducted in any of the five national languages being tested. It is acknowledged that the lack of texts and learning and teaching materials in these NLs makes implementing the policy problematic. The implications for the MoGEI are great: it is not enough to put in place a policy, teachers appear to require training and support in teaching in their national language, as well as in how to teach reading. If the Ministry is committed to the national language policy, then it will need to allocate resources to training and supporting the early grade teachers and providing them with appropriate materials. Further research is needed on whether this failure by this small sample of teachers of English and national language to teach reading in the early grade is replicated in other schools and across other language groups.
- The failure to implement the policy requirement of national language teaching in the early grades if replicated across different linguistic communities poses serious challenges to the State Ministries of Education and the National Examinations Secretariat in setting assessment tasks. If they are set in the national language, many learners will be disadvantaged and if they are set in English, they will be seen to be ignoring national policy.
- As the policy argues that learning first in one's national language makes learning in English from P4 easier it is important to note that the limited ability of the sampled early grade teachers to teach in the NL of the learners is likely to disadvantage English. This is compounded by the results which indicate that English is not being taught well as a subject in the early grades.
- The results published in this report indicate that if the situation outlined above is repeated across the country and across other national languages, then a national intervention and campaign to both prepare teachers to teach in their national language and to support them with materials and assessment practices in South Sudan's national languages should be initiated. At the same time the teaching of English as a subject in early grade classes needs to be better supported with training of teachers so they can better use the resources available.

6.2. Institutional Level

- At school and college levels it must not be assumed that a teacher or lecturer who is a speaker of a particular national language can naturally teach that language to early grade learners and trainee teachers. Teachers and lecturers need to be trained how to teach children to read in their national language and also how to teach children to read in their national language.
- The reason for the low scores in both national language and English appears to relate mainly to how teachers are teaching and are trained to teach reading. As in most African countries the focus has been on the alphabet and the naming of letters. However, this is not helpful when building and sounding out words, particularly in English where most letter names and sounds are not the same.
- This indicates that a new approach is urgently required in the way in which teachers are prepared and supported in teaching early grade reading. A relatively small change in practice to one where letter sounds and words are sounded out could make a huge difference to literacy levels and retention rates in primary schools. If teachers were also trained in how to make and use appropriate instructional materials as well as make their lessons progress through phases of development, while pairing and grouping learners so that they engage and talk and read more, then there could be a dramatic impact on the literacy levels and ability of learners to succeed across the curriculum.

6.3. Classroom and Learner Level

- It is evident from the data collected to date that most teachers are teaching in a traditional didactic 'chalk and talk' mode. This is detrimental to learners who are learning in an environment where they get very little chance to converse in the LoI (English) and to read any language. Learners in P1 – P4 need the maximum time possible given to individual reading and cooperative learning to build their language skills and confidence. Learners who are listening to the teacher are not developing and practicing their language skills.
- Teachers need to be encouraged by the MoGEI and SMoEs as well as their payam offices to teach literacy in their national language in P1 to P3, where it is the same as the learners', and they should be given support in the way of training and materials to better achieve this.
- Most teachers in the schools visited have textbooks but appear to not know how to use them. Only one of the 72 teachers observed teaching distributed textbooks to the learners, although 49% of these teachers had textbooks present in the classroom. This indicates that very few of the teachers observed appears to be confident in using LTMs in the classroom. It would appear that teachers need training and support in the use of available LTMs and in making their own LTMs out of locally available materials.
- Schools need to rethink the way that they allocate teachers to the early grades, with a single teacher teaching all the subjects in P1, another teaching all the subjects in P2 and the same in P3. This will help identify struggling children while also helping ensure that all the subjects are taught in an integrated and articulated fashion.

REFERENCES

DfID (2016). Evaluation of South Sudan Textbook Project – Final Year: Survey Report. Unpublished.

Ministry of Education, Science and Technology. (2015). *National Education Statistical Booklet of the Republic of South Sudan.* Juba.

ANNEX 1 AN OVERVIEW OF THE EGRA AND EGMA INSTRUMENTS

The sections below describe the content and purpose of each assessment tool and how they were modified to fit the South Sudanese context. It is important to note that EGMA data were only collected for Dinka, Nuer and Zande learners since RtL funded EGRA (and not EGMA) data collection for Bari and Ŋatoposa learners.

The Early Grade Reading and Mathematics Assessment (EGRA and EGMA) Tools

The final subtasks selected and adapted for this project are presented below with descriptions on what they assess children on and how they were modified.

English and National Language Early Grade Reading Assessment (EGRA)

- Vocabulary Words (English language test only)
  This subtest checks learner understanding of simple instructions and their ability to convert instructions into actions. The learners are asked to identify different parts of their body ('foot', 'arm'), items in the environment around them ('rubber', 'pencil', 'floor') and finally are shown a pencil and asked to put the pencil in different positions in relation to a piece of paper ('next to the paper', 'in front of the paper').

- Orientation of Script
  While not one of the originally planned subtests, it was decided that there may be many schools where the children were largely instructed in Arabic or Juba Arabic. In these schools, learners may not know that reading in English and (non-Arabic) national languages begins in the top left corner and proceeds to the right. It was therefore decided that a section to determine learner understanding of the basic concepts of reading script should be added to help inform the setting of standards. This would allow the team to determine whether a Primary 1 pre-reading standard should be included in the standards document if findings were such that many learners do not know how to read English and national language script.

- Letter Names and Letter Sounds
  While letter sounds are more fundamental to subsequent reading skills, previous testing processes indicated that there were likely to be very few classrooms nationwide where letter sounds were taught. Therefore, a grid of 100 letters was selected, both lower and upper case, for the children to identify by name and by sound in two separate tests. On these tasks, the 52 lower and upper case letters are randomly placed so that there are a total of 100 items including repetitions of commonly used letters. These items had been arranged in advance by the trainer through a "shuffling" program that allows for randomization. The juxta-positioning of the tests on the naming and sounding out of letters should aid in determining how teachers are teaching reading in English. While both these tests were administered for the National Languages in the first round of data collection, the letter names test was dropped from the second round of National Language EGRA data collection.

- Familiar Word Identification
  Examples of common English and National Language words which learners in Primary 3 would be expected to know were reviewed and used in addition to the adaptation workshop participants' teaching experience to create a list of over 80 words which most children should know. Words which were similar or used similar letter combinations were then removed from the list until the list comprised 50 words. These words were randomised to create the grid of words in the final assessment.

- Oral Reading Passage and Reading Comprehension Questions
  These stories typically have a standard format in that they have: a problem, a climax, and resolution. The first four comprehension questions are literal in nature as the answers are found directly in the text and spread evenly throughout the paragraph. The fifth question is inferential, asking the child to interpret clues in the text and form an opinion about how the protagonist feels or sees the situation.

- Listening Comprehension
  This subtask is similar to the Oral Reading Passage and Reading Comprehension Questions. However, it uses more complex vocabulary since children have a much higher passive than active vocabulary. For this subtask, learners are required to listen to a short oral passage read to them by the enumerator. They are then asked five comprehension questions about the story that was read to them.

Early Grade Mathematics Assessment (EGMA)

- Number Identification
  In this subtask, learners' abilities to recognise numbers correctly is assessed. A grid of numbers ranging in place values is presented to the learner. They are requested to read out each number on the grid. The exercise is timed and accuracy depends on correct identification e.g. 957 is marked as incorrect if the pupil says "nine, five, seven" as opposed to "nine hundred and fifty-seven". No modifications were made to this subtask.

- Quantitative Comparison
  Learners are assessed on their ability to differentiate between large and small quantities. Two numbers are presented alongside each other and the learners are required to state which number is larger out of the two. This exercise is not timed and the learners are only prompted to proceed to the next exercise if they answer four successive questions incorrectly.

- Numerical Pattern Recognition
  Here learners are presented a missing number exercise and fill in the blank number. This exercise requires learners to identify the pattern in the sequence and apply the right mathematical operation to determine the missing number.

- Addition Level 1
  For this subtask, learners are given a sheet of simple addition questions and are given one minute to calculate as many of them as they can. The enumerator also provides a pencil and a paper on which the learner can calculate the sums. This exercises tests what methods the learner uses to come to their final answer.

- Addition Level 2
  Only learners who have been able to provide the respond to at least one of the Addition Level 1 Questions can proceed to this subtask. The learners are given more complex addition problems which require more complex computational methods. On this subtask, learners are encouraged to use efficient mathematical strategy such as the set-up method. This subtask is not timed.

- Subtraction Level 1
  For this subtask, learners are given a sheet of simple subtraction questions and are given one minute to calculate as many of them as they can. The enumerator also provides a pencil and a paper on which the learner can calculate the subtraction questions. This exercises tests what methods the learner uses to come to their final answer.

- Subtraction Level 2
  Similar to Addition Level 2, only learners who have been able to provide the respond to at least one of the Subtraction Level 1 Questions can proceed to this subtask. The learners are given more complex subtraction problems which require more complex computational methods and strategies. On this subtask, learners are encouraged to use efficient mathematical strategy such as the set-up method. This subtask is not timed.

- Word Problems
  For this subtask, enumerators read out a word problem to the learners who are required to calculate and provide an answer to the question. The exercise requires the learners to identify what mathematical operation to apply to the problem and calculate the answer. They are given counters, a pencil and some paper to help them answer the question and the enumerator notes down what methods they have used to answer the question. The exercise is not timed.

Pupil Context Interview

The questions in this interview are used to establish the socio-economic status of the learner's family through asking questions about whether in their home the learner's family has animals, a mobile phone, fridge, TV, radio and so on. The interview also explores whether the learner's home has electricity and piped water. A number of questions are asked to determine the languages the learner speaks at home and school, whether the learner attended pre-school, whether they have repeated a grade and whether they eat breakfast before coming to school. Finally, there are some questions which aim to establish whether the learner's parents are literate and whether there are reading materials in the learner's home.

Lesson Observation Interview

The lesson observation tools instructed the observers to comment on the teacher's planning, teaching and assessment processes used during the lesson; communication techniques and to what extent the learners understood what they were taught; how instructional materials were used during the lesson; and to what extent the classroom is managed so all learners are treated equally and provision is made for a range of abilities in lessons. Enumerators were instructed to observe a teacher only once if it was found that the same teacher taught a number of the P3 or P1 target lessons. This was decided so as to avoid excessive focus on an individual teacher and because a teacher is unlikely to teach differently in different subjects, thereby eliminating the need to conduct multiple observations of the same teacher.

Teacher Interview tool

This tool focused on establishing the teacher's experience, training and where this was received; how their experience prepared them for teaching in English and/or national language and whether they feel confident doing so. Data collected using this tool was handwritten to make it easy for the enumerators to fit the teachers' responses to pre-arranged answers, with a possibility of being able to write details of deviant answers under the 'other' category, should the teacher produce an unexpected response.

ANNEX 2 EGRA AND EGMA ADAPTATION PROCESS

This annex describes how the Adaptation Teams were selected, the proceedings of the Adaptation Workshop and the challenges that were encountered during the course of the EGRA and EGMA Adaptation. The project team and the Examinations Secretariat were supported by the Department of National Languages at the MoGEI, Yei Teacher Training College (YTTC) and the Summer Linguistics Institute (SIL) in the identification of linguists and education professionals who could participate in the EGRA and EGMA Adaptation Process.

Selection of EGRA and EGMA Adaptation Teams

The selection criteria for the adaptation, translation and verification participants included:

- fluency in their national language and experience in translating it;
- experience in teaching their national language at primary school level; and
- preferably some experience in training teachers how to teach in national languages.

In the case of the February 2016 adaptation activities, two individuals were to focus on the translation of the EGRA instructions while three individuals were to develop the content for the various EGRA and EGMA tasks for each language. A total of five language experts per language were engaged in the task.

Products developed during adaptation

Over the course of the various adaptation activities, the following items were produced for each language:

- Letter Names, Letter Sounds, Familiar Words Subtests
- 3 Oral Reading Passages and Reading Comprehension Questions
- 3 Listening Comprehension Stories and Questions
- Translations of the Pupil Context Interview Questionnaires
- Translations and modifications of the EGMA tool

Proceedings of the Adaptation Workshop

All the content for the National Language EGRA subtasks was developed within the Adaptation Workshop. The participants in the core Adaptation Workshop activities worked individually and then in pairs to create a number of different stories and corresponding comprehension questions for both the Oral Reading and Listening Comprehension Subtasks. They then determined the best three passages which were revised and strengthened in a subsequent session. Finally, the group agreed on the most appropriate of the passages for inclusion in the EGRA. Activities centred around setting questions at the right difficulty levels for the age-group of learners to be assessed and appropriateness and relevance of the stories for the areas in which the tools would be used to collect data.

Where possible verification of the EGRA tools content of was done at two levels: independent peer verification and review and testing of content on children in schools where the respective language is used as a LoI. The National Languages Department at MoGEI was instrumental in finding schools in Juba where the different languages were being taught. Workshop participants and the Central Equatoria State Ministry of Education also provided useful recommendations in identifying schools where the various languages are taught. Each piloting school was visited by a representative from the National Languages Department and the project team prior to the pilot to verify that children were indeed learning in the language and to confirm that they would be available for the piloting activities.

Unfortunately, it was found that languages such as Otuho and Ŋatoposa are not taught in schools in Juba. More details on some of the challenges during the adaptation process are detailed below. In addition to the in-school piloting of the tools, participants in the Language Verification Workshop (October 2015) and Translation Workshop (February 2016) were required to conduct a final independent linguistic review on the content developed for the EGRA subtasks.

In addition to the development of the content for various EGRA subtests, the adaptation teams were also required to modify the EGMA subtasks. A summary of the modifications made to the EGMA subtasks during the adaptation activities can be found in the table belowlil:

Subtask	Modification to subtask
Number Identification	None
Quantitative Comparison	None
Numerical Pattern Recognition	None
Addition Level 1	Two items were changed to incorporate the concept of adding the number zero to ensure that learners would be ready for more difficult mathematics operations.
Addition Level 2	None
Subtraction Level 1	Two items were changed to incorporate the concept of subtracting the number zero to ensure that learners would be ready for more difficult mathematics operations
Subtraction Level 2	None
Word Problems	Some of the contexts were changed to ensure that all children would understand the questions being asked. Words like “bus” were changed to “car” and “toffees” to “groundnuts”

Challenges from the adaptation process

There were a number of challenges during the adaptation of the EGRA and EGMA instruments. These included:

- *Validity and appropriateness of Otuho EGRA and EGMA tools:* The usage or the omission of accents on Otuho vowels has been contested for many years. The last documentation available on attempted efforts to resolve this matter date back to 1986. Although the project team had been assured that the omission of diacritics is the current practice and that usage of them had long been discontinued at beginning of the February 2016 Workshop, it became clear in the process of contacting schools that few if any schools teach in Otuho and that some teach it as a subject with diacritics and some without. During the Adaptation Workshop, the Otuho linguists disagreed over the usage of diacritics, making consensus impossible.

  The project team recommended the cancellation of the Otuho data collection on the basis that whichever orthography used would disadvantage some learners. It was also recommended that consensus be built among Otuho speakers over the orthography of the language before an Otuho EGRA is conducted.

- *Availability of piloting schools:* Where possible, the adapted subtests (in particular the stories developed), were trialled with children who were learning in the languages selected for this project. The in-school activities were conducted for about half a day during the adaptation workshop and assessor training, followed by another half-day session in which the workshop facilitators and adaptors or assessors would immediately address challenges that were observed during the in-school activities. Adaptation workshop activities were only finalized once these changes had been made. It was a challenge to find government or private schools that teach children in some of the languages in Juba such as Ŋatoposa and Otuho to be able to meet the tight timeframes of the activities described above. As a result, Adaptation Workshop and Assessor Training participants from some of the language groups did not have an opportunity to test their tools on learners who spoke the language. Since the tight project timeframes and budgetary limitations could not permit the adaptation and assessor teams to travel outside Juba for a piloting process, the adaptors and assessors were only able to practice as a team: both reading the instructions and determining what letter sounds, word pronunciation and terms a learner would be expected to say, and how those responses would be recorded in the most consistent way.

- *Availability of experienced linguists*: Once the language teams had clarified their alphabets and identified a list of common or key words, the main task of the workshop was to develop stories at an appropriate level for the subtest on reading and comprehension. The stories produced went through rigorous editing processes during the adaptation workshop[9]. Each language group had a leader who drove the parallel processes of language translation and subtest adaptation, while the other team members primarily contributed ideas. This left a significant burden on the two leading language experts. In sourcing the language experts who participated in the adaptation activities, it was found that there are only a few of experienced linguists who could manage this task and they are often heavily engaged on other projects. Having learned the importance of not only translating but also adapting the tools for linguistic consistency, accuracy and age-appropriateness a language verification workshop was led simultaneously to ensure the best value for money, the most efficient use of the participants' time and that activities were not delayed.

[9] These stories went through a further process of verification during the language verification workshop as well as when the assessors were trained on how to administer the EGRA.

ANNEX 3 EGRA AND EGMA DATA COLLECTION PREPARATIONS

This annex describes the preparations for the data collection in detail, namely the:

- Identification of enumerators
- Training and selection of enumerators
- Development of a Research Protocol and Process.

Identification of Enumerators

A pool of enumerators was selected by Forcier Consulting prior to the assessor training from their pool of junior and senior researchers. Their pre-selection was based on the characteristics defined in the assessor terms of reference. The main criteria for selection were:

- Speaking and reading proficiency in English and the languages in which data was to be collected
- A minimum of secondary school education (preference for a university education)
- Previous use of Common Application Programming Interface (CAPI) devices for data collection
- Previous field experience with qualitative and quantitative data collection
- Previous fieldwork experience of a supervisory role
- Cooperative attitude towards team members
- Responsible in adhering to field guidelines and ensuring proper care of field equipment
- Good communication skills to facilitate permission process with schools and local government authorities
- Ability to coordinate logistical arrangements in the field and liaise with supervisors at Forcier head office
- Previous experience working with EGRA and EGMA projects (added advantage)

Candidates were required to submit electronic versions of their CVs and after a screening process, those shortlisted were invited for an interview and skills test. A few of the data collectors interviewed for the data collector position had been recommended by the participants from the EGRA and EGMA adaptation workshop, and in one case a participant in the adaptation process was recruited to do data collection as well. Overall a total of five enumerators were pre-selected for each language to undertake a training on the administration of EGRA and EGMA tools, as well as the lesson observation, pupil context and teacher interview questionnaires. In addition to the data collectors recruited by Forcier, some MoGEI staff were also trained on how to conduct EGRA and EGMA data collection. This was in line with the MoGEI requirement that some of its staff's capacity is built in the management and conducting of the various components. Specifically, for the first component of work the MoGEI required some of their personnel be trained on how to conduct EGRA and EGMA. Subsequently two out of the five MoGEI staff who were trained were deployed as part of the fieldwork teams. The five MoGEI trainees were recommended by the Examinations Secretariat.

Training and selection of enumerators

The enumerator training was conducted by Montrose's team of EGRA and EGMA experts. The trainee enumerators were trained over a six-day period on:

- Paper and tablet based EGRA and EGMA tests;
- The protocols to be followed for data collection (including sampling and uploading of collected data);

- Lesson observation techniques; and
- Conducting of pupil and teacher interviews.

The first two days of the training acquainted the trainees with the educational philosophy behind EGRA and EGMA and their various subtests. The third day of training was spent with the trainees practicing using the tablets loaded with 'Tangerine'; a software programme dedicated to EGRA and EGMA. During the fourth day of training an EGRA and EGMA simulation was organised at primary schools in Juba. The schools agreed to allow the enumerators to run full EGRA and EGMA tests with their learners. All the enumerators had the opportunity to administer both the EGRA English and National Language and the EGMA tests using tablets. The National Language tests could not be piloted for Ŋatoposa and Zande as there were no schools where these languages were used as a LoI within Juba. Where a piloting school was not available, the national language tools were instead tested in a micro-testing environment with adult participants who spoke the different languages.

At the end of the training four out of the five enumerators for each language were selected to conduct data collection. The selection of the assessors who would be deployed to the field was based on their ability to administer EGRA effectively on an electronic tablet which was determined by their performance on IRR tests conducted during the assessor training. IRR tests are typically conducted in training sessions. During these tests, trainees watch a mock EGRA and EGMA assessment process and are required to record the answers that the mock pupil gives noting if they are incorrect. Each trainee's test is uploaded and the facilitator assesses how well the trainee performed on the exercise as the IRR software indicates the percentage of responses which are in line with the majority of correct responses in the group. Generally, trainees who score over 95% agreement are considered to be competent to collect data. These tests also allow the facilitator to gauge whether the trainees are grasping the key concepts of EGRA and EGMA testing. They also allow the facilitator to pinpoint the EGRA and EGMA subtasks that trainees are struggling with the most. More practice on these problem areas is then worked into subsequent training sessions.

The data collectors who participated in the trainings were very strong and they performed very well at the IRR. In fact, other considerations that are typically brought into play where there is a tie in the last IRR or concerns about the ability of a particular data collector were used in the final selection of the assessors. These considerations include the individual's:

- Level of comfort in using the electronic tablet and navigating Tangerine
- Rapport with the pupils during the in-school training sessions
- Ability to manage materials during EGRA in-school training sessions.

Based on the criteria above, the four best data collectors for each language were selected from the five that were interviewed and trained. Additionally, as mentioned above the two best MoGEI officials were selected to participate in the second round of data collection.

Research Protocol and Process

In the instances that Montrose has sent enumerators out to the field to conduct school-based data collection, the enumerators' work has been guided by a strict protocol document. This document outlines in detail what exactly the team is meant to do when they are in a school, from the moment they arrive at a school until they depart. It also sets out instructions on how the assessors can randomly select the children that they will assess. The EGRA and EGMA testing protocol was amended for this project as a number of changes were made to the normal procedure. The changes required considerable coordination between the team members visiting the schools. It was therefore very important to lay these processes down carefully for reference. Some of these are described below.

Practical instructions on how to randomly select pupils for data collection

Assessors were trained and required to follow the procedure below in the selection of learners who they would administer the test on:

- Go to the P4 class. If there is more than one P4 class bring all the learners together into one classroom.

- Divide the P4 learners into a line of girls and a line of boys. Count both lines. Divide the number in each line by 5, rounding the result down. For example, if there are 54 boys and 36 girls you divide 54 by 5 = 10 and 36 by 5 = 7. You then select every 10th boy in their line and select each 7th girl in their line. You will end up with 5 girls and 5 boys i.e. 10 learners to test. If there are many boys and less than 5 girls in a class e.g. 30 boys and 3 girls, you select all the girls and 7 boys (using the same process as above, but using 7 as the divisor for selecting the boys).

- Once you have selected them take all their names. Take the first three (all girls if there are few girls in the class) and administer all 3 tests to them. Take them back to their class and immediately take the other 7 learners out of the class together. You MUST make sure that the 3 learners who have done the test are not able to talk to the other 7 learners. The 7 learners must each do all three tests, and once their card has all three signatures they can return to their classroom.

This step-by-step procedure was practised during the Assessor Training Pilots and included in each assessor's EGRA and EGMA Protocol.

Practical instructions on how to conduct data collection in each school

Normally an EGRA and EGMA enumerator would administer all the scheduled assessments on each learner randomly assigned to them. However, during the design of this EGRA and EGMA study, it was agreed amongst the EGRA and EGMA trainers that the administration of three[10] whole tests on one learner in one sitting would be too tiring for the children. It was also anticipated that planning to conduct the data collection in the same way that it is typically done would also mean that those learners who had not been tested yet would have to wait a long time for their turn. As such, the trainers modified the protocol so that:

- Each learner would undertake three tests (National Language EGRA, English EGRA and EGMA) but that each test would be administered by different enumerators, meaning that:
    - The enumerators would specialise, so that the enumerator administering the English EGRA test, for example, would do so throughout the whole process.
    - Each learner would be given a Personal Identification Number (PIN) written on a piece of paper after being selected for the sample. As their turn came up they would start the test by having the enumerator sign off on the paper. Only when the learner had collected all three signatures of the enumerators showing that they had sat all three tests were they allowed back to class.
    - As each learner was tested the enumerator would enter the learner's PIN so all that their tests were linked and could be analysed together.

[10] In areas where Early Grade Mathematics Assessment (EGMA) was conducted as well as English and National Languages EGRA.

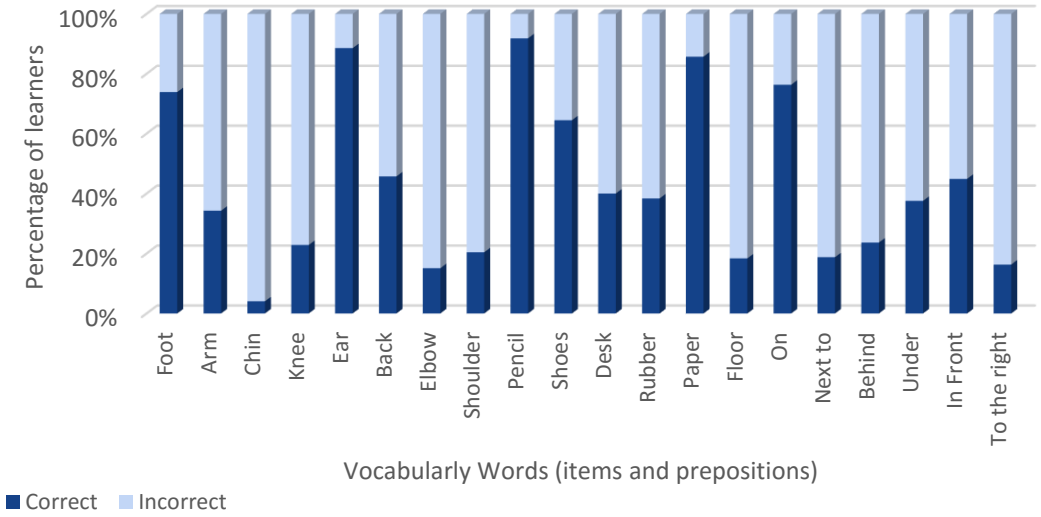
While the enumerators were doing the testing of ten P3 learners in the school, the fourth member of the team was administering the school data sheet, observing P1 and P3 teachers in their classrooms and interviewing the P3 teachers who had been observed. The enumerators undertook lesson observations using a simple written protocol, which they had been trained on by the team leader using videoed lessons and mediation of their perceptions. Careful observance of the protocol meant that the team of four could complete all the processes required in a school in a day. Data was collected from the sampled schools for a two-week period. Over the two weeks of data collection, the assessors uploaded collected data through Tangerine. This data was then compiled into a single spreadsheet for an EGRA and EGMA data analyst to clean, analyse and report on.

More details on how learner assessment was managed and conducted in schools can be found in the EGRA and EGMA Protocol document developed for this project.

ANNEX 4 ENGLISH EGRA: DETAILS OF THE SUBTESTS

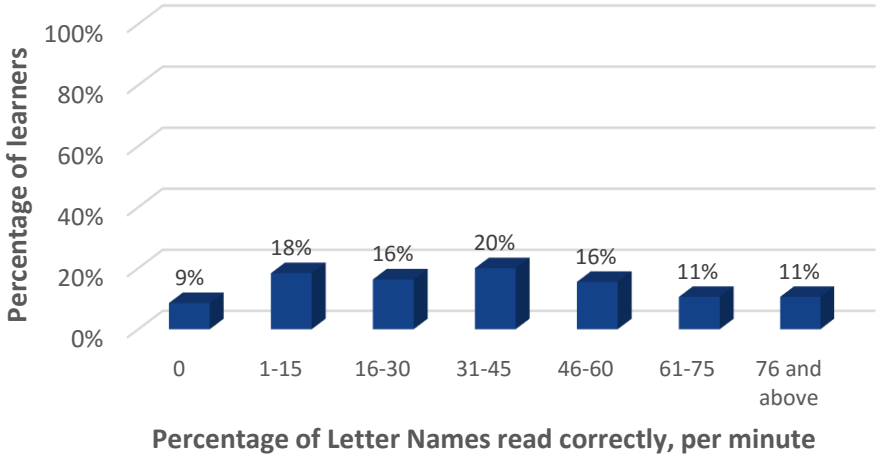
Vocabulary Subtest. The vocabulary items were broken down into three groups: body parts, classroom objects, and prepositions. The learners generally scored well in identifying items like foot, ear, pencil, paper and the preposition "on" but they were not able to correctly identify other body parts (scores for 'chin', 'elbow', and 'shoulder' were particularly low) or even basic parts of a classroom items like 'floor'. The prepositions, which are considered to be the most difficult part of this subtest, mostly had scores of less than 25%.

Graph 6:Vocabulary Item Analysis



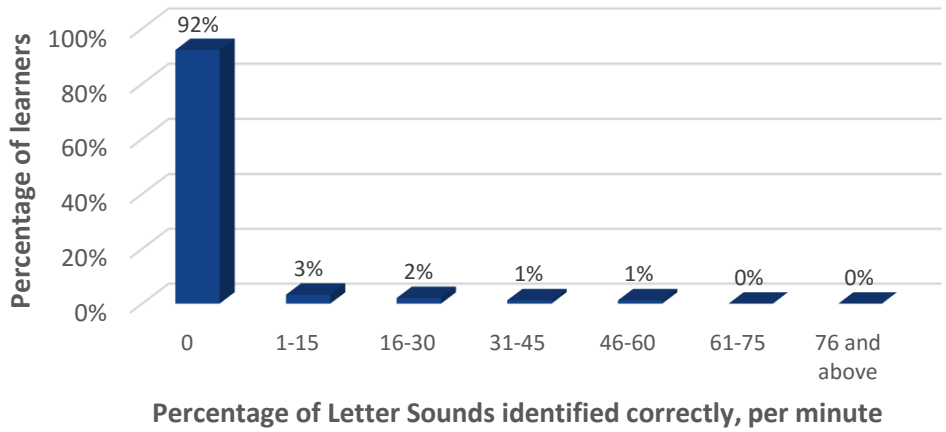
Letter Names and Sounds Subtests. Learners were asked to identify both the names and sounds of letters in the English alphabet. In naming English letters, they were fairly successful and were able to do so quite quickly. Graph 7 shows that at least 22% of the learners were able to name over 60 English letters in one minute (at least 1 letter per second) in a grid of 100 lower and upper case versions with some repetition of common letters.

Graph 7: English Letter Naming Fluency



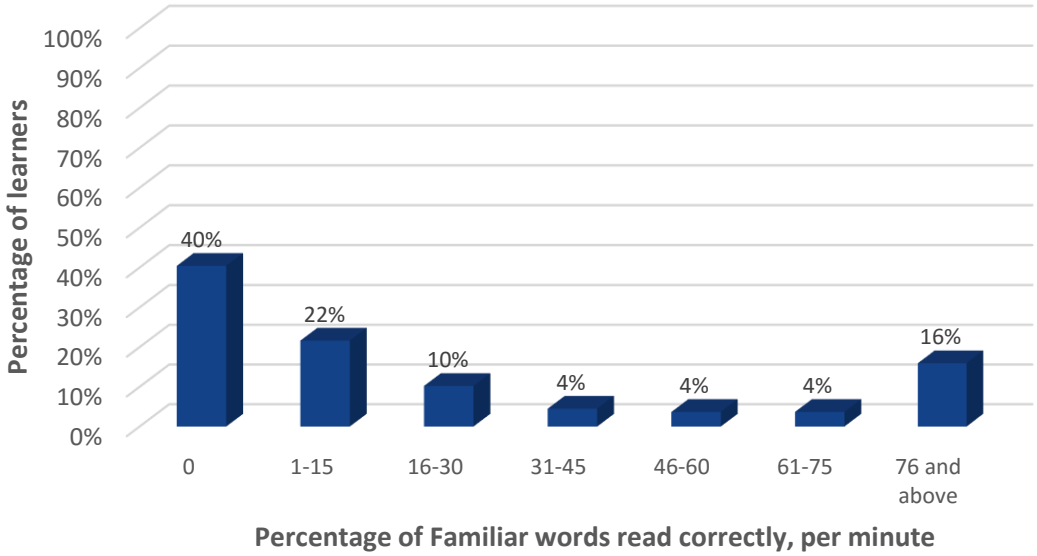
Letter sound identification, however, was quite poor, with 92% of the learners unable to identify a single English letter sound. This shows that teachers teach learners the names of the letters but not the sound each letter makes yet it is the letter sounds, not the names, that make up the fundamental phonemes. These letters. when joined together, allow learners to decode words that they have never seen before, simply by sounding them out.

Graph 8: English Letter Sound Fluency



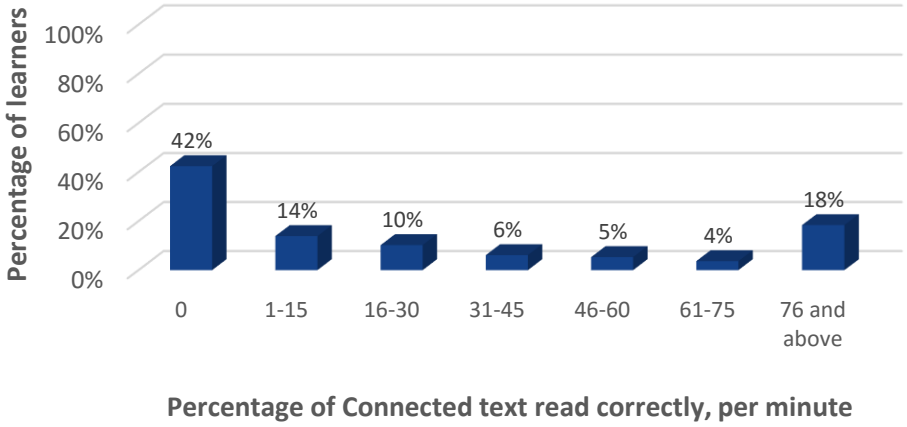
Common Words Subtest. When presented with a page of commonly used English words, nearly a half (40%) of the learners could not read a single word. Only 16% of the learners managed to read more than 75% of the words (i.e. about 40 words) in a minute yet learners at this level (Grade 3) should be reading 45 or more of these words in a minute. This indicates that most P2 and P3 teachers are teaching the alphabet and not going any further to teach words, or at least not these commonly used words.

Graph 9: English Familiar Word Fluency



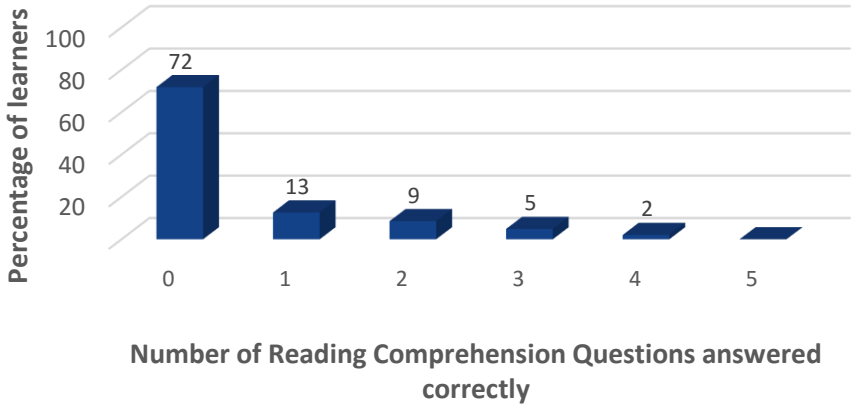
Connected Text and Comprehension Subtests. Each learner was asked to read a connected text passage. In the minute allowed, Graph 10 demonstrates a similar trend to Graph 9 above from the familiar words subtest, showing that about 40% of the learners were unable to read a single word of a simple story presented to them. Similarly, just 18% of the learners were able to read at least three quarters of the 53-word story in one minute and only 6% were able to read at least 50 words in a minute which is close to what is commensurate with being fast enough to understand what they are reading. This is based on English language EGRA data, where it has been shown that children who can read faster than approximately 60 words per minute are comfortable with reading and are thus able to think about the ideas behind the words, rather than struggling to recognise and pronounce the words themselves.

Graph 10:English Reading Fluency

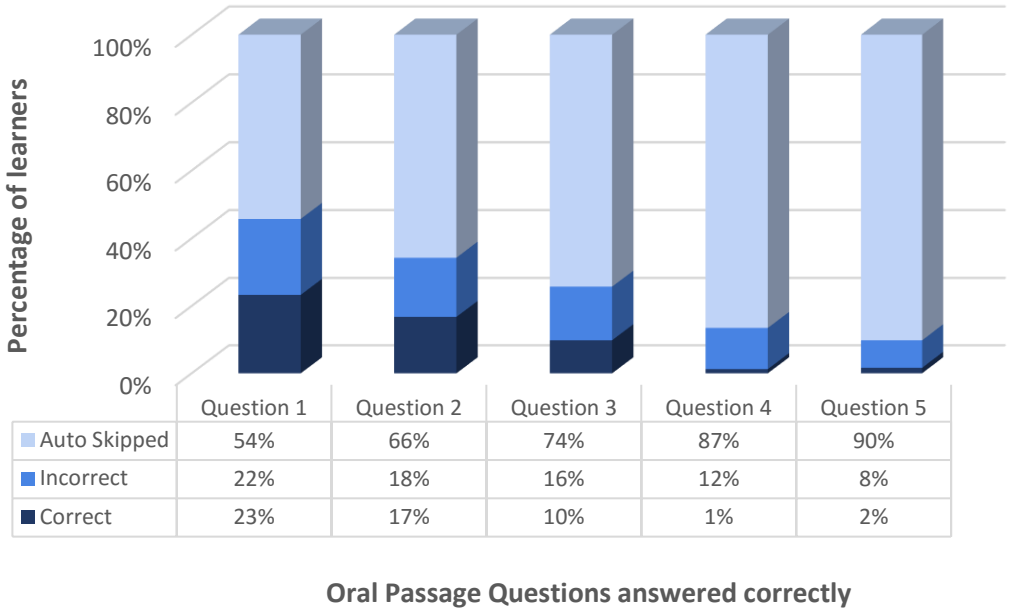


With so few learners able to decode above 50 words of the text in one minute, it is expected that few would be able to answer any of the five reading comprehension questions correctly. Graph 11 shows that well over 70% of the learners were unable to answer a single question (either because they didn't read far enough to be asked the comprehension questions or because their answers were all incorrect) and none of the learners answered all the five questions correctly. Question 5 was an inferential question, while the other four questions were based on facts for recall from the text. None of the five learners who were able to read the whole story and who answered question 4 correctly could answer question 5.

Graph 11: English Reading Comprehension

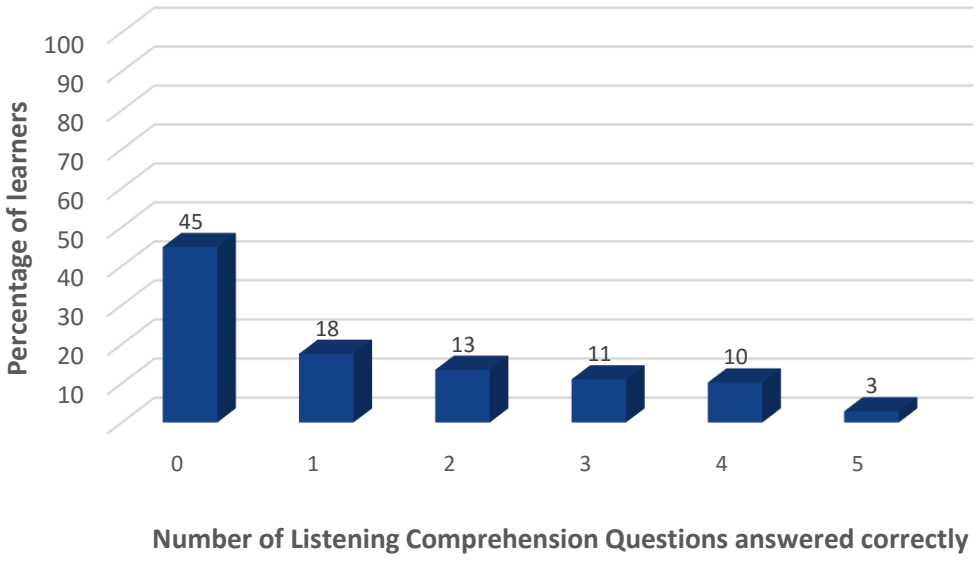


Graph 12: English Listening Comprehension Item Analysis (overall)

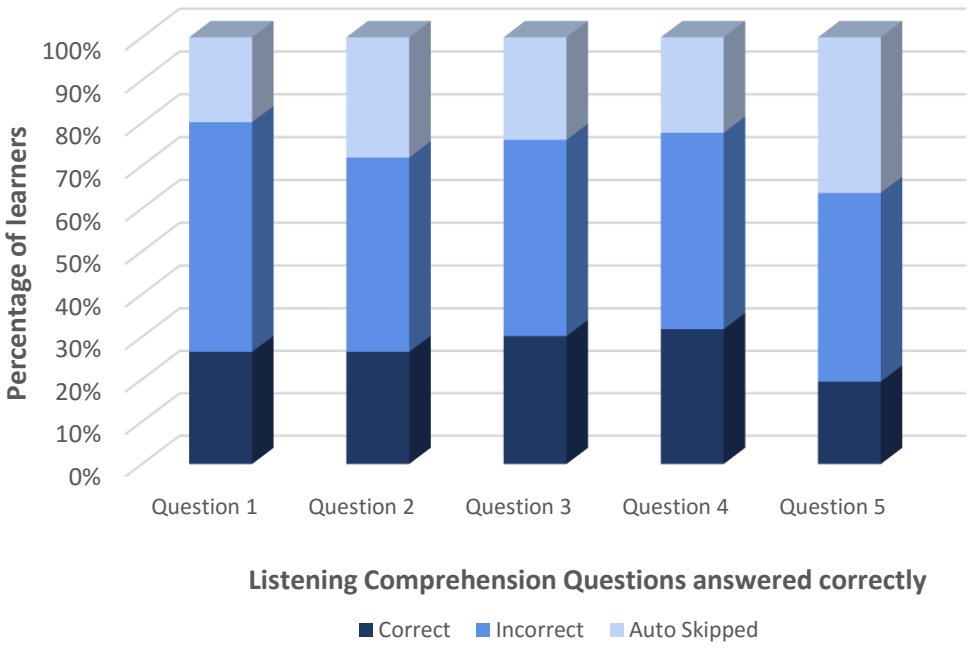


Listening Comprehension Subtext. The enumerators read the listening comprehension passage twice to the learner and then asked five questions orally. All learners were asked all five of the listening comprehension questions. 45% of the learners (Graph 13) were unable to answer any one of the questions correctly and less than a quarter of the learners were able to answer a majority of the comprehension questions correctly. About 20% of the learners (Graph 13) answered any of the questions correctly all of which point towards very low levels of English comprehension. This could also relate to the learners being unfamiliar with this type of exercise or lacking oral skills in English, which would make it difficult for them to respond.

Graph 13: English Listening Comprehension



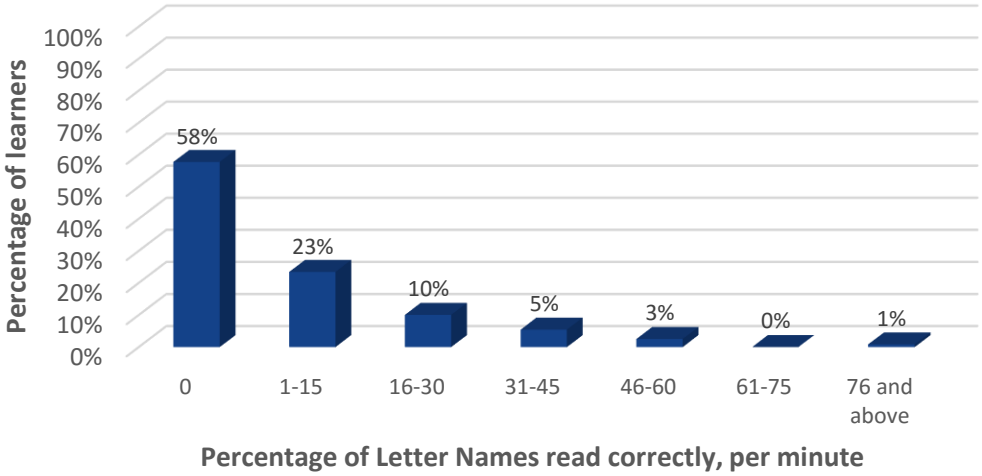
Graph 14: English Listening Comprehension Item Analysis (overall)



ANNEX 5 NATIONAL LANGUAGE EGRA: DETAILS OF THE SUBTESTS

Letter Names and Sounds Subtest. Letter identification in national language was not nearly as good as in English, despite MoGEI policy of teaching in national language through to the end of P3. Close to two thirds (58%) of the learners were unable to identify correctly a single letter name in their respective national languages and less than 10% were able to identify correctly more than 30% of the letter names.

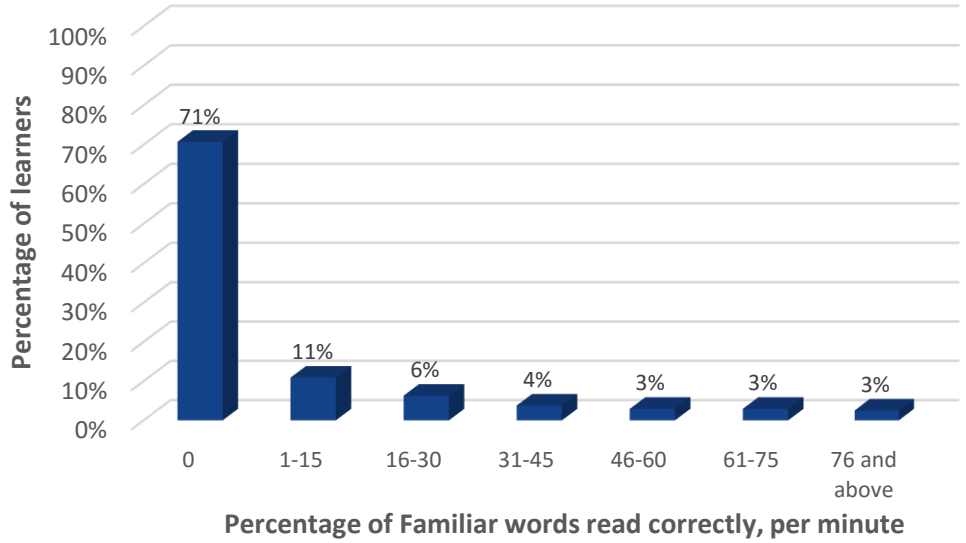
Graph 15: National Language Letter Naming Fluency



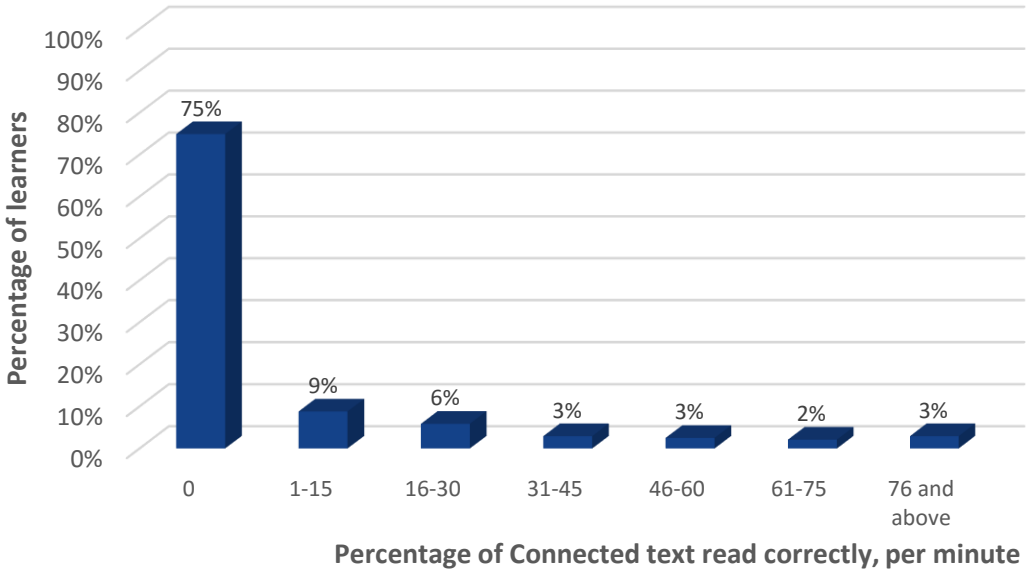
Common Words Subtest. 71% of the sampled learners were unable to read a single common word in their national language.

Connected Text and Comprehension Subtest. Reading of connected text passage also follows a similar trend (see Graph 17).

Graph 16: Common Word Fluency

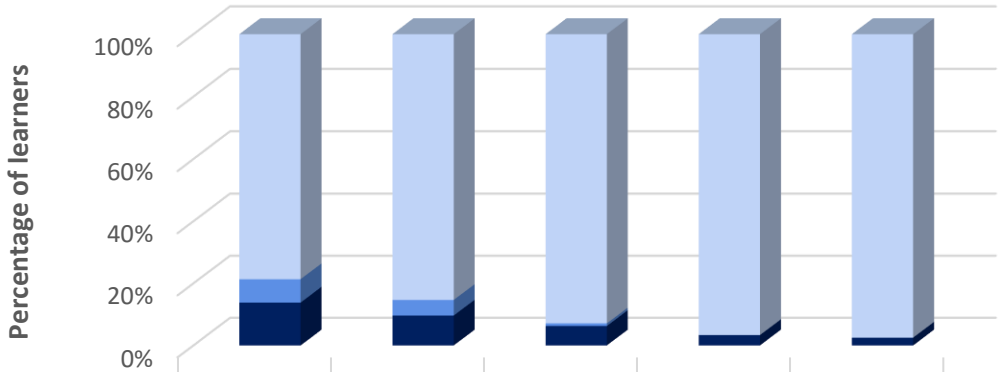


Graph 17: Oral Reading Fluency



Given that the majority of learners seem to be unfamiliar with decoding words in their national language and appear to lack automaticity for recognising common words and even letters, less than 10% of learners were able to answer correctly any of the five comprehension questions they were asked on the connected text.

Graph 18: National Language Reading Comprehension Item Analysis

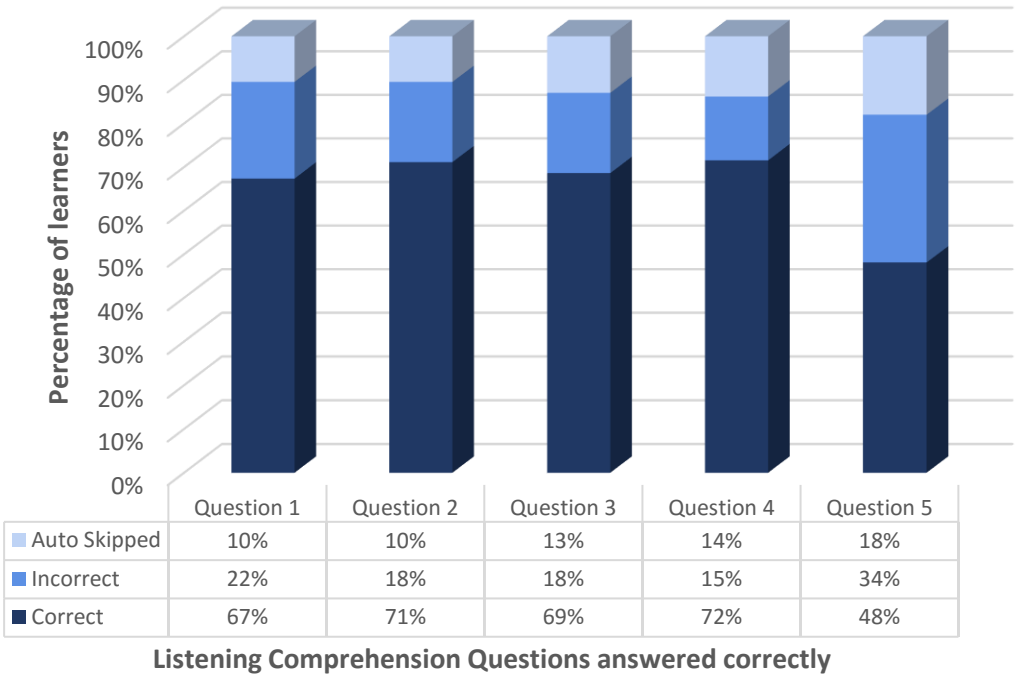


	Question 1	Question 2	Question 3	Question 4	Question 5
Auto Skipped	79%	85%	93%	97%	97%
Incorrect	8%	5%	1%	0%	0%
Correct	14%	10%	6%	3%	3%

Oral Passage Questions answered correctly

Listening Comprehension Subtest. Scores related to the national language listening comprehension were fairly high (averaging 70% except for Question 5, which was an inferential question).

Graph 19: Listening Comprehension Item Analysis



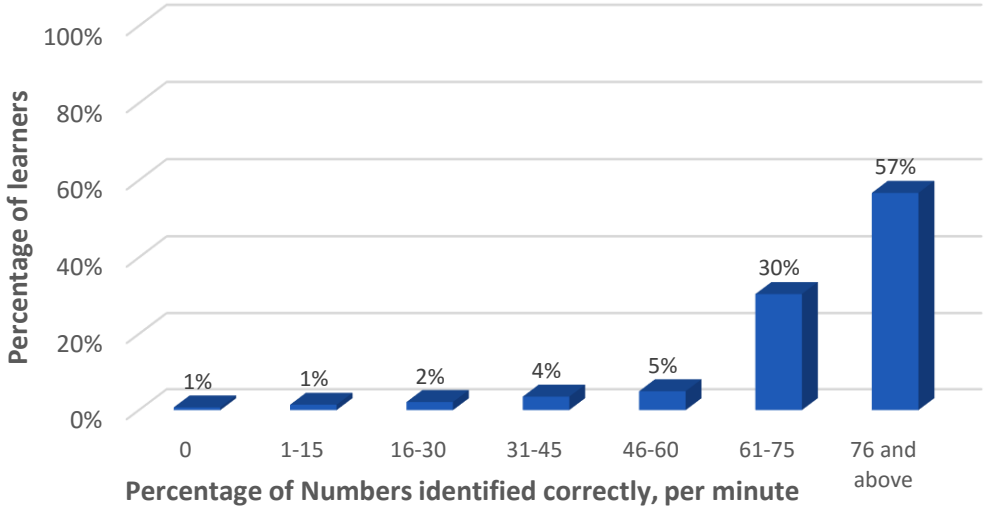
	Question 1	Question 2	Question 3	Question 4	Question 5
Auto Skipped	10%	10%	13%	14%	18%
Incorrect	22%	18%	18%	15%	34%
Correct	67%	71%	69%	72%	48%

Listening Comprehension Questions answered correctly

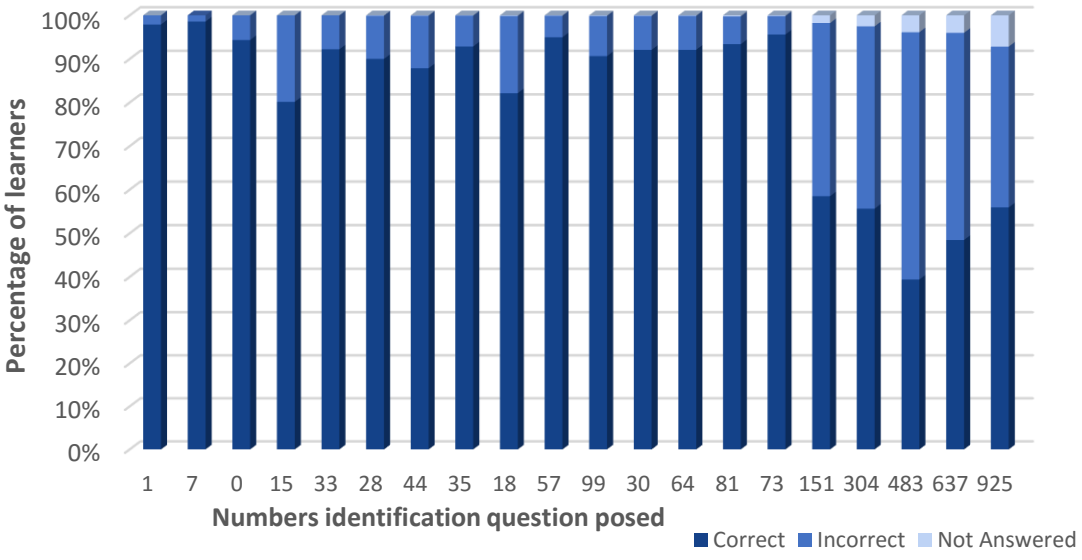
ANNEX 6 EGMA: DETAILS OF THE SUBTESTS

Generally, the results on the numeracy tests were somewhat better than the literacy ones. It is important to note that all the numeracy tests can be administered in any language the learners choose. This means that language should not be a major barrier to understanding what was required of them in each subtest.

Number Identification Subtest. Number identification fluency rates indicated that the learners on average identified each number in just under 2 seconds. As some of the numbers are hard to say quickly, such as 673 ("six hundred and seventy-three"), this result is positive, but should not lead to complacency as a faster speed would be expected at Grade 3 which would allow the learners greater automaticity when it comes to harder algorithms. There were only a few of the more complex numbers which learners struggled to identify correctly, such as 15, 18, and the triple-digit numbers. It should also be noted that only 1% of the sample could not identify any number on the grid.



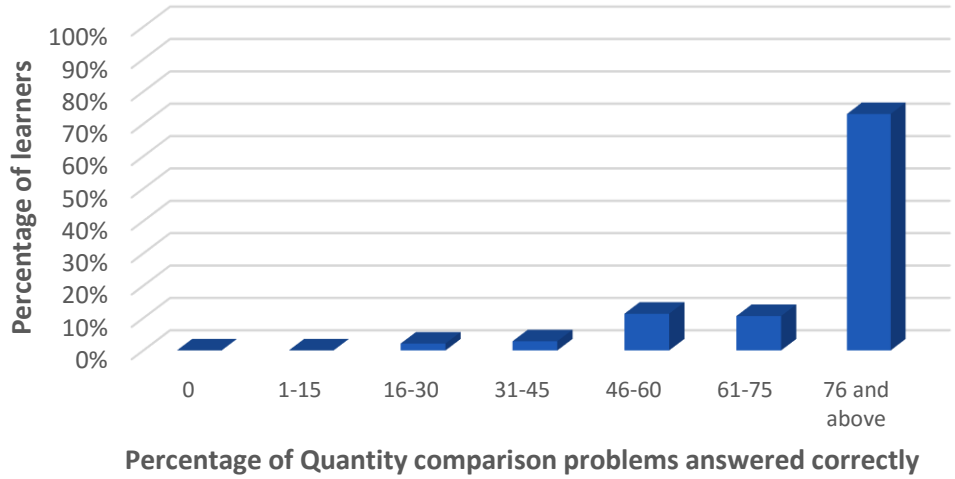
Graph 20: Number Identification Fluency



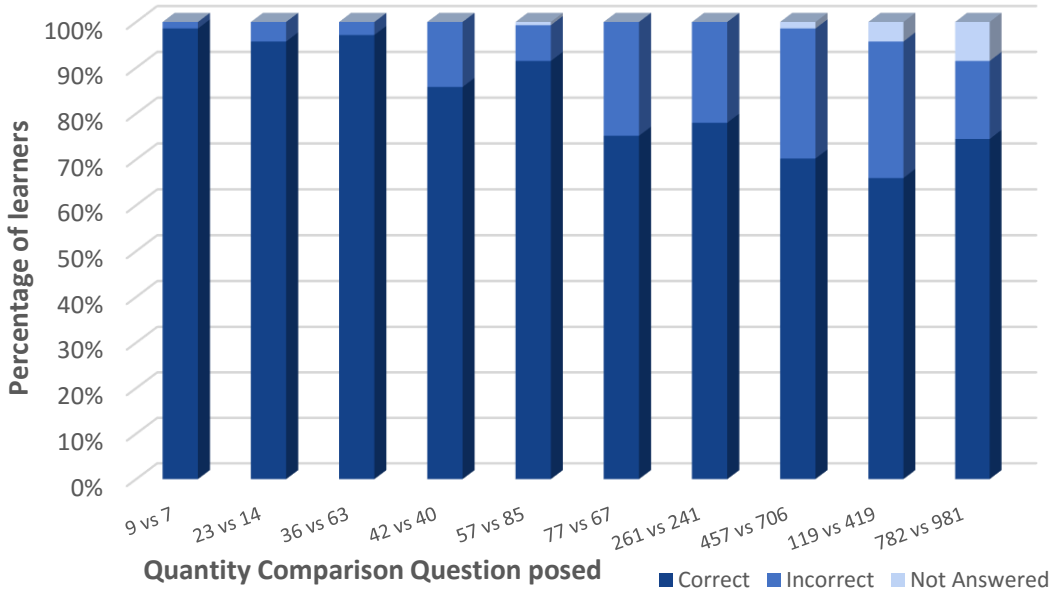
Graph 21: Number Identification Item Analysis

Quantitative Discrimination Subtest. Quantitative discrimination (also called quantitative comparisons) was an untimed test. The scores are based on the child selecting one of two answers, the one they identify as the larger of the pair. This automatically gives the learner a 50% chance of guessing correctly, so it is typical to see high scores on this subtest.

Graph 22:Quantitative Comparisons Items Correct

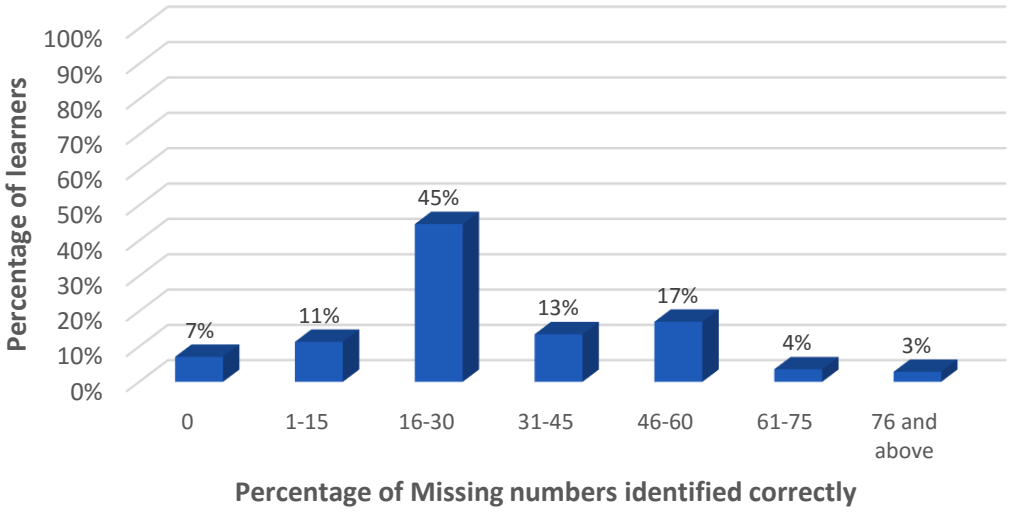


Graph 23:Quantitative Comparisons Item Analysis

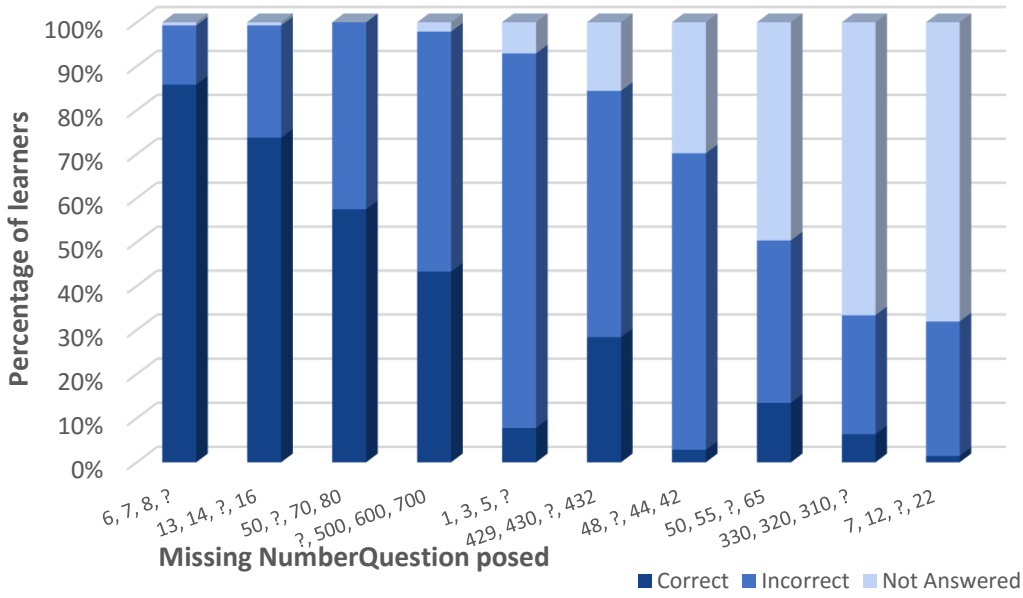


Missing Number Subtest. The missing number subtest requires learners to understand number patterns. These patterns should be easily understood by learners who have been taught numerical concepts such as the number line, but 7% of learners could not answer any of the first four questions, and then only 6% of children could answer the fifth question (1, 3, 5, _). This shows that little emphasis is being put on number-line activities, probably because much emphasis is placed on knowing the order of the numbers (one, two, three, four, etc.) but not on understanding how these numbers relate, the distances the numbers are apart, how to count down, or how to count by twos, fives and tens. It may also indicate that multiplication tables are not being taught by Grade 3.

Graph 24: Missing Number Items Correct

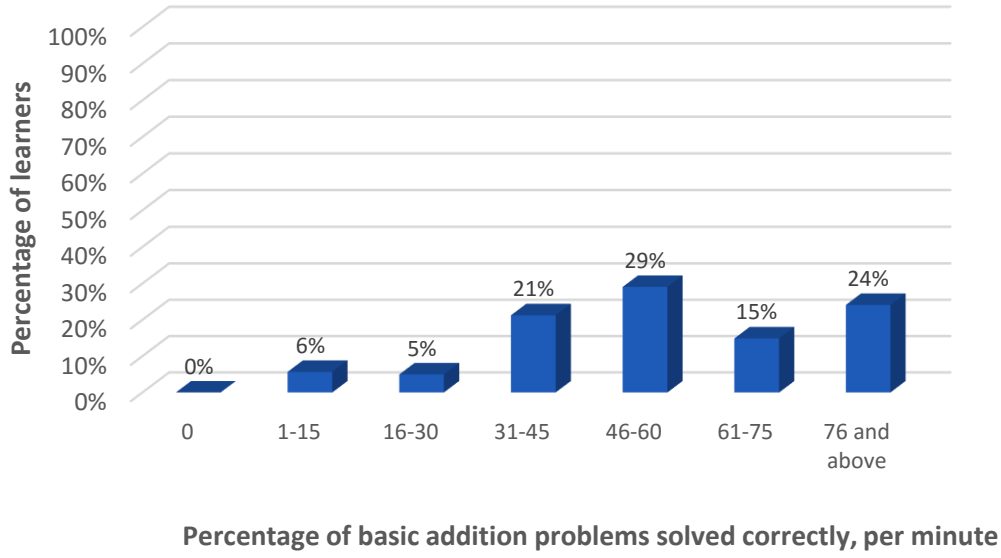


Graph 25: Missing Number Item Analysis

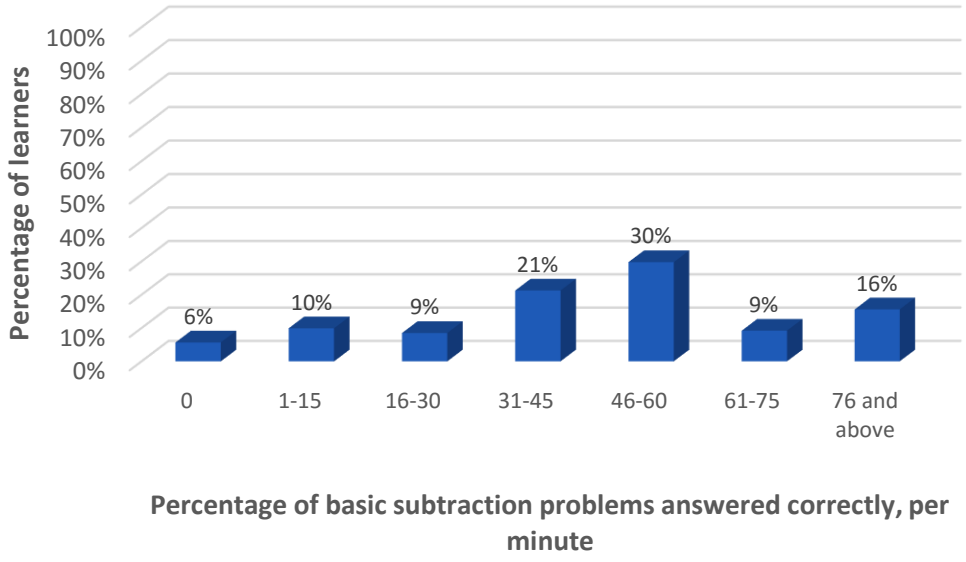


Addition and Subtraction Subtests. Poor methodology is most probably the cause of learners being unable to perform higher level addition and subtraction tasks quickly, while they did reasonably well in the basic addition and subtraction exercises, as they generally needed to use fingers or other manipulatives to complete these sums. Using manipulatives slows the learner's rate of completion of individual tasks, as they are slow and inefficient means of doing more complex sums. For this reason, with the Level 2 addition and subtraction subtests if the learner could only use manipulatives and could not use the set up method or perform a mental calculation, the test was discontinued.

Graph 26: Basic Addition Fluency

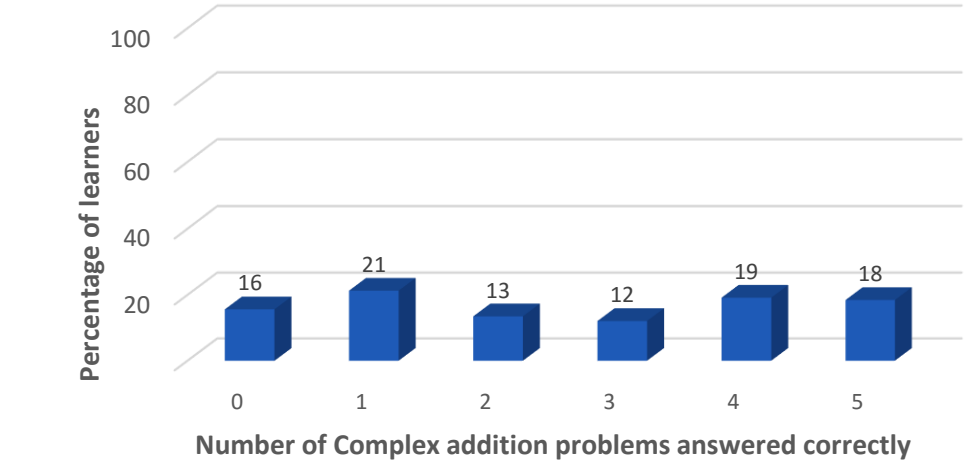


Graph 27: Basic Subtraction Fluency

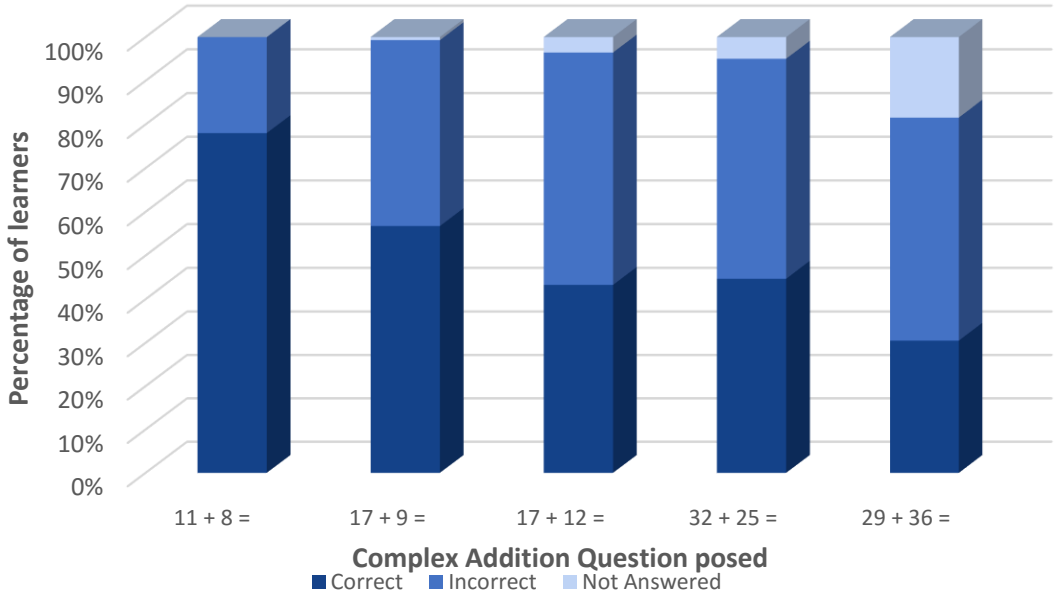


Learners performed better on the basic addition than on the basic subtraction task, although only a few learners were able to complete all 20 of the problems in under a minute. The more complicated level addition problems involved some carrying, with question 5 demanding carrying and the addition of two 2 digit numbers. Learners struggled with this.

Graph 28:Addition Level 2 Items Correct

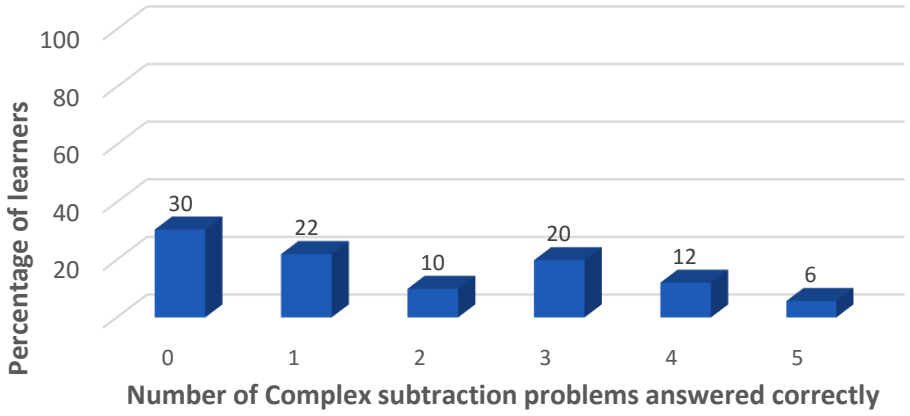


Graph 29:Addition Level 2 Item Analysis

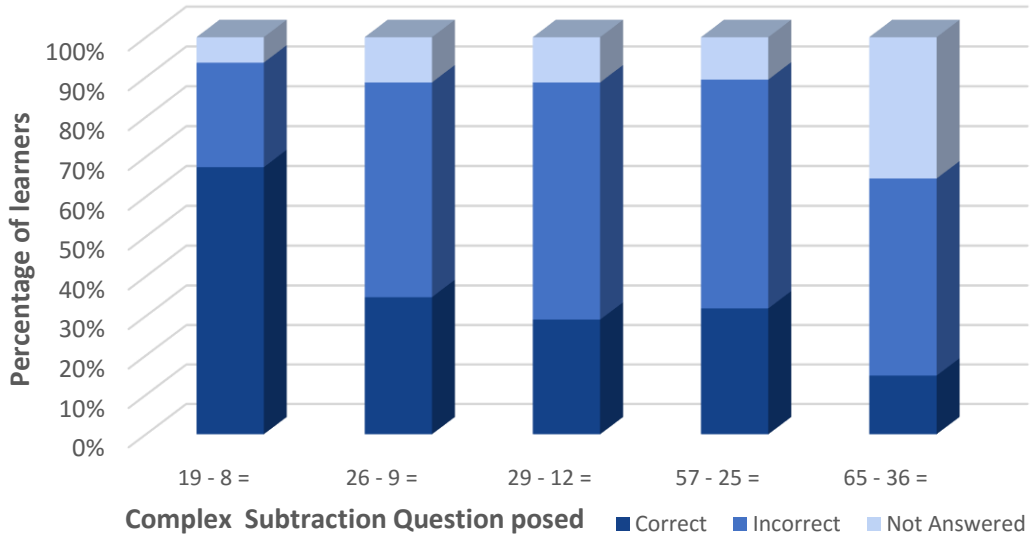


Similarly, many learners struggled to answer the higher level subtraction problems. Again, problem 5 entailed an advanced concept - in this case borrowing while subtracting with two 2-digit numbers. Fewer than 40% of learners were able to answer any of the last four questions correctly.

Graph 30: Subtraction Level 2 Items Correct

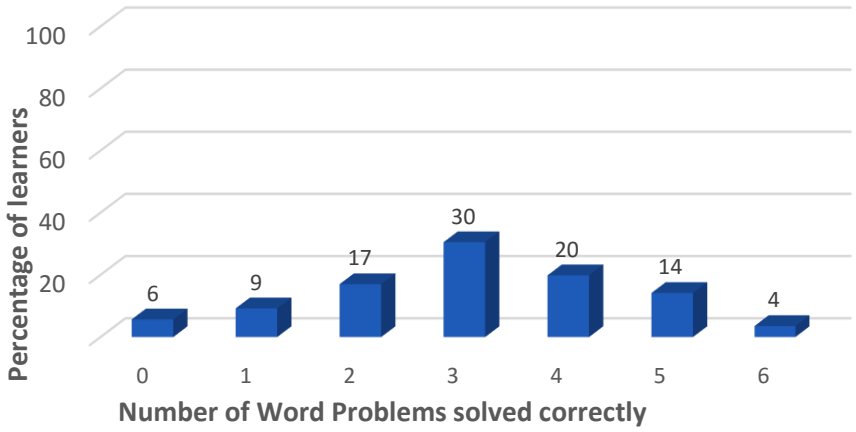


Graph 31:Subtraction Level 2 Item Analysis

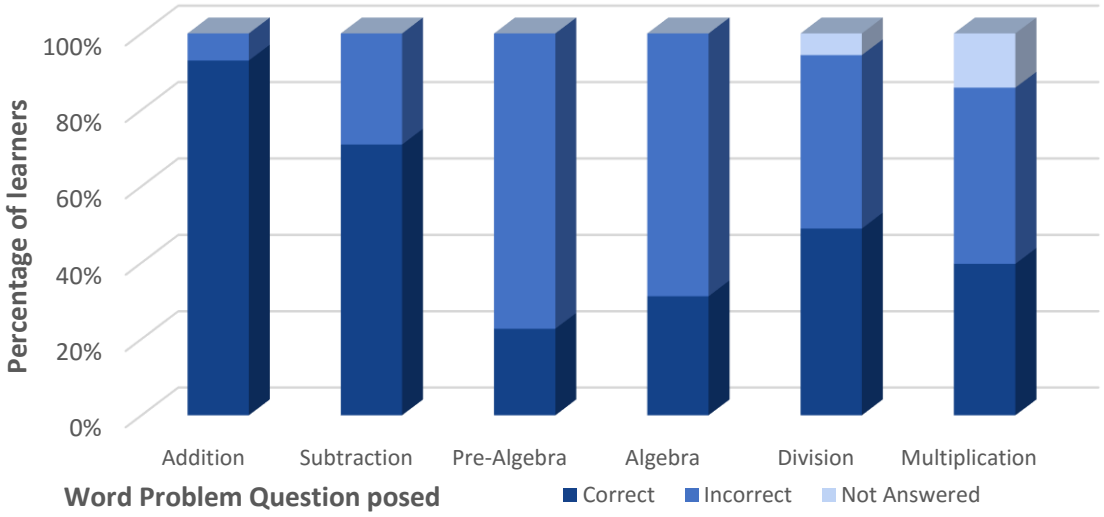


Word Problem Subtest. The word problem subtest was slightly different, in that instead of allowing learners to use manipulatives if they desired, the assessor actively suggested the use of manipulatives. Nearly all of the learners were able to answer the addition word problem correctly but as the problems became more difficult, scores dropped.

Graph 32: Word Problem Items Correct



Graph 33: Word Problem Item Analysis



Overall the EGMA subtests indicate that most learners can do basic mathematical calculations as long as they only involve single figures. This indicates that Grade 3 teachers are not stretching the learners and are probably not teaching mental arithmetic and are not teaching the set-up method.