SPOTLIGHT ON BASIC EDUCATION COMPLETION
AND FOUNDATIONAL LEARNING

South Africa

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Global Education Monitoring Report
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Association for the Development of Education in Africa
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In partnership with
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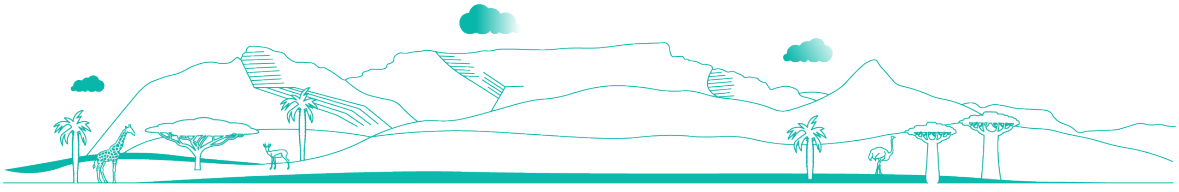

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This report would not have been possible without the contribution of numerous people and institutions.

The Spotlight series on universal basic education completion and foundational learning in Africa aims to leverage research insights to influence policy decisions at continental and national levels. We are honoured and grateful for the opportunity to launch this South Africa country report at the 2024 Basic Education Sector Lekgotla.

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Consultations on the report were held during the Teacher Development and Curriculum Management committee meeting and at a consultation meeting with DBE staff, provincial level actors, experts from the National Education Collaboration Trust and academics from the University of the Witwatersrand. Through the fieldwork, perspectives from teachers, communities, school leaders and district officials further enriched the report.

We appreciate the partnership and collaboration with the African Union and the Association for the Development of Education in Africa (ADEA), particularly the guidance provided by Albert Nsengiyumva and Shem Bodo at ADEA.

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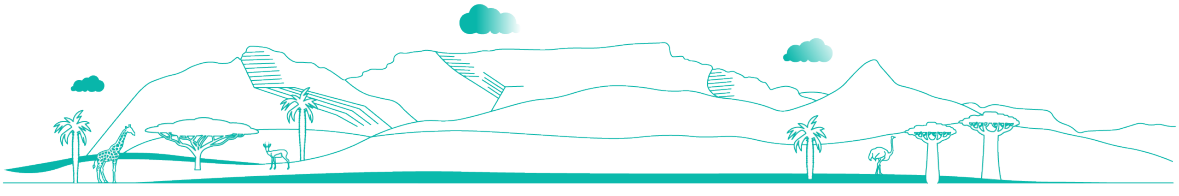


Foreword

The Government of South Africa is dedicated to ensuring education, training and lifelong learning opportunities, which will improve the quality of life of its citizens for a peaceful, prosperous and democratic South Africa. It is particularly committed to building strong foundations through the work of the Department of Basic Education and the nine Provincial Education Departments. This is exemplified by the first goal 1 of the action plans 'Towards the realisation of Schooling 2030", namely, to increase the number of learners who have mastered the minimum language and numeracy competencies for Grade 3 by the end of that year.

This report is aligned with the Department's efforts to enhance the quality of mathematics education in South Africa's primary schools. It is part of the Spotlight report series on universal basic education completion and foundational learning in Africa, which aims to spur national debate but also promote policy dialogue among African countries on challenges related to early grades.

Using the Global Proficiency Framework for Mathematics as a benchmark, the report illustrates how our national vision is aligned externally with global standards and internally with the curriculum, textbooks, teacher guides and learning assessments in grades 3 and 6. The findings confirm a good degree of alignment with international minimum proficiency requirements and areas where policy coherence can be improved. The report also showcases national efforts such as Teaching Mathematics for Understanding and the Mental Starters Assessment Project, which aim to improve pedagogy and teaching and learning support materials.

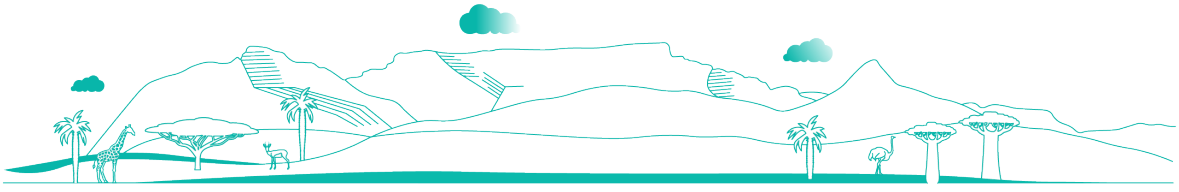
Drawing on lessons from implementing these and other targeted pilot programmes and in line with the recommendations of this report, the Department aims to strengthen impact at system level to ensure that our teachers are equipped with the skills that will enhance learning in classrooms.

We are pleased to have collaborated with the Spotlight partners, the Global Education Monitoring Report, the Association for the Development of Education in Africa, and the African Union (AU). Building on the momentum of 2024 as the AU Year of Education, through this report, we look forward to sharing positive policy practices in South Africa, including our use of evidence to inform policy, with the rest of the continent, as part of a cohort of countries, including Mauritania, Niger, Uganda and Zambia.

Addressing learning challenges is critical for education transformation. Every South African child is born to learn. Education, starting with foundational skills, is the key to unlocking our children's potential and safeguarding our nation's future.

The Government of South Africa is pleased to be part of the Spotlight initiative.

Mrs AM Motshekga, MP
Minister of Basic Education
South Africa



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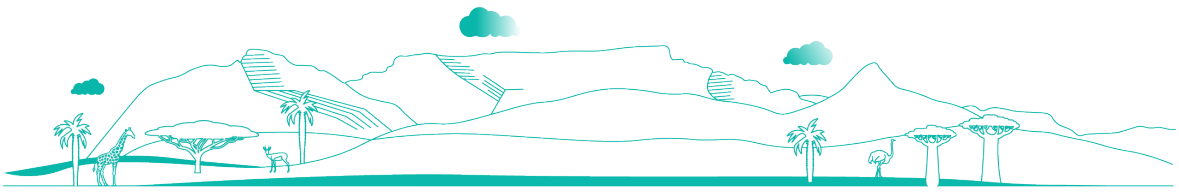

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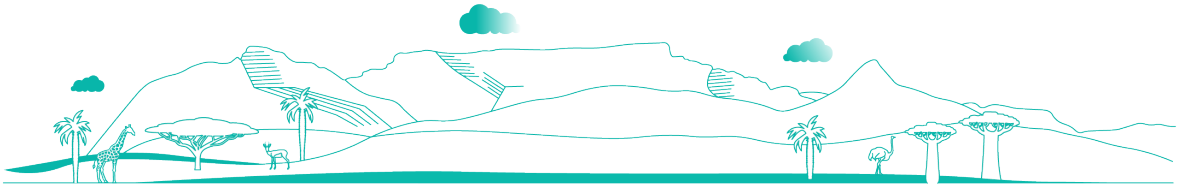

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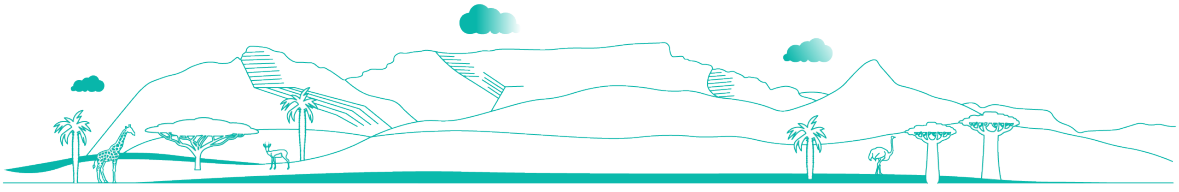
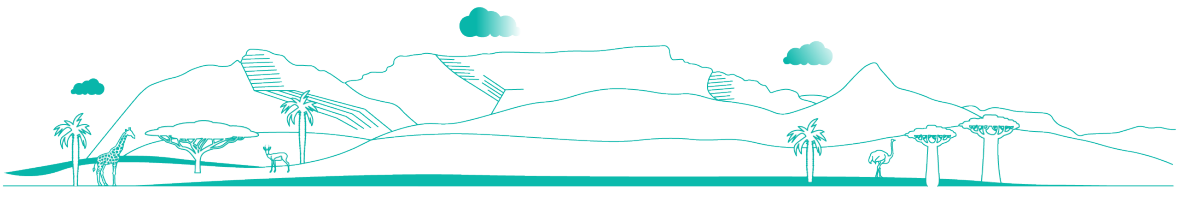


Abbreviations

ADEA	Association for the Development of Education in Africa
CAPS	Curriculum and Assessment Policy Statement
DBE	Department of Basic Education
EGRS	Early grade reading study
GEM	Global Education Monitoring
GPF	Global Proficiency Framework
HSES	Home Socio-Economic Status
LAB	Learner Activity Book (a student activity book)
LoLT	Language of learning and teaching
LTSM	Learning and teaching support materials
MPL	Minimum proficiency level
PIRLS	Progress in International Reading Literacy
SA	Subject advisor
SA-SAMS	South African School Administration Management System
SDG	Sustainable Development Goal
SGB	School governing body
Stats SA	Statistics South Africa
TMU	Teaching Mathematics with Understanding



Executive summary

Objectives and research questions

The Spotlight report of South Africa is intended to provide timely, evidence-based diagnostics to support the country's education leaders in their efforts to achieve out-of-school, completion and foundational learning targets (benchmarks) through research, dialogue with DBE officials and advocacy activities.

This country report is part of a series spotlighting early grade learning in African countries. Research conducted for the report systematically analyses the extent to which government vision is reflected in concrete, actionable objectives to improve basic skills (e.g. in mathematics) and how these intentions are translated into fit-for-purpose curricula and workbooks, teacher support mechanisms, and learning assessment.

The Spotlight series uses data collected by mapping four pedagogical inputs together – the national curriculum, learner workbooks, teachers' guides and learning assessments – with insights from semi-structured interviews and classroom observations to discuss the extent to which learners are provided with coherent opportunities to learn foundational skills. The series investigates foundational learning policy alignment using a systematic approach that combines mapping competencies found across a country's education system and looks into all levels of curriculum implementation, from the intended curriculum to the curriculum as it is enacted in the classroom. The second Spotlight series addresses the following questions:

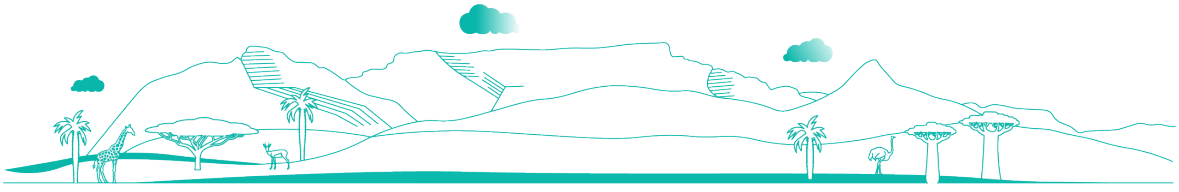
- Which domains, constructs, subconstructs and competencies are included in the country's curriculum/workbooks/teachers' guides/national assessment for Grades 3 and 6?
- To what extent do teaching and learning materials and learning assessments align with the intended curriculum? How do they support the learning process?
- How do teaching and learning materials reflect pedagogical guidance expressed in curriculum documents? Do practices observed in the classroom correspond to what is expected by the curriculum and to known best practices in teaching basic numeracy and literacy skills?
- How does the national curriculum compare with the international minimum proficiency requirements at Grade 3 and the last grade of primary education?

National vision and learning

South Africa's national vision for education centres on children learning foundational skills. South Africa's national vision for improved teaching practice and increased learning opportunities is contained in the National Development Plan, Vision for 2030 (National Planning Commission, 2011), which has supported and held the focus of those working towards educational excellence in South Africa over the past years, drawing on previous planning initiatives set in motion by the South African Department of Education and actioned in the provinces under the leadership of the provincial education departments. Educational change is a slow process. Plans embedded in the South African system have been carefully honed to support policy changes over time – with the goal of 2030 ever in the minds of all educational planners and support systems. The changes were necessitated by the need to continually strengthen the policy. The learning in the system has shown that, although difficult to achieve, change is possible.

Foundational literacy and numeracy levels

Since the advent of democracy in South Africa in 1994 there have been massive positive shifts in the completion rates and improvements in school attendance. But learning levels in mathematics and reading are a concern (2030 Reading Panel, 2023). In the 2019 Trends in International Mathematics and Science Study, 41% of Grade 5 students achieved the minimum proficiency level (MPL) in mathematics (up from 11% in 2003) but in the 2021 Progress in International Reading Literacy Study (PIRLS), only 19% of Grade 5 students reached the minimum proficiency level in reading (down from 22% in 2016).



Mapping the curriculum, learning and teaching materials, and assessment

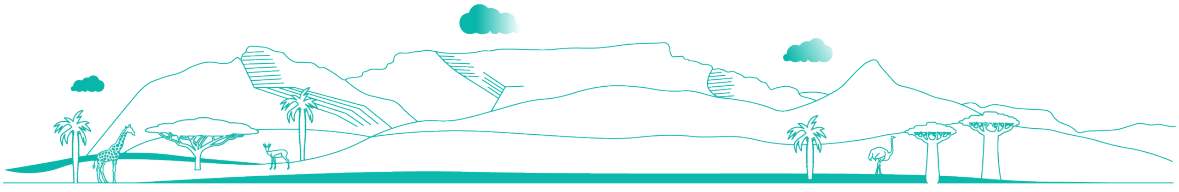
The second Spotlight series reviewed the curriculum and teaching and learning materials. In South Africa, this review specifically focused on the framework of the Teaching Mathematics with Understanding (TMU) project as well as the content to be taught, the learning and teaching support materials (LTSM) which are stipulated in the Curriculum and Assessment Policy Statement (CAPS). A research team collected systematic data across pedagogical inputs – the national curriculum, learner workbooks, teachers' guides and learning assessments – and analysed the extent to which learners are provided with coherent opportunities to learn foundational numeracy skills. The degree of alignment across pedagogical inputs (curriculum, workbooks, teachers' guides and assessments) is one factor that contributes to whether learners effectively master foundational numeracy skills (Alia et al., 2022; Scheerens, 2017; World Bank, 2020). The two grades that constituted the focus of this study were Grades 3 and 6, the final grades in the first two phases of education in the South African school system. In addition to the mapping analysis, a research team conducted fieldwork in the three South African provinces of KwaZulu-Natal, the Eastern Cape and Limpopo. This work included classroom observations (of Grade 3 and 6 lessons), interviews with stakeholders (Grade 3 and 6 teachers, principals, school governing body [SGB] members and subject advisors [SAs]), and mapping of schools and their characteristics to better understand the degree to which the intended curriculum is enacted in classrooms, and the challenges teachers and administrators face in implementing South Africa's curriculum. Table A presents the total number of stakeholder interviews and classroom observations conducted in the three provinces.

Table A. Stakeholder interviews and classroom observations

Instrument	Respondents	Total
Interviews	Principals	**14**
	School governing body members	**13**
	Subject advisor	**1**
	Grade 3 teachers	**14**
	Grade 6 teachers	**13**
Classroom observations	Grade 3 classes	**12**
	Grade 6 classes	**11**

Fieldwork

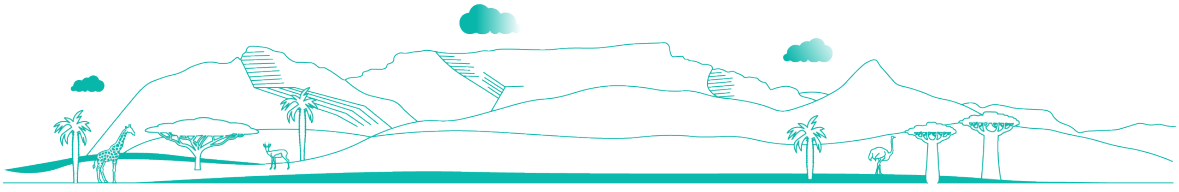
In total, 23 TMU mathematics classrooms were observed and 45 key informants were interviewed. Grade 3 and 6 teachers typically use the TMU lesson plans to prepare their lessons. Every teacher bases their lessons on the TMU workbook, which is known as the Learner Activity Book (LAB). Although most teachers make use of the manipulatives at their disposal, there is room for improvement in both the quantity and quality of these resources. It is important to support Grade 6 mathematics teachers in using manipulatives and hands-on activities to help learners better understand abstract ideas. Even though all the teachers are familiar with the CAPS, they reported that some curriculum topics present difficulties for them, for example, telling time at Grade 3 and long division strategies at Grade 6. The availability of educational materials in all South African languages attests to the presence of mother tongue instruction at the Grade 3 level. The TMU Framework has ensured the provision of bilingual LTSM in Grades 1–4. Beyond Grade 4, the TMU supports the use of purposeful translanguaging in mathematics teaching. It is necessary to reinforce the use of English as a language of instruction at the Grade 6 level for the benefit of English second language learners. It is commendable that, as seen in the lesson observations, most teachers ask questions that aim to ascertain learners' comprehension levels and help them recall material they have already learned. However, teachers still need to provide learners with more opportunities for mathematical talk and use questioning techniques that foster imagination and creativity in both grades. To increase teachers' confidence in teaching topics that are difficult for students to understand, teachers need ongoing professional development and assistance. Some teachers reported positive experiences of pedagogical content support provided by the SAs, but it was also noted that this could be strengthened.



Recommendations

Based on the mapping analysis and fieldwork carried out for this report, the following seven recommendations can be made:

- Continue to support the vision of foundational literacy and numeracy in South Africa.
- Consider the continued provision of concrete manipulatives for early grade maths classes with additional teacher training on how to use, sustain and maintain manipulatives and materials (i.e. maths kits and games).
- Time the delivery of instructional materials to schools so that they reach schools before a term begins.
- Strengthen the accessibility of materials in all official languages across all years of primary school education and ensure awareness of open-source TMU materials.
- Plan targeted teacher support and ongoing professional development to enhance teacher's content knowledge and pedagogical skills.
- Utilize learner responses in learning assessments better to improve teaching practices (via SAs).
- Continue improving infrastructure to accommodate increases in learner enrolment.



1. Introduction

1.1 Background

The Global Education Monitoring (GEM) Report is an editorially independent report hosted and published by UNESCO with the mandate to monitor progress on education in the Sustainable Development Goals (SDGs) and on the implementation of national and international strategies to achieve SDG 4. As part of the GEM Report's objectives to build partnerships and increase impact at the regional and national level, a regional report series was introduced in 2019 to examine the theme of the global report in more depth in selected regions. The concept of the regional report was adjusted in the case of Africa. Entitled "Spotlight", this report series:

- Focuses on the theme of universal basic education completion and foundational learning
- Consists of three report cycles, covering the entire continent
- Is underpinned by reports in five to six focus countries
- Is informed by additional country case studies and other background papers covering the broad range of policy issues associated with foundational learning.

Primary education, and early grades in particular, is the level of interest, except where it is necessary to also address issues related to pre-primary or lower secondary education. In this regional report series, the GEM Report has partnered with the Association for the Development of Education in Africa and the African Union.

The first Spotlight continental report, country reports, country case studies and other background papers were launched in October 2022 at the ADEA Triennale.[1] The report introduced the Spotlight analytical framework and its seven factors (**Figure 1**). The second Spotlight cycle focuses on selected elements of three of these factors, seeking to elaborate on how countries align their national vision with their curriculum and workbooks, teacher support, and assessment. A specific focus on mathematics is used to illustrate variations observed across the continent. The second Spotlight series has three goals:

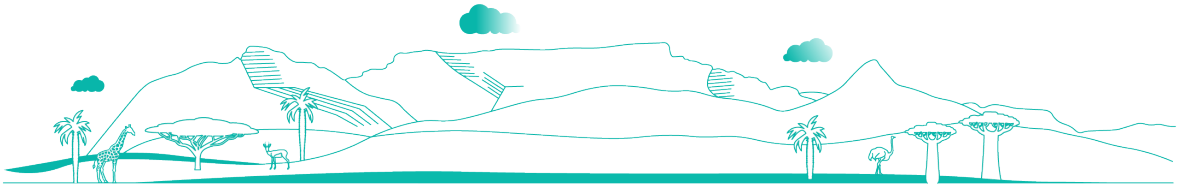
- Support countries in their efforts to achieve out-of-school, completion and foundational learning targets (benchmarks) through research, dialogue with country governments and advocacy activities
- Support countries to share positive practices that promote foundational learning with their peers on the continent
- Raise the political salience of foundational learning in Africa, through the mobilization of regional organizations and peer learning mechanisms.

The focus of the second Spotlight cycle on curriculum, textbooks and assessment matches the intent of the Spotlight series to work with three clusters of the Continental Education Strategy for Africa 2016–25 – curriculum, teacher development and planning – as part of the Leveraging Education Analysis for Results Network. This peer learning mechanism aims to act as a catalyst for cross-cluster collaboration to address foundational learning issues in Africa.

The Spotlight study in South Africa comprised a set of activities, each generating evidence and findings related to the study's four research questions:

- Literature review, stakeholder mapping and curriculum mapping (July–August 2023)
- Initial stakeholder discussion, curriculum materials mapping (July–December 2023)
- Fieldwork (October–November 2023)
- Validation workshop (February 2024).

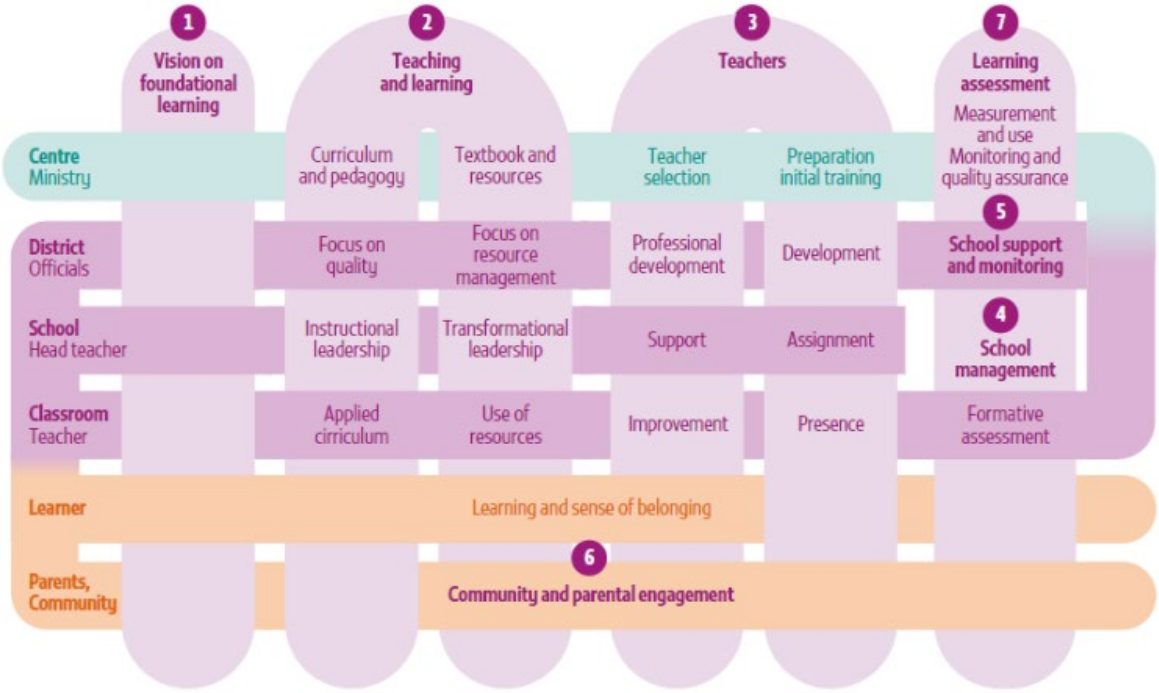
[1] All reports and background papers are available at: https://www.unesco.org/gem-report/en/2022-spotlight-africa



1.2 Analytical framework

The Spotlight analytical framework takes a system approach and acknowledges the interdependencies between multiple levels and policy levers in an education system that need to be mobilized to achieve foundational learning (**Figure 1**). Seven broad factors are distinguished, which can be customized to fit the country context.

FIGURE 1. ANALYTICAL FRAMEWORK OF THE SPOTLIGHT SERIES

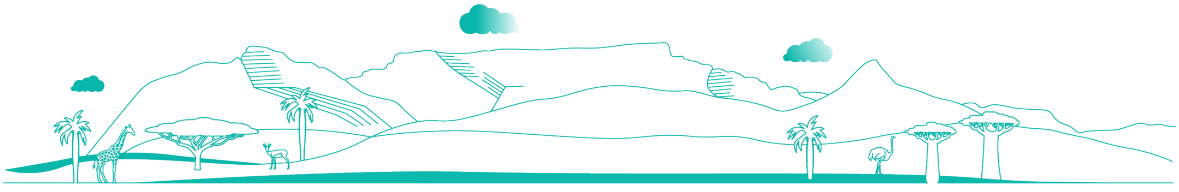


First, a country needs to have a clear vision to improve foundational learning for all children (**1**), with full understanding and buy-in from all education leadership levels, from the ministry to local authorities and school personnel. This is expressed through specific targets that are monitored and reported on. The vision should be reflected and communicated via policy decisions on the 'what' (curriculum) and the 'how' (pedagogy) of teaching and learning in early grades (**2**), including the language of instruction and the use of appropriate materials, especially textbooks (DBE workbook and TMU LAB). Eventually, the national vision should be reflected in policy decisions on teacher preparation, management and support (**3**).

School-level decisions are central to ensuring that foundational learning skills improve through better classroom practices. Headteachers need to be prepared to focus on instructional and transformational leadership (**4**). Their skills should be nurtured and developed to support teachers and to communicate with parents and communities. Schools also need to be supported by local education authorities, which effectively communicate expectations for improvement and provide the latest information (**5**).

An often-neglected policy dimension is that community and parental engagement can strengthen school responsiveness to external scrutiny and monitoring. Efforts need to overcome barriers to such participation due to lack of confidence and resources (**6**). Finally, reliable data on access, completion and learning are needed. An assessment system is needed that monitors progress on what learners are expected to learn and is linked to classroom processes and practices as well as international standards (**7**).

While the 2021/22 research cycle addressed each of the seven factors of the analytical framework, the 2023 cycle addresses the coherence and alignment of elements of three factors with the national vision: 1) curriculum and textbooks (DBE workbook and TMU LAB); 2) teacher support mechanisms; and 3) assessment (7).



While the 2021/22 research cycle addressed each of the seven factors of the analytical framework, the 2023 cycle addresses the coherence and alignment of elements of three factors with the national vision: 1) curriculum and textbooks (DBE workbook and TMU LAB); 2) teacher support mechanisms; and 3) assessment **(7)**.

Each country report under the second Spotlight research cycle systematically analyses the extent to which government vision is reflected in concrete, actionable objectives to improve basic skills (e.g. in mathematics) and how these intentions are translated into fit-for-purpose curricula and textbooks (DBE workbook and TMU LAB), teacher support mechanisms, and learning assessment (**Table 1**). The questions can be adapted to country context.

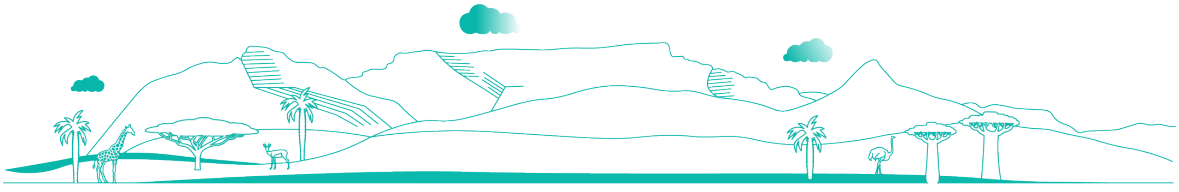
Table 1. Policy analysis in the second Spotlight series country reports

	Curriculum and textbooks (DBE workbook and TMU LAB)	**Teacher support**	**Learning assessment**
Key analytical questions	How is the national vision translated into the curriculum and relevant and effective teaching and learning materials?	How are teachers supported to realize the national vision on foundational learning? What main support mechanisms do they have at their disposal and to which extent are their teaching resources adapted to support and improve teaching practices?	How does the country monitor the achievement of its national vision? How is *classroom assessment* used to generate formative feedback? How is *system assessment* organized, including national examinations, and how is it used to inform policy?
Data and evidence	Curriculum, syllabus and textbooks (DBE workbook and TMU LAB)	Teachers' guides and support structures	National assessment framework and strategy, teacher training in assessment, primary school examinations, system-wide assessments
Methods and outputs	Systematic mapping and coding of curriculum, textbook (DBE workbook and TMU LAB) content, qualitative analysis of workbooks and curriculum	Systematic mapping and coding of teachers' guides, policy analysis of teacher support structures, qualitative analysis of teachers' guides and their use	Systematic mapping and coding of national learning assessment frameworks and practices
Overall analysis of alignment and coherence	Which domains and constructs are reflected in textbooks (DBE workbook and TMU LAB)? What is the time allocated to foundational learning in the curriculum? What are the pedagogical underpinnings in the textbook (DBE workbook and TMU LAB) design?	Which domains and constructs are reflected in teachers' guides? Are these aligned with workbooks? What are the pedagogical underpinnings in teachers' guide design?	Which domains and constructs are reflected in national learning assessment frameworks and practices? To what extent is learning assessment used to improve teacher practice and system improvement?

Note: DBE: Department of Basic Education; TMU: Teaching Mathematics with Understanding; LAB: Learner Activity Book.

1.3 Research questions

Learners' achievement is shaped by the quality of their opportunities to learn (Muijs et al., 2014). The Spotlight series uses data collected by mapping pedagogical inputs together with insights from semi-structured interviews and classroom observations to discuss the extent to which learners are provided with coherent opportunities to learn foundational skills.



Opportunities to learn are the 'observable structure' of education systems and their quality builds on the alignment between educational goals and teaching and assessment practices (Alia et al., 2022; Scheerens, 2017; World Bank 2020). Whether learners effectively master foundational skills depends in large part on the degree to which they are provided with the right opportunities to learn, shaped by the education system's policy alignment. In the second Spotlight series analytical framework, education system policy alignment is the bedrock of educational effectiveness and constitutes one of the prerequisites to improving levels of foundational learning.

Policy alignment is understood as:

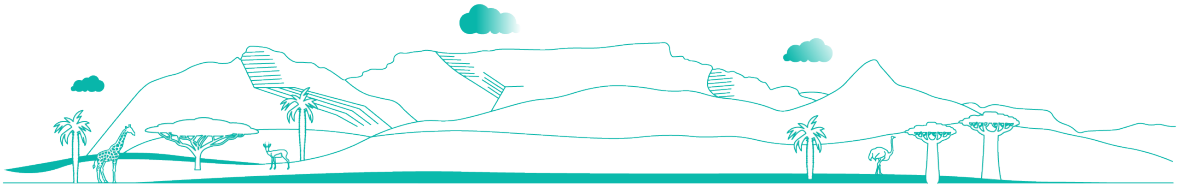
- **Content alignment** between all the pedagogical resources that determine learners' learning experience.
- **Pedagogical and cognitive alignment** between the curriculum, existing best practices and what is happening in the classroom, throughout learners' learning experience.
- **Political alignment** between a country's regional and international commitment, such as improving the proportion of learners who meet internationally agreed-upon minimum proficiency levels, and its national policy.

The second Spotlight series investigates foundational learning policy alignment using a systematic approach that combines mapping competencies found across a country's education system and insights into all levels of curriculum implementation, from the intended curriculum to the curriculum as it is enacted in the classroom. The second Spotlight series addresses the following questions:

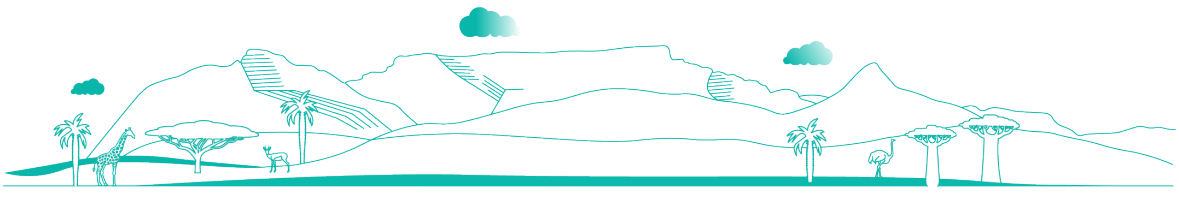
- Which domains, constructs, subconstructs and competencies are included in the country's curriculum/textbooks (DBE workbook and TMU LAB)/teachers' guides/national assessment for Grades 3 and 6?
- To what extent do teaching and learning materials and learning assessments align with the intended curriculum? How do they support the learning process?
- How do teaching and learning materials reflect pedagogical guidance expressed in curriculum documents?
- Do practices observed in the classroom correspond to what is expected by the curriculum and to best practices in teaching basic numeracy and literacy skills?
- How does the national curriculum compare with international minimum proficiency requirements at Grades 3 and 6?

A government's policy to improve foundational numeracy skills is mediated by at least four key elements: 1) the official curriculum; 2) learners' textbooks (DBE workbook and TMU LAB); 3) teachers' pedagogical support such as teachers' guides; and 4) learning assessments.

- The **official curriculum** outlines what learners should know and do. It communicates a government's vision of what learners are expected to learn, how they are to learn it and the amount of time they are to spend learning it. Ideally, the curriculum sets measurable learning outcomes at each grade level and against which teachers and the system at large can measure progress.
- **Textbooks (DBE workbook and TMU LAB)** act as mediators between the official curriculum and the curriculum as implemented by teachers. They translate a somewhat abstract curriculum into concrete operations that teachers and learners can easily carry out. Because of their roles as mediators of intent, textbooks (DBE workbook and TMU LAB) heavily influence what mathematics teachers teach, how they teach it and, by extension, how learners experience it and how much instructional time they devote to each topic.
- **Teachers' guides** assist teachers in structuring and articulating learners' opportunities to learn. They provide guidance on textbook (DBE workbook and TMU LAB) intended use and help teachers develop and plan lessons. Just as textbooks (DBE workbook and TMU LAB) frame teachers' instructional decisions, teachers' guides have the potential to influence the pedagogical choices teachers make in the classroom. At the very least, they identify the order in which teachers should address topics and how much time they should spend on each topic. Many provide guidance on how teachers should present topics to learners and include summative evaluation tools to measure learner performance on these topics. Teachers' guides that are highly scripted go even further, providing teachers with daily lesson plans that outline each step in the learning process. Like textbooks (DBE workbook and TMU LAB), teachers' guides serve to translate an abstract curriculum into concrete and operational steps for teachers to follow.
- **Learning assessments** are designed to measure the extent to which learners can demonstrate the knowledge and skills specified in the curriculum. They can be used summatively to assess general levels of skills or formatively to identify domains where systems may require improvements. Learning assessments take different forms: national assessments, national examinations or classroom assessments, and their content must be assessed against their objectives.



These four pedagogical inputs are highly interconnected. In an environment designed to maximize learning, each input reinforces and builds on the other three. Textbooks (DBE workbook and TMU LAB) and teachers' guides, for example, assist teachers in implementing the vision outlined in the curriculum and should, therefore, be closely keyed to curriculum learning outcomes expected at each grade level. From a policy perspective, aligning these four pedagogical inputs provides learners with a comprehensive and systematic learning experience, which is at the heart of the second Spotlight series.



2. Country context

2.1 The South African education system

South Africa's education system includes four phases: the foundation phase (Grades R-3), the intermediate phase (Grades 4–6), the senior phase (Grades 7–9), and further education and training (Grades 10–12) (**Table 2**). Progression between grades and phases is based on internal school-based assessment. Grade 12 is the last year of schooling in South Africa, and is the year in which learners take the National Senior Certificate examination for matriculation to higher education, or to enter the workforce. The National Senior Certificate is the national school leaving examination which determines university access. It is currently the only formal national examination, although there are plans for a school leaving certificate, which would be taken at the end of the senior phase (in Grade 9). These plans have not yet been actioned.

Table 2. Structure of South Africa's school education system

<table>
<tr><th>Age</th><th>Grade</th><th>Structure</th><th>Type of schooling</th></tr>
<tr><td>18</td><td>12</td><td rowspan="3">Further education and training</td><td rowspan="5">High school</td></tr>
<tr><td>17</td><td>11</td></tr>
<tr><td>16</td><td>10</td></tr>
<tr><td>15</td><td>9</td><td rowspan="3">Senior phase</td></tr>
<tr><td>14</td><td>8</td></tr>
<tr><td>13</td><td>7</td><td rowspan="10">Primary school</td></tr>
<tr><td>12</td><td>6</td><td rowspan="3">Intermediate phase</td></tr>
<tr><td>11</td><td>5</td></tr>
<tr><td>10</td><td>4</td></tr>
<tr><td>9</td><td>3</td><td rowspan="4">Foundation phase</td></tr>
<tr><td>8</td><td>2</td></tr>
<tr><td>7</td><td>1</td></tr>
<tr><td>6</td><td>R</td></tr>
<tr><td>< 5</td><td>ECD</td><td>Informal</td><td>Informal</td></tr>
</table>

Note: ECD: early childhood development.

South Africa is classified as a middle-income country, having an estimated gross national income per capita of $6,090 (World Development Indicators, 2022). Education is a top priority in the South African budget to provide quality basic education for all and lead the establishment and development of a South African schooling system for the 21st century. Historically, education has been the largest budget item in the South African national budget for many years. **Figure 2** shows the recent trend in spending.

Despite these investments in education, many challenges remain, in particular for achieving higher and more equitable learning outcomes. Foundational numeracy and literacy are priorities of the Department of Education. This is reflected in the government's national budget. The DBE's education priorities over the medium term include improving school infrastructure, providing support to improve school completion rates, providing high-quality support materials for learners and teachers, facilitating an increase in the supply of quality teachers while preparing serving teachers to teach new subjects that will prepare learners for a changing world, improving services provided through the early childhood development function taken over from the social development sector, and providing nutritious meals for learners through the National School Nutrition Programme.

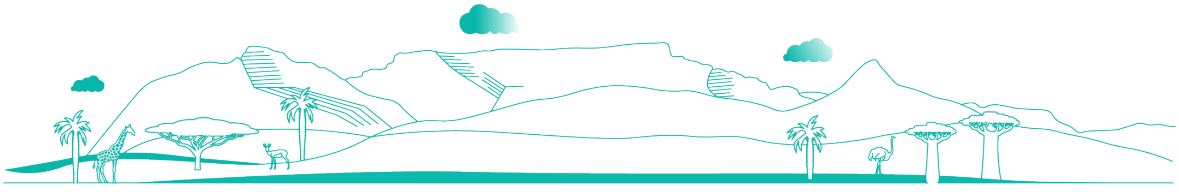
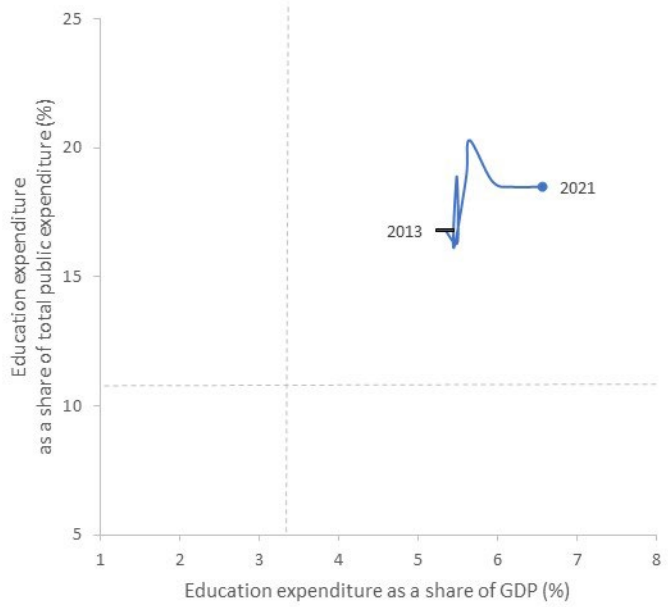


FIGURE 2. TREND IN SOUTH AFRICA'S PUBLIC EDUCATIONAL EXPENDITURE, 2013-2021



Source: UIS database

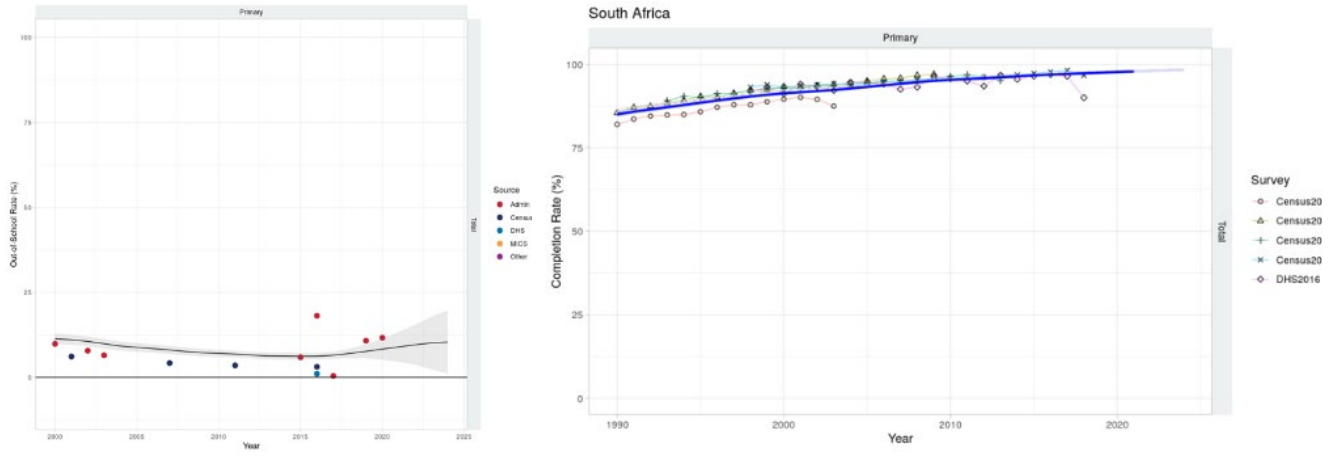
Access to and completion of primary education

The South African government is actively committed to keeping children in school through the completion of their education. School completion rates have been steadily increasing since 1991, but with some variation over time (**Figure 3**). Approximately 14.5 million individuals aged 5–24 years attended school in 2022 (50.3% males and 49.7% female), and enrolment rates were high at 98%. Most learners complete their primary education. South Africa's completion rate for primary education in 2023 was 90.3%. However, according to a recent publication based on the Stats SA general household survey, roughly 40% of all South African learners do not make it to their final year of school, and there is an average drop-out rate of 4.5% per year (Stats SA, 2023).

FIGURE 3. PRIMARY EDUCATION INDICATORS

A. Out-of-school rate

B. Completion rate



Source: UNESCO, Visualizing Indicators of Education for the World (VIEW) 2023.

Key documents

The South African curriculum, contained in the CAPS, was introduced after several rounds of curriculum development post-1994 (Department of Basic Education, 2011a). It is a single, comprehensive, concise policy document which replaced previous subject and learning area statements, learning programme guidelines, and subject assessment guidelines for all the subjects listed in the National Curriculum Statement Grades R–12.

The *National Curriculum Statement Grades R–12* represents a policy statement for learning and teaching in South African schools and comprises the following:

- CAPS for each approved school subject as listed in the policy document National policy about the programme and promotion requirements of the National Curriculum Statement Grades R–12 (**Box 2**).
- The policy document National policy about the programme and promotion requirements of the National Curriculum Statement Grades R–12, which describes the number of subjects to be offered to learners in each grade and the promotion requirements to be obtained.
- The policy document National Protocol for Assessment Grades R–12 which standardises the recording and reporting processes for Grades R–12 within the framework.

There is a CAPS document per phase, and for this report, the full curriculum of Grades 3 and 6 (from the foundation phase and intermediate phase CAPS documents, respectively) were mapped to the Global Proficiency mapping tool designed by the Spotlight 2023 research team. The DBE developed a workbook that has been in circulation nationally since 2010, initiated by the Ministry of Basic Education to support better access to print materials in previously disadvantaged schools (Venkat and Sapire, 2022). The use of workbooks has since become ubiquitous in South Africa. A recent review of LTSM in South Africa noted that they were ‘developed as a supplementary resource but [are] being [used] as a primary resource’ (Roberts et al., 2023, p. 5). Acknowledging the value of the workbooks in the system, the LTSM report recommended that the workbooks continue to be produced but that they be improved based on the findings and work done in the DBE’s Teaching Mathematics for Understanding pilot. CAPS is the operational curriculum in South Africa. This report also reviewed workbooks and learning materials from the TMU, especially for lower primary, which offers a complementary learning framework to the CAPs and additional workbooks, teachers’ guides and learning materials.

Assessment within the curriculum. The CAPS proposes continuous learning assessment with skills, content and concepts being assessed in alignment with work that has been covered in learners’ classrooms, though the use of summative

assessment is also part of the curriculum. Learners, when being assessed, are supposed to be provided with differentiated or multiple opportunities to showcase their understanding and capabilities. The learning goals and focus of each task are to be integrated and assessed through a variety of activities. While some learning goals may be evaluated concurrently, others may be assessed at different times.

Formal and informal assessments are a mandated part of the curriculum. A formal assessment task constitutes a structured set of concepts, content knowledge and skills designed for assessment. These elements are systematically evaluated through various forms of assessment, including observation and oral, practical and written assessments, with outcomes recorded using a holistic rubric. The choice of assessment forms may vary across terms and grades, aligning with learners' cognitive development and metacognitive abilities. While the specific forms of assessment may differ, all grades must incorporate a comprehensive range of assessment methods in each formal assessment task, guided by the selected concepts, content knowledge and skills. Assessment, as a continuous and deliberate process, encompasses the systematic collection, recording, interpretation, utilization and reporting of information concerning a child's progress and accomplishments in acquiring knowledge, skills and attitudes. The fundamental purpose of assessment lies in furnishing insights into learner achievement and progress, thereby guiding ongoing teaching and learning endeavours.

The inception of the annual national assessments in South Africa in 2011 marked a pivotal moment for the education system, introducing a comprehensive evaluation system aimed at assessing learners' proficiency in crucial subjects and grades. This initiative targeted learners in Grades 1–6 and 9, with a primary focus on core subjects, including mathematics, languages and natural sciences. The development of the annual national assessments was a collaborative effort, involving contributions from education experts, curriculum specialists and assessment professionals (Department of Basic Education, 2011b).

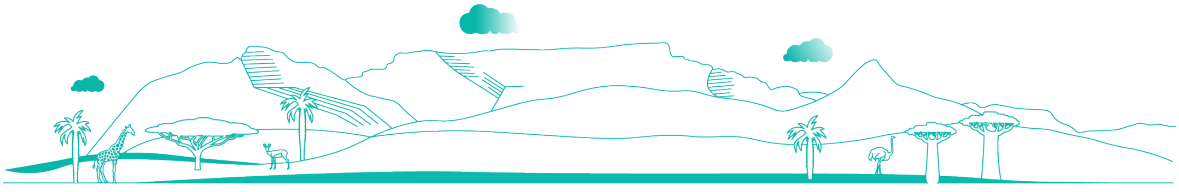
Since 2011, the DBE has been actively involved in formulating and implementing a comprehensive **National Assessment Framework**. This framework is structured around a three-pronged approach, each prong serving distinct purposes within the educational landscape. The **first prong** of the framework is dedicated to formative classroom-based assessments strategically designed to serve diagnostic purposes and facilitate error analysis, thereby providing valuable insights to inform teaching practices. Notable components falling under this prong include the DBE foundation phase Diagnostic Assessments 2021 and the Mental Maths Starters. The **second prong** adopts a summative approach and encompasses assessments conducted at critical points in the educational journey. This includes the Early Learning National Assessment for learners in the beginning of Grade 1; the national systemic assessments currently under development, a comprehensive evaluation process that assesses learners at various levels; and the General Education Certificate specifically targeted at the culmination of Grade 9. The **third prong** extends the assessment focus beyond national borders and emphasizes regional and international assessments. Examples of assessments falling under this prong include the South African Consortium for Monitoring Educational Quality as well as international assessments such as PIRLS and Trends in International Mathematics and Science Study. This multifaceted National Assessment Framework reflects the DBE's commitment to a holistic assessment approach, encompassing formative, summative and international dimensions to ensure a comprehensive evaluation of educational outcomes.

2.2 Foundational literacy and numeracy

Early-grade mathematics learning levels

Learners' learning outcomes in South Africa are well below target. In 2016, an estimated 78% of Grade 4 learners were below grade level and could not read a text for meaning in any language (2030 Reading Panel, 2023). In 2022, a language assessment of Grades 3 and 6 in Western Cape found that only 59% of Grade 3 and 76% of Grade 6 learners could pass at the lowest level (scoring at least 30% on the exam). Low foundational learning skills are a reality faced by the DBE.

From an international perspective, in the 2019 Trends in International Mathematics and Science Study, South Africa was one of the three countries with the lowest achievements, but it continues to make progress. In 2019, 41% of mathematics learners and 36% of science learners had acquired the foundational subject knowledge and skills measured by TIMMS. This is equivalent to a fourfold increase for mathematics (from 11% to 41%) and a threefold increase for science (from 13% to 36%) over 20 years (TIMMS, 2022).



Early-grade reading skills

In 2021, South Africa scored the lowest among the countries participating in the PIRLS examination. The performance of South African learners significantly decreased by 0.3 standard deviations between 2016 and 2021 (from a score of 320 to 288). The share of learners not reaching the minimum proficiency levels also increased significantly, from 78% to 81%.

In 2021, only 19% of children reached the minimum proficiency level in reading (PIRLS, 2021). Girls scored higher than boys on average (almost 0.5 standard deviations higher), and the proportion of girls not reaching the MPL in reading was lower by almost 10 percentage points from 2016. There is a sharp urban-rural divide in the data, with children from rural areas scoring significantly below children from urban areas (0.5 standard deviations lower), and a higher share of children from rural areas not reaching the MPL (approximately 20%). The socioeconomic gradient is strong, with children from lower socioeconomic backgrounds scoring lower and being less likely to reach the MPL in reading than children from higher socioeconomic backgrounds. Further analysis of the 2021 PIRLS finding is presented in **Annex 5**.

Overall, South Africa's reading performance in PIRLS has worsened since 2016, with the average score decreasing by 0.3 standard deviations and the share of children not reaching the MPL in reading increasing by 3 percentage points. This is concerning given South Africa's commitment to improving education quality.

2.3 National vision and learning

South Africa's education system includes a political commitment to achieve foundational learning and numeracy. The current development agenda, as articulated by the National Development Plan: Vision for 2030 (National Planning Commission, 2011), focuses on the realization of the goals in the 2025 Action Plan and the achievement of the nation's long-term development vision of becoming a prosperous middle-income country by 2030.

The vision for improving the system is strong and much is being done to enable improved equity of access, as well as the standard and quality of education. There have also been many improvements to the education system, such as the introduction of no-fee schools, school nutrition programmes, access to scholar transport and the Integrated Early Childhood Development Policy (Census, 2022).

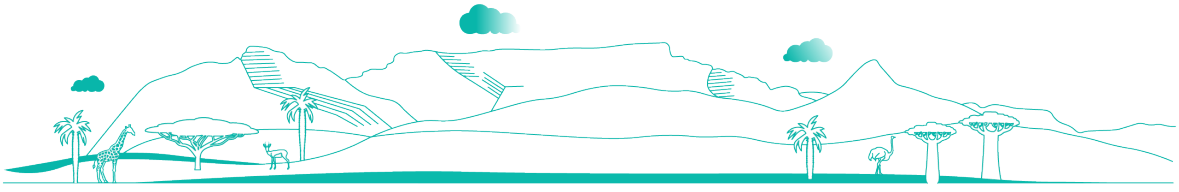
The 2030 plan addresses inter alia schooling, financing of schooling and financial support, resourcing schooling, language of instruction, Early Grade Reading Assessment (support to underpin all teaching and learning, transport to and from schools, and meals for those in need through the National School Nutrition Programme). The plan and implementation of the plan are needed, as the system still faces challenges, although strides have been made since the advent of the new democracy.

Promising practices for improving foundational learning

In 2019, the DBE launched the TMU programme, which is still in its pilot phase. This programme was introduced by the Minster of Basic Education as 'a balanced and multi-dimensional approach for the teaching of mathematics in South Africa' (Department of Basic Education, 2019). The programme has been piloted in 40 schools over the past 5 years. It has been well received on the ground and shows huge promise. The TMU programme is motivated by the goals of the 2025 Action Plan (Department of Basic Education, 2010), the first two of which are to:

1. Increase the number of learners in Grade 3 who, by the end of the year, have mastered the minimum language and numeracy competencies for Grade 3
2. Increase the number of learners in Grade 6 who, by the end of the year, have mastered the minimum language and numeracy competencies for Grade 6.

These goals emphasize the core commitment of South Africa's focus to improve foundational learning skills. Two recent policy developments that are expected to positively impact teaching and learning in the system are the TMU and the Mental Maths Starters Programmes (**Boxes 1-3**).

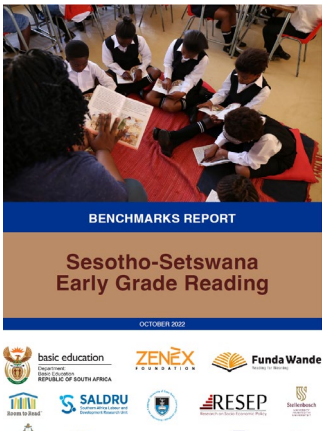


Box 1. The Department of Basic Education's promising research and evaluation efforts: Building internal capacity through collaboration

South Africa's Department of Basic Education (DBE) has fostered close partnerships with researchers and practitioners and has, in turn, built internal capacity to undertake research and evaluation. The DBE aims to effectively use research and evidence in policy and programming. Both the Teaching Mathematics with Understanding Framework and the Mental Starters Assessment Project (**Boxes 2-3**) are examples of collaborative efforts between government, development partners, researchers and practitioners. These partners were closely involved in the design, piloting and evaluation of both programmes. Efforts to build internal capacity for research and evaluation also include:

- **Internship programmes:** Through internship programmes hosted in the DBE, numerous young researchers have been absorbed into the DBE or the education sector in other partner organisations. This ensures that there is strong technical capacity to undertake and use research in policymaking and planning processes.
- **Collaboration and evaluation across departments:** Over the years, the Planning, Monitoring and Evaluation Team has evaluated several key education programmes, including the National Schools Nutrition Programme, the Funza Lushaka Bursary Programme and the Grade R Programme. The results of these evaluations have supported various quality improvements in the way these programmes are implemented. The evaluation of the Funza Lushaka Bursary Programme, for example, was useful in motivating for additional programme funding.
- **Public dissemination of research:** Through a repository of reports on the DBE website, and through making certain de-identified administrative data available, for instance through the University of Cape Town's DataFirst portal, the DBE has worked to promote and share research evidence. The DBE also published a research agenda to guide external researchers towards currently policy-relevant areas of work.
- **Early grade reading studies:** The Early Grade Reading Studies (EGRS) have been undertaken over 10 years. The EGRS is a series of large-scale evaluations led by the DBE in collaboration with academics at various universities and partner organizations. The project aims to build evidence about what works to improve the learning and teaching of early grade reading in South African schools. The EGRS uses formal impact evaluation methodologies (randomized experiments) and makes extensive use of mixed methods (classroom observation and detailed case studies) to provide both quantitative estimates of programme impacts as well as understand where, how and why different elements of support are working.
- **Learning benchmarks:** The EGRS project collected a substantial amount of data on home language reading outcomes across South Africa's languages. This effort led to a secondary output in the development of reading benchmarks in all the country's languages. Since benchmarks indicating progress in learning to read in one language cannot necessarily be inferred from another language, the DBE led a detailed analysis of the linguistic features of each language and large sample data analysis to better understand the relationships between reading skills, such as oral reading fluency and comprehension, in each language. These benchmarks have now been approved for use by teachers to better understand their students' progress.

For more information, see the video on EGRS and use for government programming and planning at:
https://www.education.gov.za/Portals/0/Documents/Publications/EGRS/EGRS%202022/EGRS-INDABA-HIGHLIGHTS.mp4



Box 2. Teaching Mathematics for Understanding

The purpose of the Teaching Mathematics for Understanding (TMU) Framework is to provide guidance to the mathematics education community in two ways. First, it provides the theoretical background to the proposed balanced approach. Second, it includes worked exemplars that bring the dimensions of this balanced approach to life in the context of mathematical examples across all phases in the sector. The five-part Framework draws the 4 strands of mathematical proficiency within a learning-centred classroom and is currently being piloted in 40 schools (Kilpatrick et al., 2019). The Framework dimensions represent a contextualisation and adaptation of the strands to the South African context. It proposes steps be taken to bring about the transformation of mathematics teaching in South Africa.

Within the TMU Framework, teachers strive to:

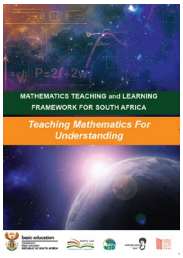
- Teach mathematics for **conceptual understanding** to enable comprehension of mathematical concepts, operations and relations
- Teach so that learners develop **procedural fluency**, which involves skill in carrying out procedures flexibly, accurately, efficiently and appropriately
- Develop learners' **strategic competence** – the ability to formulate, represent and decide on appropriate strategies to solve mathematical problems
- Provide multiple and varied opportunities for learners to develop their mathematical **reasoning** skills – the capacity for logical thought, reflection, explanation and justification within
- A **learning-centred classroom**, which enables all of the above, supported by teachers engaging with learners in ways that foreground mathematical learning for all.

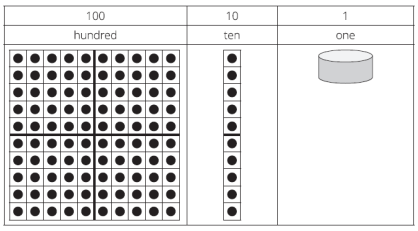
The Framework's design is simple, and this document has been kept relatively short to make it more accessible to teachers. It is comprised of four sections:

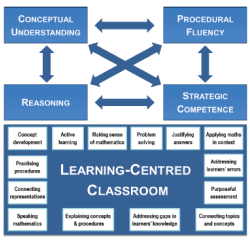
- An introduction situating the Framework in the context of teaching and learning mathematics in South Africa
- A **theoretical exposition** to outline and explain the reasoning of the model accompanied with examples
- **Phase exemplars** to inspire teachers and offer guidance on implementing the four dimensions in a learning-centred classroom
- The **implications** of the Framework in the key educational areas of curriculum, assessment, teacher development (pre-service and in-service), learning and teaching support materials, information and communication technology, and language of learning and teaching (LoLT).

TMU provides an ideal opportunity to strengthen the Curriculum and Policy Statement (CAPS) towards a deeper curriculum by:

- Emphasising links of concepts and progression over grades (progression: learning new concepts based on prior knowledge)
- Repeating topics with less conceptual progression within and across grades
- Reconsidering separating topics for an appropriate breadth and depth per unit
- Adding missing important knowledge, skills or concepts, and removing some of the knowledge/skills or concepts because the CAPS curriculum is overloaded
- Aligning topics across phases and developing curriculum documents throughout the phases.







Box 3. The Mental Starters Assessment Project

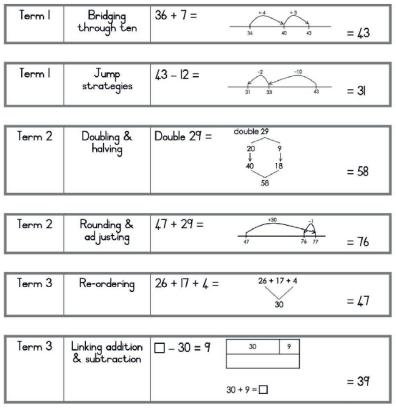
The Mental Starters Assessment Project introduces six mental mathematics lesson starter units tailored for Grade 3 learners: addition and subtraction strategies, multiplication strategies, division strategies, place value and rounding, fractions, and geometry and measurement. These units meticulously emphasize distinct calculation strategies drawn directly from the curriculum, each dedicated to a specific cluster of interconnected skills. The primary objective is to transition learners beyond the practice of counting individually on their fingers or using tally marks, methodologies recognized for their time-consuming nature, proneness to errors and decreasing efficiency with an expanding number range. The featured strategies and skills aim to cultivate a robust number sense among learners.

Structured around a three-week timeline, each unit commences and concludes with brief assessments, offering insights into learners' progress in applying the designated skills over the specified duration. The assessments include three categories: 1) fluency; 2) strategic calculating; and 3) strategic thinking. The comprehensive approach anticipates that engaging with these lesson starters will culminate in enhanced performance, as evidenced by improved pre- to post-test outcomes. Such advancements signify developmental strides in mental mathematics proficiency and number sense. Complementing this initiative, a dedicated print masters booklet has been devised, encompassing pre-tests and post-tests, take-home worksheets, and printable teaching support materials to augment the overall learning experience (Graven and Venkat, 2020). QR codes help teachers download example lessons.

Support Video

Bridging Through Ten 2

https://youtu.be/upvlvkC3Yko



Source: Graven and Venkat (2020).

[END BOX]

3. Alignment analysis and fieldwork findings

An extensive mapping analysis of content outlined in South Africa's national curriculum (CAPS and TMU unit plans) (*intended curriculum*) was conducted. The degree to which the content is included in DBE workbooks and TMU teaching materials (*enacted curriculum*), and national learning assessments DBE DIAGNOSTICS 2021 (*assessed curriculum*) was systematically mapped to better understand policy alignment. Mapping foundational learning policy alignment requires knowledge of learning domains and constructs, a consistent method of analysis, as well as insights into all the levels of curriculum implementation, from the intended curriculum to its implementation in the classroom. The Spotlight series mapping was carried out using a tool designed for this purpose which enabled rigour and consistency of mapping across all the participating countries in the series.

In addition to the curriculum and materials mapping analysis, the Spotlight research team conducted fieldwork in three South African provinces: Eastern Cape, KwaZulu-Natal and Limpopo. This work included classroom observations and interviews with stakeholders (teachers, principals, SGB members and SAs). The observations at schools enabled in-depth assessment of the 15 schools that were visited and their characteristics to better understand the degree to which the intended curriculum is enacted in classrooms, and provide insight related to the challenges teachers and administrators face in implementing South Africa's curriculum.

3.1 Curriculum

The Spotlight research team reviewed the CAPS and TMU mathematics curriculum and related teaching and learning materials in South Africa and conducted an extensive mapping analysis of the material. The analysis provides insight into the learning opportunities of South African learners in Grades 3 and 6. The research team collected systematic data across four pedagogical inputs –- the national curriculum, learner workbooks, teachers' guides and learning assessments – and analyzed the extent to which learners are provided with coherent opportunities to learn foundational numeracy skills through these inputs. A mapping tool designed by the Spotlight research team collected extensive data from South Africa's CAPS and TMU curriculum content to assess competencies present in the curriculum and across different levels of cognitive demand. The degree of alignment across pedagogical inputs (curriculum, workbooks, teachers' guides and assessments) is one factor contributing to whether learners effectively master foundational numeracy skills (Alia et al., 2022; Scheerens, 2017; World Bank 2020).

The material assessed for Grade 3 in the mapping analysis includes the CAPS curriculum, the TMU teaching and learning materials (DBE, *Grade 3 Mathematics in English Book 1&2* as well as the *Mathematics Grade 3 English Learner Activity Book 2020 Term 1-4*), and the National Diagnostic Assessment. The Grade 6 materials assessed include the intended CAPS curriculum, the CAPS teaching and learning materials (*Grade 6 Mathematics in English Book 1&2*), and the National Diagnostic Assessment.

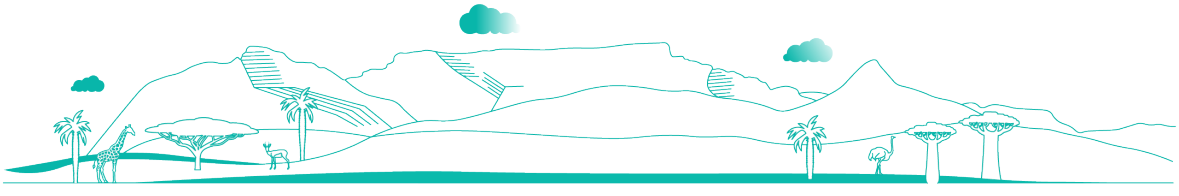
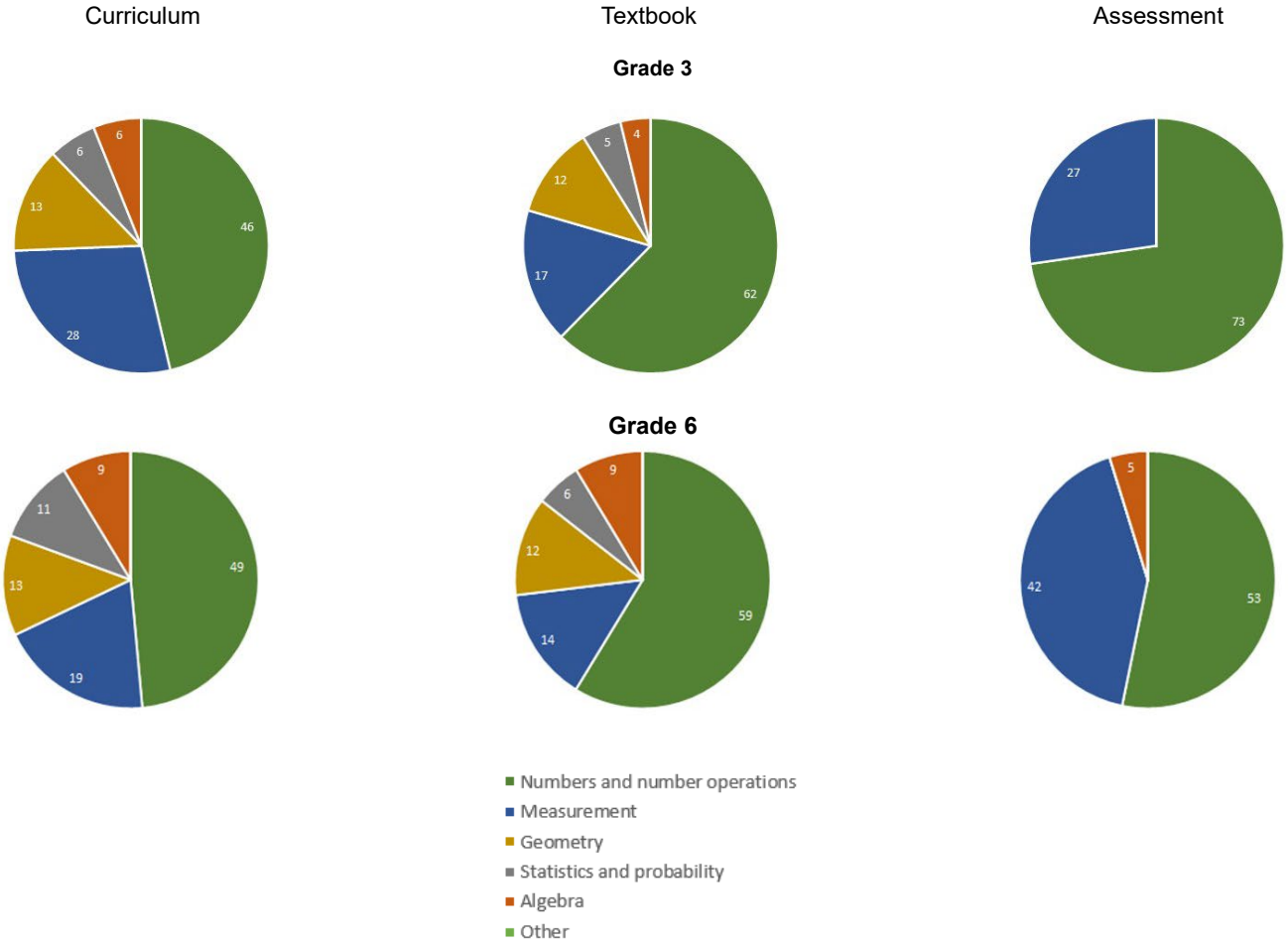


FIGURE 4. DISTRIBUTION OF COMPETENCIES IN CURRICULUM, WORKBOOK AND ASSESSMENT, BY DOMAIN



Source: UNESCO GEM Report team analysis

Content alignment

While there is a considerable degree of alignment of competencies across the intended curriculum, the learner textbooks (DBE workbook and TMU LAB) and the competencies assessed due to the assessment task being based on the interim stance of learning recovery, there is a noticeable degree of misalignment between the intended national curriculum stipulated in the CAPS and the content included in learner textbooks (DBE workbook and TMU LAB) and national assessments, especially for Grade 3. Alignment is more balanced across pedagogical inputs for Grade 6. Areas with less alignment are partially accounted for because of the DBE implementing building back better with a learning recovery post-COVID, namely the Recovery Annual Teaching Plan (RATP2023/24). To mitigate the impact of COVID-19 on learning and teaching, the DBE adopted a multiyear curriculum recovery approach. The recovery curriculum is designed to accommodate the negative impact of COVID-19 and is, therefore, an important and intended interim deviation from the original curriculum, a transitional arrangement until the policy amendment processes are completed.

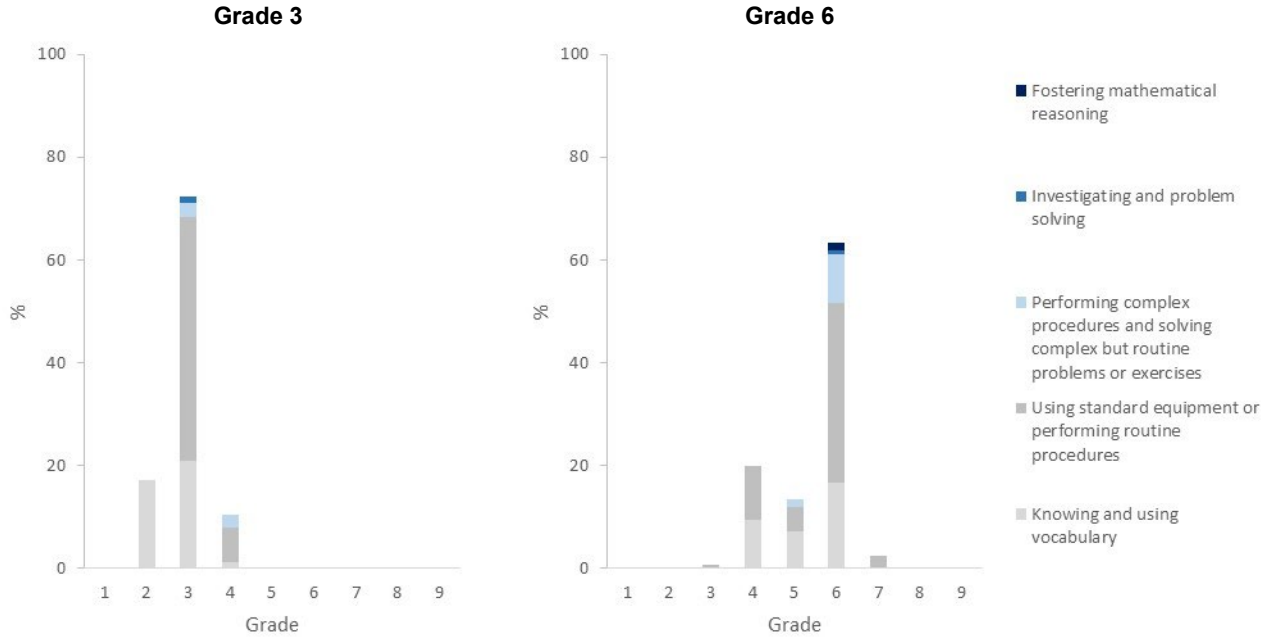
In Grade 3, domains intended, enacted and assessed include numbers and number operations (only 46% in the curriculum compared to 62% in the TMU LAB and 73% in the national diagnostic assessment) as well as measurement (26% in the curriculum compared to 17% in the TMU LAB and 27% in the national diagnostic assessment). The remaining learning opportunities are dedicated in similar shares to geometry, statistics and probability, and algebra competencies in the intended curriculum and enacted (TMU LAB), with no inclusion of these activities in the Grade 3 assessment. This variation in Grade 3

is partly due to the materials reviewed in the underlying analysis. There are some observable and intended differences between the CAPS and the TMU materials, where the TMU materials are meant to focus on lower-order, foundational and cognitive skills, and include more focus on numbers and number operations. The TMU Framework's focus on low-order skills is mainly intended to build and develop a specific concept using the relevant four dimensions instead of merely stating a concept and using multiple random strategies. Therefore, the analysis cannot draw firm conclusions around curriculum alignment, but can be used to highlight differences across the different pedagogical inputs utilized in South Africa.

In Grade 6, the share of content across different pedagogical inputs is more aligned. Domains intended, enacted and assessed include number and number operations (49% in the curriculum compared to 59% in the DBE workbook and 52% in the national diagnostic assessment) as well as measurement (19% in the curriculum compared to 14% in the DBE workbook and 43% in the national diagnostic assessment). As with Grade 3, the remaining learning opportunities are dedicated in similar shares to geometry, statistics and probability, and algebra competencies in the intended curriculum and enacted learner DBE learner workboaok, with little content from these domains found in the national diagnostic assessment (5%).

There is less alignment between the intended curriculum and the assessed curriculum than in the curriculum enacted in the DBE learner workbooks. This is due largely to the nature of the assessment instruments used for this study, namely the diagnostic assessment for mathematics in Grades 3 and 6 which are formative, not summative (Department of Basic Education, 2021). The National Systemic Tests were not selected for analysis since these are still in the process of being piloted. For this reason, results must be read and interpreted with caution, keeping in mind the nature of the assessment. **Figure 5** shows, for the diagnostic instruments that were mapped, the distribution of the items across grades and cognitive levels.

FIGURE 5. DISTRIBUTION OF NATIONAL ASSESSMENT ITEMS: THEORETICAL GRADE AND COGNITIVE DEMAND



Source: UNESCO GEM Report team analysis.

As frequently observed in diagnostic assessments, examination items assess competencies across different grade levels. The Grade 3 assessment items measured competencies from Grades 2 to 4. The Grade 6 assessment included items that evaluated competencies addressed in Grades 3 to 7. That said, most of the items for each grade level assessed competencies for the grade level in question.

In both grades, most of the items included in national assessments addressed lower-level cognitive thinking: Level A (knowing) and Level B (using standard equipment to perform routine procedures or solve routine problems). A subset of Grade 6 items and a limited number of Grade 5 items (4 out of a possible 74 items) targeted Level C (using complex procedures and solving complex but routine exercises). Only one item at each grade level required that learners perform at a Level D (investigating

and problem solving). In Grade 6, 2 items out of a possible 114 addressed the higher cognitive demand of Level E: fostering mathematical reasoning. The results suggest a discernible emphasis on nurturing foundational mathematical skills at lower cognitive levels evident in these diagnostic tests, as opposed to higher-order cognitive skills.

Overall, content alignment can be considered as high. **Figure 6** shows visually and in further detail the content alignment between the four sets of texts analysed for the study. The alignment between curriculum competencies is shown by the alignment of colours along the bars for each of the mapped curriculum components (assessment, DBE learner workbook, teacher's materials and the national curriculum).[2] The content in the national diagnostic test is intended to cover a smaller range of content and is less aligned with the intended national curriculum.

[2] While in Grade 3 the research team mapped the teachers' guide and student workbook, at Grade 6 the team only mapped the student workbook, which included narrative and other support. The alignment between the different curriculum components is visibly strong, particularly between the curriculum and the teachers' guide and student workbook in Grade 3 and the curriculum and the student workbook in Grade 6. Perfection in this instance would not be expected since the interpretation of curriculum documents anticipates the professional discretion of the experts and practitioners who implement it.

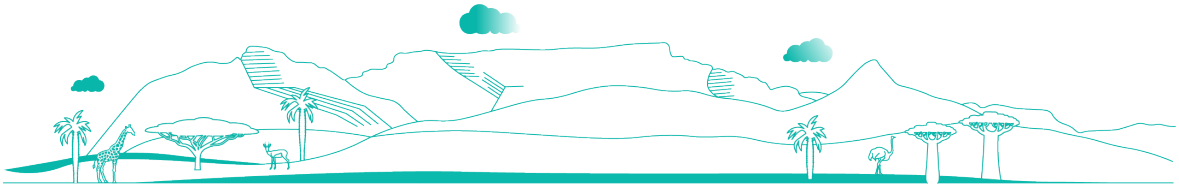


FIGURE 6. CONTENT ALIGNMENT BETWEEN CURRICULUM, WORKBOOK AND LEARNING ASSESSMENT

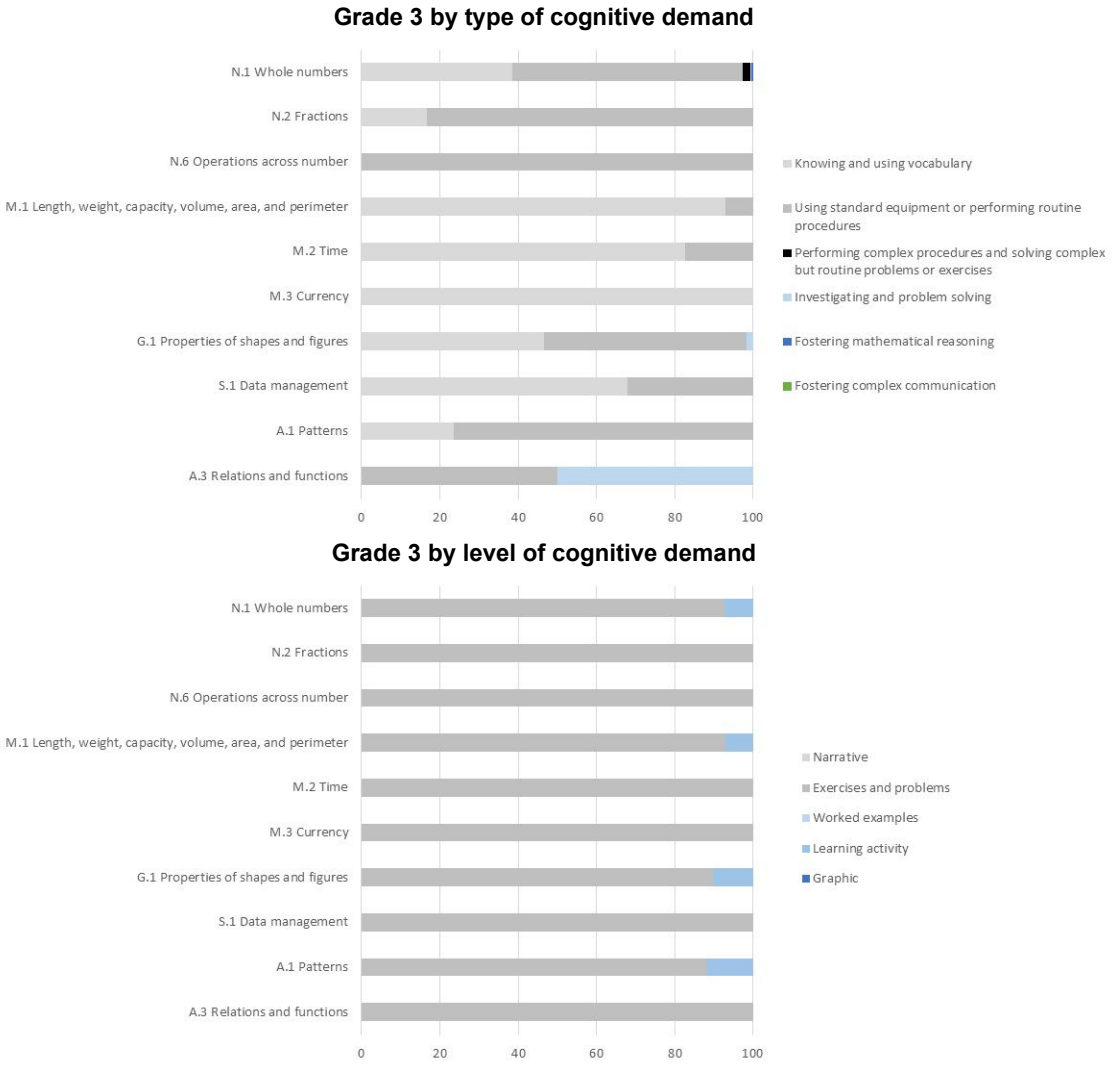
Source: UNESCO GEM Report team analysis

Pedagogical alignment

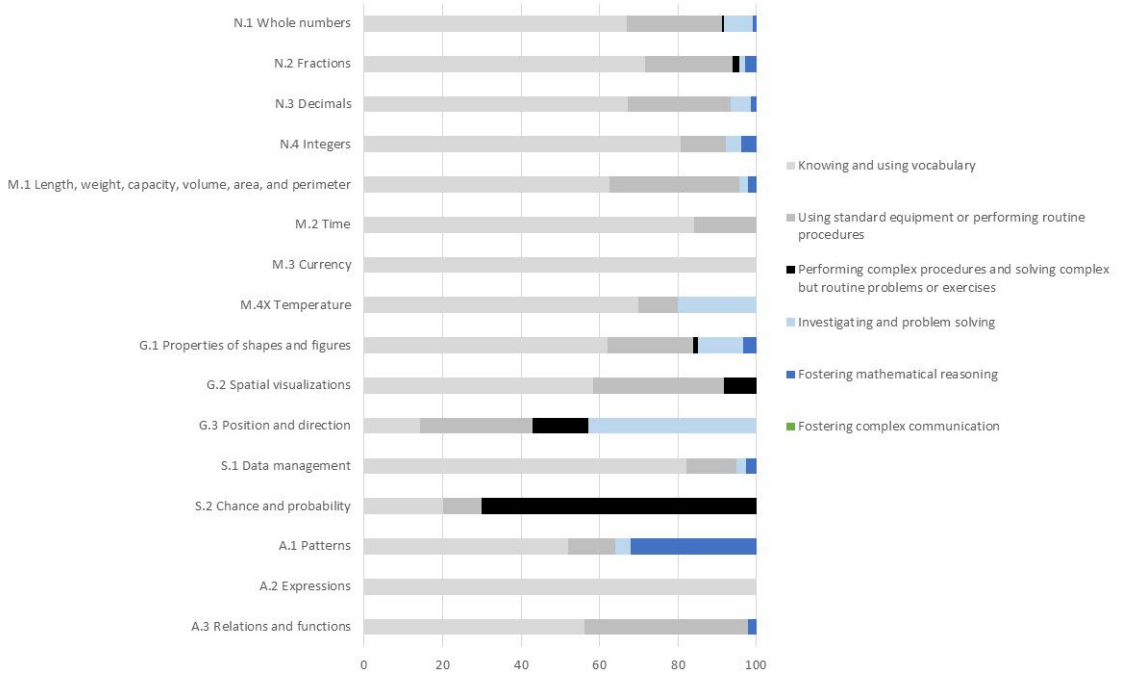
Learner textbooks (DBE workbook and TMU LAB) are fundamental pedagogical inputs to a learner's learning and understanding of the curriculum. As part of the mapping analysis, the Spotlight team mapped activities in the Grade 3 TMU LAB (still in pilot form) and the Grade 6 DBE workbook, which is a free, national workbook provided to each learner (**Figure 7**).

The Grade 3 LAB emphasizes foundational skills that require lower levels of cognitive difficulty (**Figure 7**). The main cognitive levels addressed in Grade 3 are A (knowing and using vocabulary) and B (using standard equipment or performing routine procedures), appropriate for introducing core basic knowledge to learners. Only 2% of activities in the workbook require higher cognitive thinking levels such as C (performing complex procedures and solving complex but routine problems and exercises) or D (investigating and problem solving). This is most likely by design since the workbook was developed to support learners in taking the first steps towards improving their mathematical knowledge, but consideration needs to be given to this design choice in terms of the learning opportunities for extension that it offers. The workbook does not include any explanations of content (in narrative or graphic form) to help support learner learning.

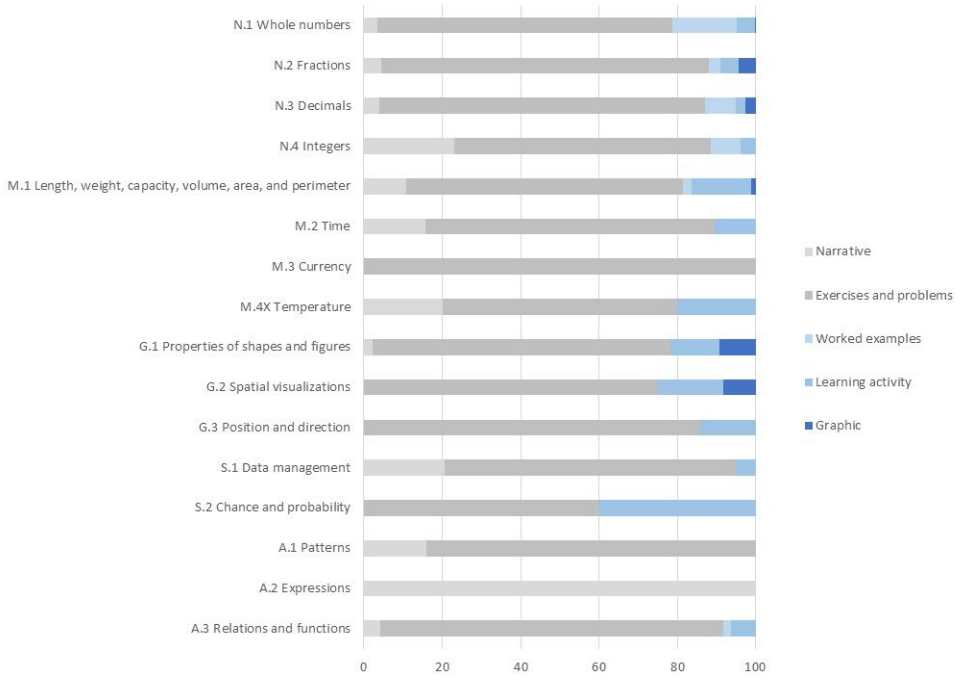
FIGURE 7. LEARNING ACTIVITIES IN TMU LAB BY TYPE AND LEVEL OF COGNITIVE DEMAND



Grade 6 by type of cognitive demand



Grade 6 by level of cognitive demand



Source: UNESCO GEM Report team analysis

In Grade 6, activities outlined in the DBE workbook are spread across different levels of cognitive difficulty, and 76% of the blocks consist of exercises and problems. Explanations (either in narrative or graphic form) and worked examples comprise 16% of the blocks. More specifically, narrative explanations form 6% of the blocks, while graphic explanations and worked examples together form 10%.[3] Graphic explanations and worked examples provide more accessible information to learners with lower reading or language skills. The use of a high percentage of narrative versus graphic explanations could pose accessibility issues for learners with weak reading skills. They may not be able to access the required information. This point needs to be considered in a highly multilingual context.

Overall, Grade 6 learners are presented with more opportunities to engage in higher-level thinking activities, with 10% of the blocks in the DBE learner workbook tackling Level C cognitive skills (performing complex procedures and solving complex but routine problems or exercises), D (investigating and problem solving) and E (fostering mathematical reasoning).

Political alignment

As part of its SDG 4 commitment, South Africa has promised to increase the "Proportion of children and young people: (a) in Grade 3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex". These minimum levels of proficiency are defined by the Global Proficiency Framework (GPF) but an important question remains whether South Africa's curriculum enables it to meet these commitments (**Figure 8**).[4]

Both Grade 3 and Grade 6 curricula align well with the GPF. The South African curriculum exceeds the number of specified competencies outlined in the GPF for some areas (i.e. solving operations using whole numbers); whereas for other competencies it does not reach the same level/number of specified competencies in the GPF (i.e. telling time). Overall, the spread of the competencies is well-aligned with the global standards, according to the minimal standards in the GPF, against which both were mapped.

South Africa's curriculum is well-aligned with global standards for Grade 3. In Grade 3, the curriculum covers all the subconstructs recommended for minimum proficiency in the GPF except one (demonstrate an understanding of equivalency). At the same time, the curriculum covers one subconstruct that is not included in the GPF at Grade 3 (solving real-world problems involving fractions), and one that is not included in the GPF at all (problem solving and calculation techniques across operations)[5]. The alignment in terms of the number of competencies addressed in each subconstruct is particularly strong in the domain of numbers and number operations, meaning the curriculum and the GPF place very similar importance on each subconstruct. Across the other domains, the curriculum places a lower emphasis on the subconstructs "tell time" and "describe the position and direction of objects in space": only 7% and 2% of the national curriculum competencies pertain to these areas, respectively, versus 11% and 6% in the GPF. On the other hand, the curriculum places a stronger emphasis on the subconstruct "use non-standard and standard units to measure, compare and order": 13% of the competencies in the Grade 3 curriculum address this area, while only 8% of the GPF competencies do.

In Grade 6, the national curriculum addresses all the subconstructs recommended for minimum proficiency in the GPF and goes beyond, by addressing the subconstruct "solve operations using integers", and adds two subconstructs that were not covered by the GPF (measure temperature and the history of measurement). Moreover, the GPF places the most weight on the subconstructs "solve operations using fractions" and "solve real-world problems involving fractions": respectively 12% and 15% of GPF competencies recommended for minimum proficiency at Grade 6 pertain to these. The national curriculum does not place the same emphasis on these two subconstructs (only 7% and 4% of the curriculum competencies target these areas,

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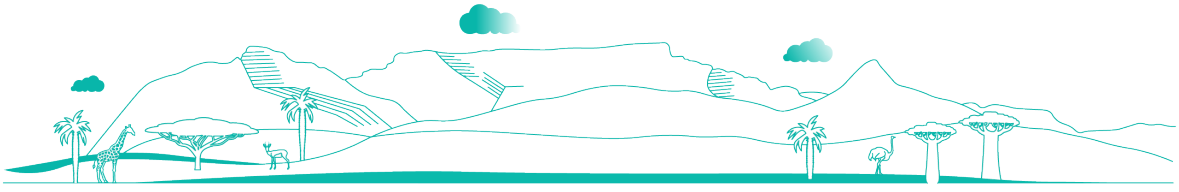
[3] Note that percentages of activity types are shown in the graphical representation as the spread of activity type per subconstruct, which might obscure the overall percentages given here. For example, the subconstruct "expressions" was found in only one block (of several hundred) and the entire block was narrative.

[4] Figure 8 shows the alignment between the South African national curriculum and the Global Proficiency Framework (GPF). The GPF specifies the competencies as well as the grades at which the competencies should be theoretically acquired. In Figure 8, the spread of the competencies (per subconstruct, per grade) according to the GPF is represented by an empty bar (as seen in the legend on the right of the graph) while the corresponding national curriculum competencies are shown by the blue shading in (or extending beyond) the empty GPF bars. The wider the bar, the greater the weight (represented by the number of competencies) that is given to a specific subconstruct by the GPF/national curriculum, for a specific grade level.

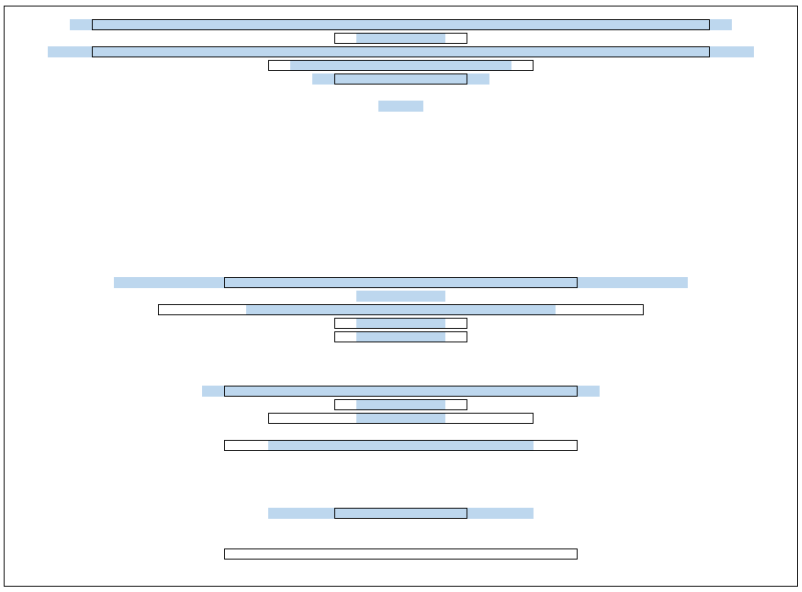
[5] The particular emphasis on calculation techniques in the South African curriculum is not found in other national curricula.



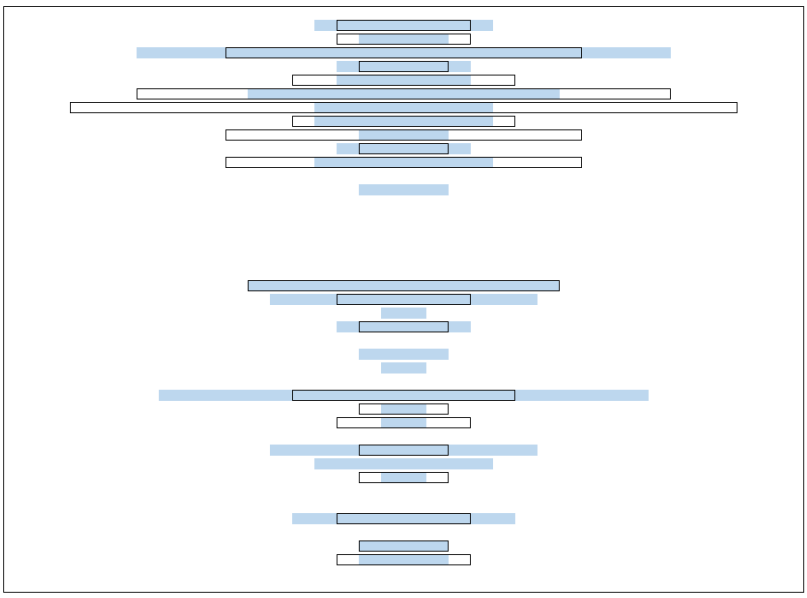
respectively), while many national curriculum competencies focus on the subconstruct “solve operations using whole numbers”, followed by “recognize and describe shapes and figures”.

FIGURE 8. POLITICAL ALIGNMENT, NATIONAL CURRICULUM VS MINIMUM PROFICIENCY IN THE GPF

Grade 3



Grade 6

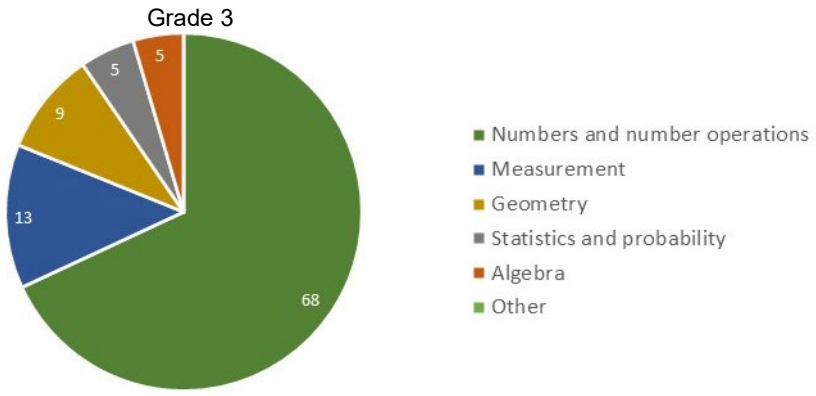


Note: GPF: Global Proficiency Framework.
Source: UNESCO GEM Report team analysis.

3.2 Teacher support for curriculum implementation

The Grade 3 teachers' guide is well-aligned with the learner textbooks (DBE workbook and TMU LAB) **(Figure 9).** This is a result of the TMU Framework team's efforts to reorganise the CAPS curriculum. Aligning with the curriculum and textbooks (DBE workbook and TMU LAB), 68% of the content in teachers' guides covers numbers and operations in Grade 3 compared to 46% in the intended curriculum and 62% in the learner textbook. This is followed by measurement concepts (14% in the teachers' guide compared to 28% in the CAPS curriculum and 17% in the learner textbooks [DBE workbook and TMU LAB]), and equal measures in geometry, statistics and probability, and algebra.

FIGURE 9. DISTRIBUTION OF COMPETENCIES IN THE TEACHER GUIDE, BY NUMERACY DOMAIN



Source: UNESCO GEM Report team analysis.

It is worth noting that the lack of narrative explanations in the textbook (DBE workbook and TMU LAB) is compensated for by the teachers' guide, which is composed mainly of narrative blocks (74%). The rest of the teachers' guide is composed of exercises and problems (representing 26% of blocks). The data also reveal that the majority of exercises and problems contained in the teachers' guide address the same cognitive levels as the textbooks (DBE workbook and TMU LAB) (cognitive Levels A and B).[6] Therefore, the use of the teachers' guide does not seem to potentially impact learners' learning possibilities in terms of cognitive demand.

In field interviews, teachers reported that SAs provided them with structured guidance and professional development in teachers' primary areas of need, such as lesson planning. Most teachers indicated that they get enough support from their respective SA, who come to their schools and hold professional development workshops for their clusters. Grade 3 teachers indicated that they need refresher workshops on difficult topics such as teaching time. Discussions at these workshops provide them with much-needed peer support. Teacher workshops also provide updates on TMU technological resources. Teachers also indicated a need for additional instructional resources, including having adequate numbers of LABs and having them delivered on time. When these resources are not delivered on time, teachers often resort to photocopying the soft copy of the LAB.

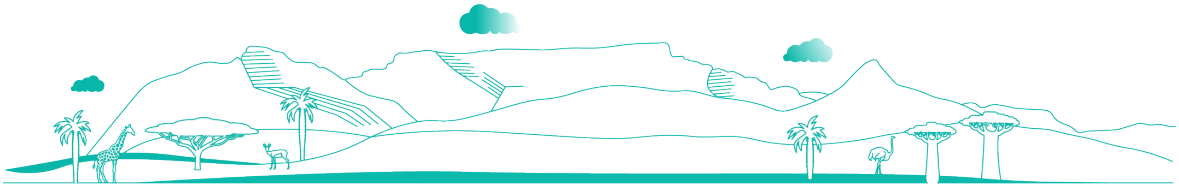
Teachers also reported that the LABs should include games and mental math exercises. Furthermore, the Grade 3 teachers indicated the need for better skills to manage large classes and additional human resources, such as an assistant, to help with marking homework. Examples of instructional resources required include general learning and teaching support material, including whiteboards and projectors.

While one of the Grade 6 teachers indicated that the TMU lesson plans are detailed enough and would not require any additional teacher support, most Grade 6 teachers indicated the need for professional development workshops for teachers, teaching

[6] This finding needs to be clarified since the narrative contained in the teachers' guide contains scripting for teachers to use when they teach each day. This scripting includes more challenging tasks and questions, which if used effectively by teachers, would raise the cognitive level of the work engaged with by students. The standard application of cognitive levels according to the agreed spotlight mapping process did not allow for this aspect of the teachers' guide to be seen.

assistants, curriculum coverage and instructional resources. Teachers felt the professional development workshops would upskill teachers on how to present challenging topics such as division and decimals as well as on general curriculum coverage. The addition of teaching assistants in overcrowded classrooms could ensure that all learners receive the same amount of attention. Curriculum support would assist teachers in covering all the activities meant to be covered in a lesson.

Most teachers indicated that having learners from a wide range of socioeconomic backgrounds and/or with varying academic abilities only slightly affected classroom instruction. Since learners are instructed in their mother tongue in Grade 3, the language of instruction presents no difficulties at all. Teachers are not greatly impacted by the presence of learners with special needs, but they are greatly impacted by the lack of instructional materials for learners to use and the lack of supplies for use in demonstrations.



4. Recommendations

The following recommendations emerge from the findings based on the document analysis and in the field:

Continue to support the vision of foundational literacy and numeracy

- The South African Department of Basic Education has shown a commitment to supporting mathematics in the early grades (seen, for example, in budget allocations to early reading programmes, feeding schemes and school transport systems), but the achievement of improved learner outcomes in these grades has not yet been realized, hence, the call to continue support until the goal of high-quality education for all has been achieved.
- The TMU pilot could be the driver of this change if it is allocated sufficient budget to review and strengthen the materials. For example, consideration could be given to the range of activity types (narrative, graphic, worked examples, exercises and problems, and learning activities). The cognitive level of activities in the LABs should also be given some attention. The provision of high-quality materials, available to all South African learners, should remain a top priority.

Consider the continued provision of concrete manipulatives for early grade maths classes with additional teacher training on how to use, sustain and maintain manipulatives and materials (i.e. maths kits and games)

- International and local literature speak to the value of concrete materials particularly in the early grades. The findings from school observations show that teachers would value the provision of concrete materials to support their teaching, especially in Grade 3 but also in Grade 6, where foundational learning of concepts is still taking place.
- Although most teachers make use of the manipulatives at their disposal, there is room for improvement in both the quantity and quality of these resources. It is important to support Grade 6 mathematics teachers in using manipulatives and hands-on activities to help learners better understand abstract ideas.
- Within textbooks (DBE workbook and TMU LAB), in Grades 3 and 6, learners would be better served with more explanations of content (in narrative or graphic form). At present, textbooks (DBE workbook and TMU LAB) often lack explanations and examples, and early grades can really benefit from explanations in graphic form.

Time the delivery of instructional materials to schools so that they reach schools before a term begins

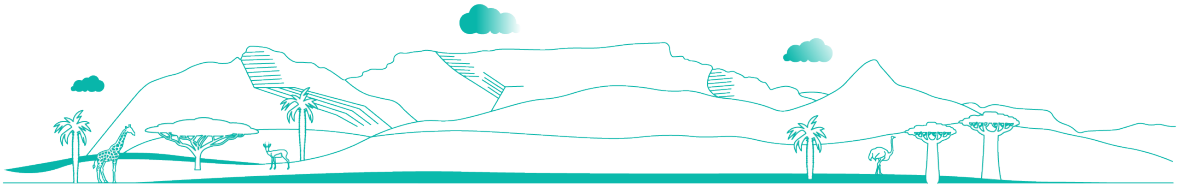
- The delivery of the DBE workbook to all schools in South Africa is a smooth operation and schools receive books well on time for teaching every term. This is highly commended. Teachers at the TMU pilot schools, however, indicated that they value the TMU materials highly and use them daily but to do so they often have to photocopy the books for their learners themselves as deliveries are not made on time, if at all. They would highly value receiving the books on time for use in school when the term begins.

Strengthen the accessibility of materials in all official languages across all years of primary school education and ensure awareness of open-source TMU materials

- The TMU programme materials (in the pilot schools) and the DBE workbooks (available to all learners in South Africa) are available in all the official languages of the learners in the foundation phase. This is highly commended. Observations made by the Spotlight team and comments made in interviews carried out by the team show that teachers not only in Grade 3 but also in Grade 6 would appreciate this multilingual support. This would align with the requirements of the Language in Education Policy. The spotlight mapping activity showed an emphasis on narrative explanations in the Grade 3 teachers' guide and Grade 6 workbook. It is recommended that this be given consideration and that provision of more varied forms of explanation be considered given the low level of reading skills in the learner population, particularly since this is exacerbated by the multilingual context.

Plan targeted teacher support and ongoing professional development to enhance teachers' content knowledge and pedagogical skills

- Findings from interviews conducted by the Spotlight team indicate that further support is needed in targeted areas. Officials are stretched thin due to the high number of schools they have to support and recommended that this be given due consideration.



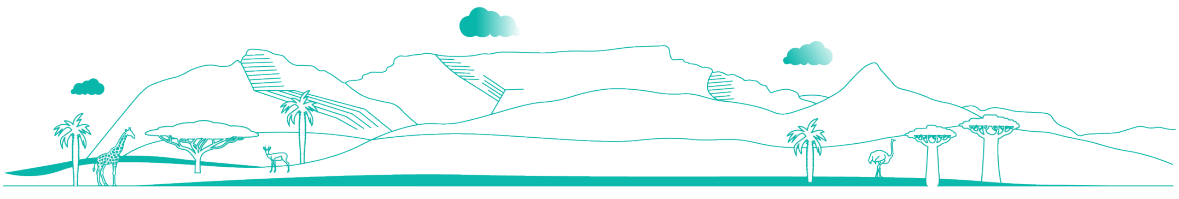
- To increase teachers' confidence in teaching topics that are difficult for learners to understand, they need ongoing professional development and assistance. Some teachers reported positive experiences of pedagogical content support provided by the SAs, but it was also noted that this could be strengthened.

Making better use of learner responses in learning assessments to improve teaching practices (via SAs)

- The planned multifaceted National Assessment Framework (in pilot phase) reflects the DBE's commitment to a holistic assessment approach, encompassing formative, summative and international dimensions to ensure a comprehensive evaluation of educational outcomes. The process of development of the new national systemic tests is applauded and should be completed with due consideration so that the final tests serve the South African education system over the coming years.

Continue to improve infrastructure to accommodate increased enrolment

- The Government of South Africa, through the DBE's decades of granting budget allocations to infrastructure development, has enabled significant improvements to school infrastructure, but field observations made by the Spotlight team show that further infrastructure development would be supportive of all South African learners having access to classes in schools which are well maintained and not overcrowded. Since overcrowding is seen to detract from learning outcomes, this would be another way of securing the goal of equitable education for all learners in South Africa.



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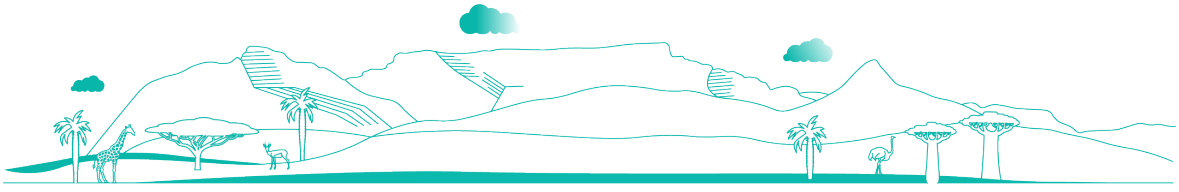


Annex 1. Fieldwork details

The purpose of the fieldwork in this study was to gather the opinions of principals, teachers and members of the school governing body (SGB) regarding the quality of mathematics instruction at the Grade 3 and Grade 6 levels. Only three of South Africa's nine provinces – Limpopo (25–29 September), KwaZulu-Natal (6–8 November) and the Eastern Cape (6–9 November) – were used for the fieldwork because these are provinces where the Teaching Mathematics with Understanding (TMU) pilot programme is underway, and the team wanted to observe schools using the TMU pilot materials. Insights in relation to curriculum coverage, the availability of learning and teaching support materials, teachers' pedagogical practices, and the availability of teacher support were found by the data gathered from the schools (and reported on), though it is noted that the findings are not intended to be nationally representative.

The Department of Basic Education (DBE) provided the ethical clearance to conduct the study and collect data in schools. It sent letters to the principal of each school to request their participation in the study, after which arrangements were made for the school visits. Across the 3 provinces, 15 schools where the TMU programme is being piloted were purposefully selected. At each school, letters of consent were signed by the principal, teachers and SGB members. The research team interviewed the principal, a Grade 3 teacher, a Grade 6 teacher and a member of the SGB in each school. Subject advisors (SAs) in each district supported the research teams (to differing extents, depending on their availability) and one SA was interviewed. Teachers of Grades 3 and 6 were observed while conducting a mathematics lesson prior to being interviewed. The lesson observed was not selected specially for the observation, it was the lesson that was to be taught on the day according to the teacher's normal planning. Observers only took notes and with permission took photographs which did not reveal the names of any schools or reveal the identities of any teachers or learners. **Table A1.1** shows the total number of key informants interviewed and classroom observations made in each district.

Table A1.1. School fieldwork details

	Eastern Cape	KwaZulu-Natal	Limpopo			Total
	Chris Hani East	Ilembe	Mopani East	Vhembe East	Vhembe West	
Interviews						
Principals	6	3	3	1	1	**14**
School Governing Body members	6	2	3	0	2	**13**
Subject Advisors		0	1	0	0	**1**
Grade 3 teachers	6	3	3	1	1	**14**
Grade 6 Teachers	6	3	3	0	1	**13**
Classroom observations						
Grade 3	5	2	3	1	1	**12**
Grade 6	5	2	3	0	1	**11**

Fieldwork in KwaZulu-Natal province was disrupted by teacher union activities and only three out of the five targeted schools were visited. To make up for the disruptions in KwaZulu-Natal, more schools were visited in Eastern Cape and Limpopo.

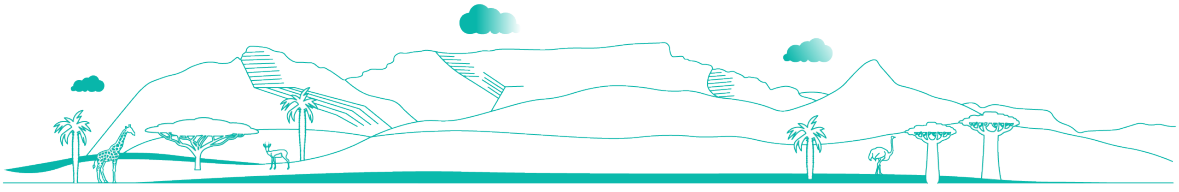
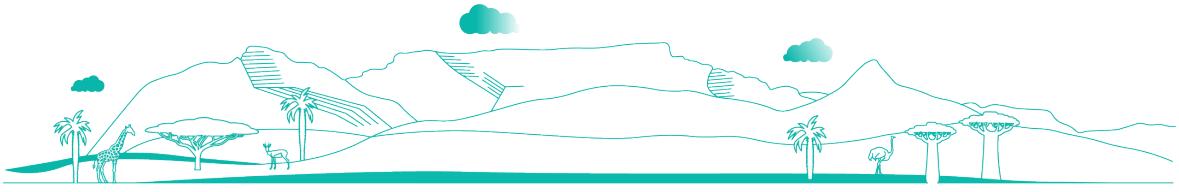


Table A1.2 shows the numbers of learners observed in each classroom observation per grade, in each district.

Table A1.2. Total number of learners observed per district

Grade	District	Number of learners observed
Grade 3	Vhembe East	41
	Mopani East	23
	Mopani East	30
	Mopani East	46
	Vhembe West	43
	Ilembe District	54
	Ilembe District	37
	Chris Hani East	32
	Chris Hani East	60
	Chris Hani East	15
	Chris Hani East	52
	Chris Hani East	43
Grade 6	Mopani East	22
	Mopani East	33
	Mopani East	49
	Vhembe West	20
	Ilembe District	55
	Ilembe District	95
	Chris Hani East	34
	Chris Hani East	13
	Chris Hani East	64
	Chris Hani East	55
	Chris Hani East	35

The lowest and highest numbers of learners in an observed lesson in Grade 3 were 15 and 60, respectively. Both of these classes were observed in the Eastern Cape Province's Christ Hani East District. In this district, the lowest number of learners in an observed lesson at the Grade 6 level was 22, while in the Ilembe District, the highest number of learners in an observed lesson was 95. There were no assistant teachers in any of the classrooms the research team observed.



Annex 2. Fieldwork findings

The fieldwork findings presented here were drawn up based on school visits to 15 schools in 3 provinces in South Africa, where the Teaching Mathematics with Understanding (TMU) programme is being piloted. At each school, the research team interviewed the principal, a Grade 3 teacher, a Grade 6 teacher and a member of the school governing body (SGB). Subject advisors (SAs) in each district supported the research teams (to differing extents, depending on their availability) and one SA was interviewed. The teachers of Grades 3 and 6 were observed while conducting a mathematics lesson prior to being interviewed.

Instructional materials

Teachers' guides and lesson plans: Interview findings indicated that all the teachers followed a teachers' guide or a lesson plan when preparing their lessons. Most teachers used lesson plans provided by the TMU. One of the teachers used the annual teaching plans for lesson planning and another used the Department of Basic Education (DBE) workbooks for their planning.

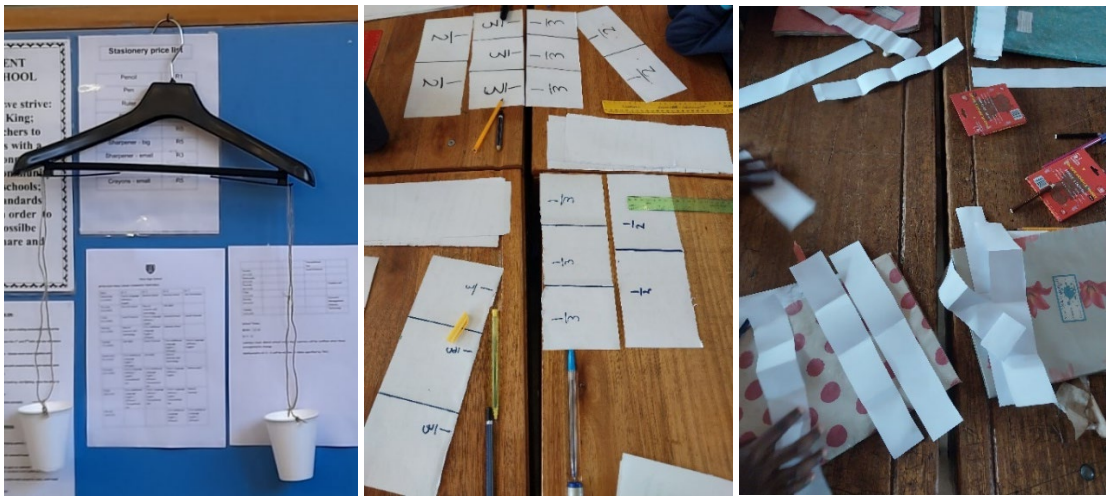
Learner workbooks: All the teachers used a DBE workbook or TMU Learner Activity Book (LAB) workbook when teaching mathematics. This finding from the interviews was corroborated by classroom observations. In cases where the TMU LABs are delivered late to the schools, the teachers photocopy the soft copy of the LABs provided to them and distribute these to learners for use in the classroom. Sixty-one percent of the teachers (n=14) base approximately 76-100% of the weekly mathematics teaching time on the TMU LABs.

Manipulatives: Manipulatives are artifacts used in mathematics education to provide learners with concrete representations of abstract mathematical concepts. Learners handle them so they can explore, acquire or investigate mathematical concepts or processes. Learners also use manipulatives to perform problem-solving activities. During observations, teachers were seen using manipulatives, generally manipulatives made by themselves or the learners.

Eighty-three percent (n=10) of the Grade 3 teachers used manipulatives more than once in the observed lesson while 17% (n=2) did not use any. Sixty-four percent (n=7) of the Grade 6 teachers used manipulatives more than once in the observed lesson while 36% (n=4) did not use any. Thus, manipulative use was more prevalent in the lower grade than in the upper grade. In interviews, some teachers indicated that they would like to receive more technical manipulatives. **Figure A2.1** shows some of the manipulatives used in the observed classrooms.

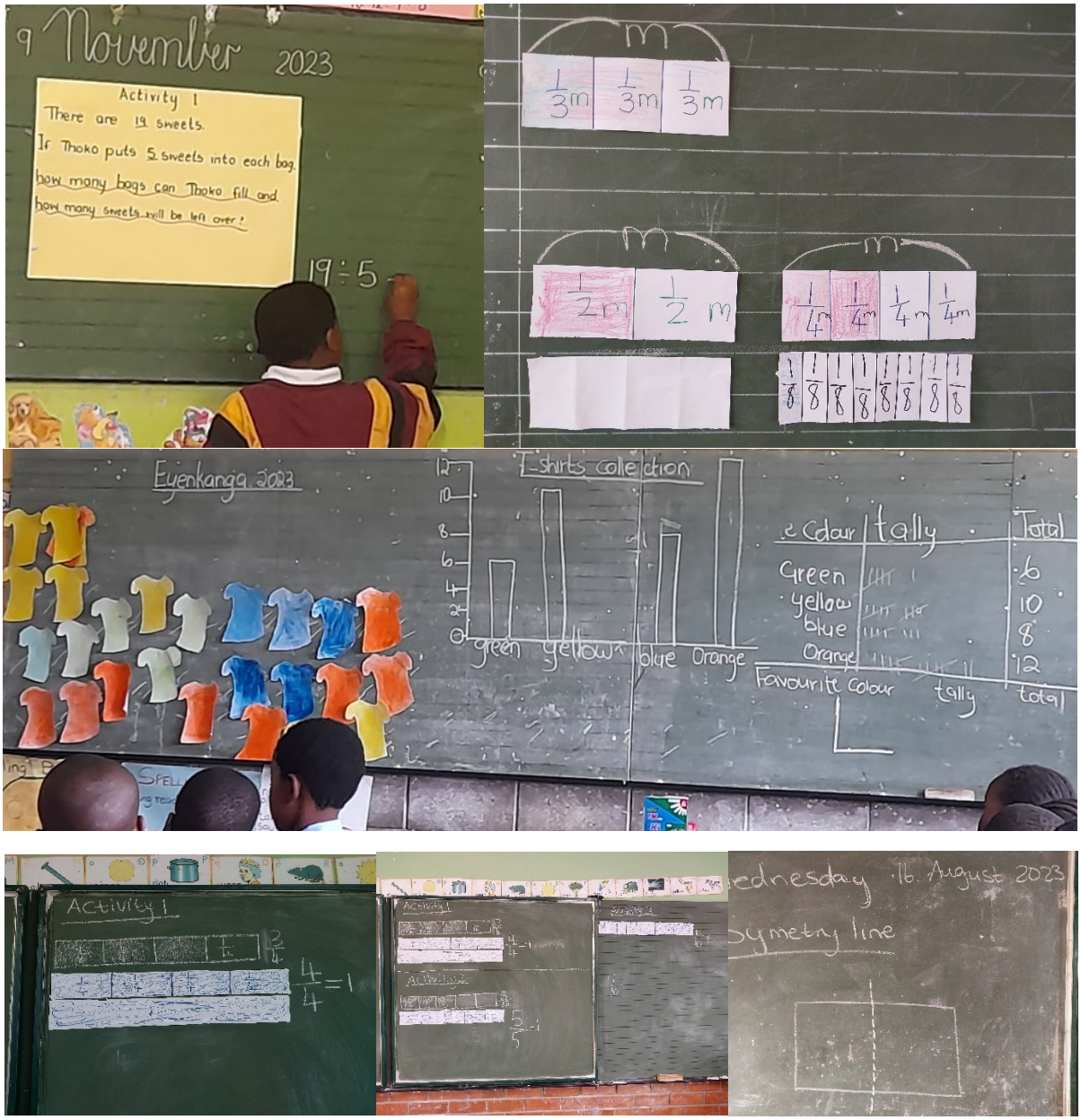
Chalkboard use: Every classroom observed had chalkboards for writing. Most of the chalkboards were functional, though a few were worn out and had poor contrast. Every mathematics teacher observed used the boards in their classrooms, and some of them let learners write on them while they were being guided. **Figure A2.2** shows samples of chalkboard usage in the classrooms observed.

FIGURE A2.1. USE OF MANIPULATIVES IN THE OBSERVED CLASSROOMS



Source: Ingrid Sapire and Lindiwe Tshuma for UNESCO GEM Report team.

FIGURE A2.2. CHALKBOARD USE IN OBSERVED CLASSROOMS



Source: Ingrid Sapire and Lindiwe Tshuma for UNESCO GEM Report team.

Curriculum coverage

All the teachers observed were familiar with the Curriculum and Assessment Policy Statement (CAPS) curriculum and 91% (n=21) reported basing their lessons on it. Nine percent (n=2) said they based their lessons solely on the TMU. This may be linked to one of the challenges teachers raised in the interviews, which was that when basing lessons on the TMU, some teachers had to accommodate learners from non-TMU schools, where the teaching methods and content may be different.[7] Based on this observation, the DBE should consider extending the TMU nationally so that leaners moving across schools, districts or provinces are not negatively affected.

Least challenging topics: During interviews, teachers cited the following topics as being the easiest to teach at Grade 3: multiplication (using arrays), fractions, addition (using the pictorial method), subtraction, problem solving using number sentences, division, number operations, capacity, data handling, space and shape and measurement. The Grade 6 teachers indicated the following as being the easiest topics to teach: symmetry; multiplication; geometric patterns; two-dimension shapes and three-dimension objects; capacity; column method for addition and subtraction; and area.

Most challenging topics: The Grade 3 teachers reported the following topics to be the most challenging to teach: addition and subtraction using number lines, telling time (quarter to), money, tally marks (in data handling), probability, multiplication with double digits and number sentences (introduction to algebraic expressions). Grade 6 teachers found the following topics to be the most difficult to teach: angles; long division; the number line; rate and ratios; direct/indirect proportion; and multiplication of decimals. At Grade 6 level, some teachers found the following topics difficult to teach: fractions, ratio and rate; division and measurement, while others found these same topics easy to teach. The DBE should coordinate compulsory teacher development activities focusing on pedagogical content knowledge, assessment and reflective practise through the use of provincial training centres.

Language use in the mathematics classroom

Code-switching refers to the practice of switching between two or more languages or language varieties within a single discourse or conversation. In the context of mathematics teaching in South Africa, where classrooms often comprise learners with diverse linguistic backgrounds, code-switching allows teachers to seamlessly transition between languages to enhance understanding. For example, a teacher might use the learners' home language (such as isiZulu or Sesotho) to explain a complex mathematical concept, ensuring that learners grasp the content more effectively. Code-switching helps bridge language gaps and ensures that learners can comprehend mathematical ideas, fostering a more inclusive and accessible learning environment.

Translanguaging is a pedagogical approach that goes beyond code-switching. It involves the intentional and strategic use of multiple languages to support learning and communication. In the South African mathematics classroom, translanguaging acknowledges the value of learners' home languages and considers them as valuable resources for learning. Teachers practicing translanguaging may encourage learners to express mathematical ideas in their home language, fostering a deeper understanding of the subject matter. This approach promotes a positive attitude towards linguistic diversity and validates learners' linguistic repertoires, creating a more inclusive and culturally responsive mathematics education.

At the foundation phase, the language of instruction is the learner's mother tongue. Most of the teachers used the learner's mother tongue while teaching Grade 3 mathematics lessons, though many of them translanguaged to English for certain mathematical words at times. The issue of language use in multilingual classrooms and the importance of allowing mixed language use in classrooms is well-documented in the literature (see, for example, Sapire and Essien [2021]). While several teachers used translanguaging, one used English throughout the mathematics lesson. In this school, learners have a choice to learn mathematics in English or Afrikaans. The observed lesson was conducted in an English LoLT[8] class.

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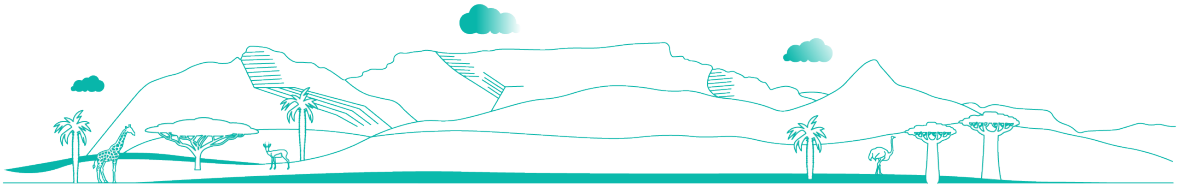
[7] The TMU is aligned to the CAPS though in some instances it draws on methodologies not contained in the CAPS, such as the column method for recording numeric algorithms in Grade 3. In Grade 6, the TMU reorganisation of the CAPS brings in work from higher grades (up to Grade 8), which may also pose problems for students who move between schools.

[8] Language of learning and teaching (LoLT) schools can select English as the LoLT even if it is not the mother tongue of the learners at the school.



Most of the observed teachers explained technical mathematics terms and new vocabulary and prompted learners to talk about their mathematical ideas. Most teachers used examples from learners' everyday lives and made connections that relate mathematics to other content areas to make mathematics learning relevant.

The transition from mother tongue of English (or Afrikaans) as a LoLT in schools takes place in Grade 4 in South Africa. In the observed Grade 6 classrooms, the most common (82%, n=9) language used during the lessons was English. One teacher used Xitsonga while another used isiZulu throughout the lesson.

Observed teacher pedagogical practices

The pedagogical practices observed encompassed a range of activities, including teachers supervising learners while they worked, facilitating lessons and using questioning strategies. All the teachers (n=23) closely observed their learners' independent work, modelled learning tasks, gave constructive criticism and scaffolded learning. **Figure A2.3** shows the teachers' observed pedagogical practices.

Observations did show that teachers still need to increase learners' chances to talk with their peers in class about mathematical concepts in both grades. There is also room for improvement in the way homework is collected and distributed at the start and end of each lesson. Since the classroom observations were conducted just before the end-of-year examination period, when homework is typically suspended, these activities were infrequently observed in this study. **Figure A2.4** shows the types of questions teachers asked.

Most teachers are to be commended for posing questions that seek to determine learners' level of understanding and recall of previously learnt information. At both grades, teachers still need to develop questioning techniques that require learners to apply information to new topics, and that appeal to learners' creativity and imagination. Teachers also need to give learners time to respond meaningfully to these questions.

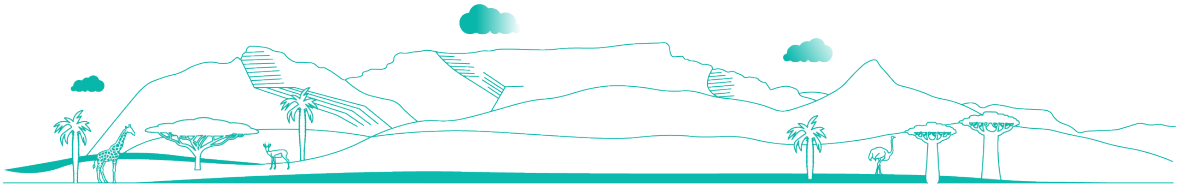
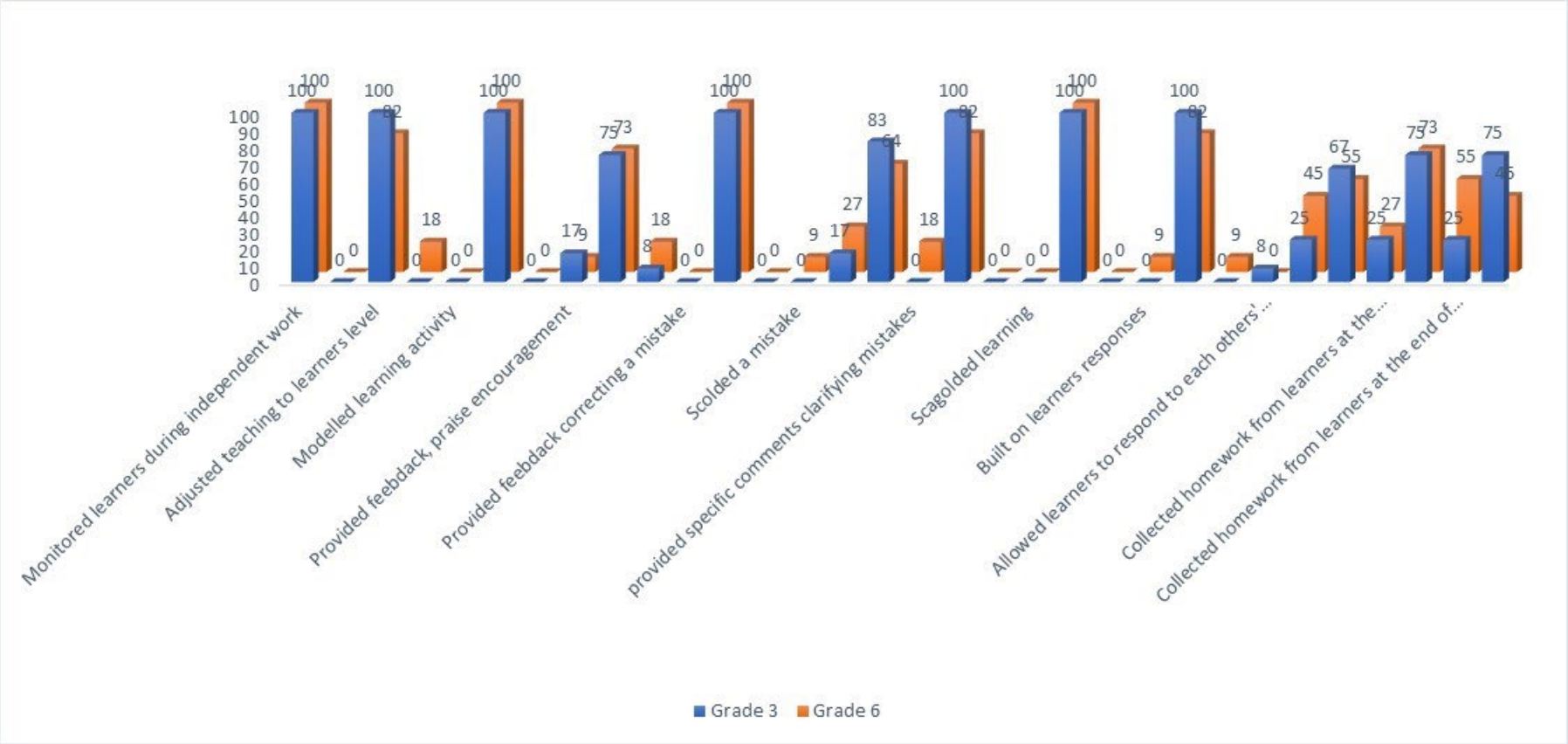
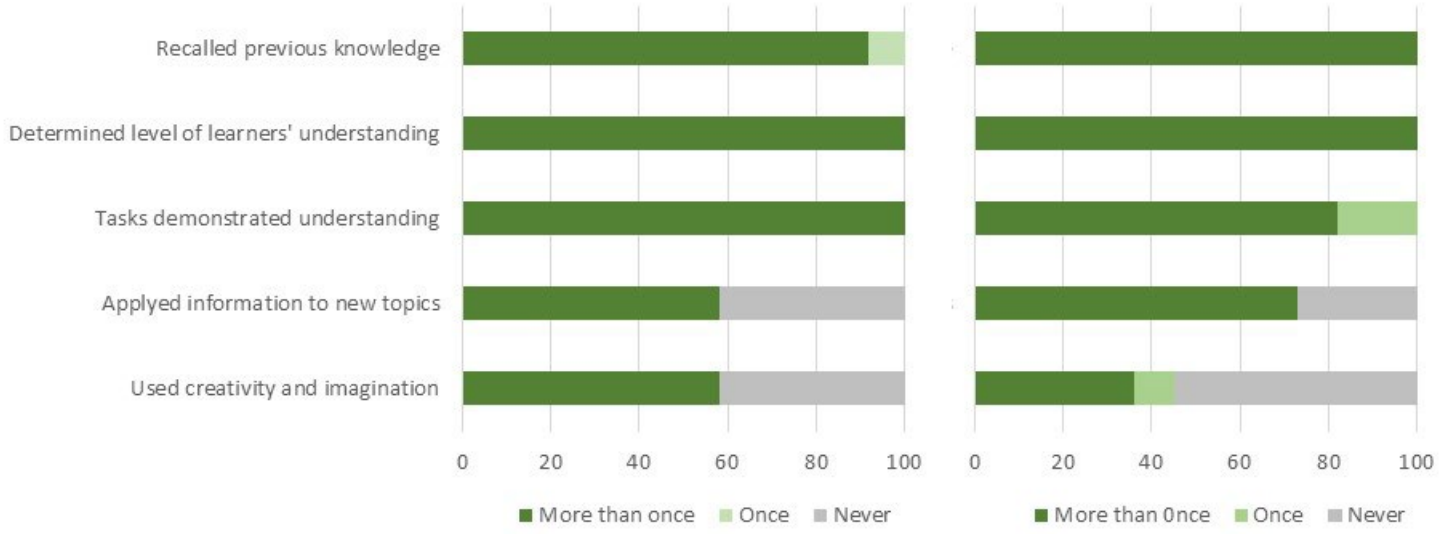


FIGURE A2.3. OBSERVED TEACHER PEDAGOGICAL PRACTICES



Source: UNESCO GEM Report team school observations.

FIGURE A2.4. TYPES OF QUESTIONS ASKED BY MATHEMATICS TEACHERS

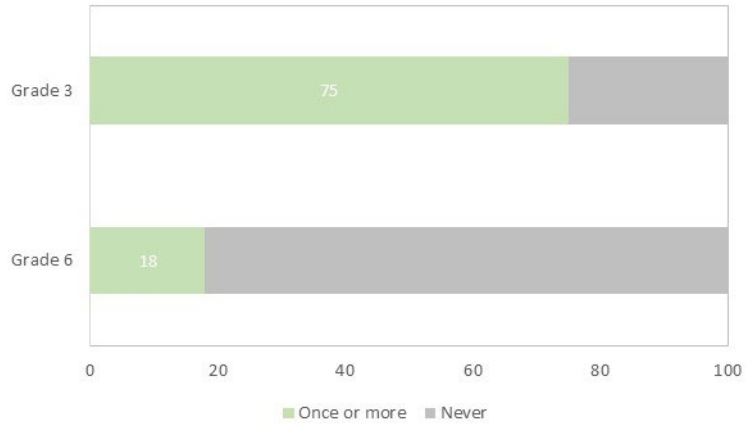


Notes: Grade 3: n= 12 teachers observed; *Grade 6: n= 11 teachers observed.*

Source: UNESCO GEM Report team school observations.

Play-based activities: Among other things, play-based learning activities improve learners' cognitive and problem-solving abilities. In this study, 'play-based learning' was used to describe mathematical tasks in which learners engaged in active participation and learned through enjoyment. **Figure A2.5** shows the observed play-based activities.

FIGURE A2.5. OBSERVED PLAY-BASED ACTIVITIES



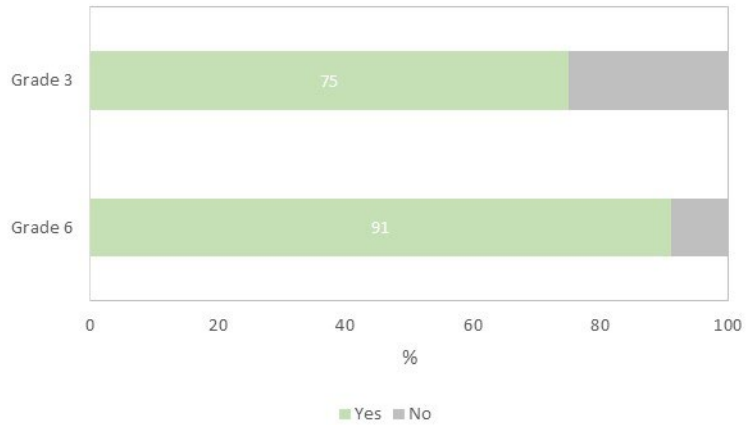
Note: Twelve Grade 3 teachers and 11 Grade 6 teachers were observed.
Source: UNESCO GEM Report team school observations.

Seventy-five percent (n=9) of observed Grade 3 teachers engaged learners in play-based activities more than once in the observed lesson, while 25% (n=3) did not. Only 18% (n=2) of the Grade 6 teachers engaged learners in play-based activities more than once in the observed lesson, while 82% (n=9) did not at all. Play-based activities were the heart of the lesson at the Grade 3 level, but used sparingly at the Grade 6 level.

Teacher support

In this study, teachers reported that SAs provided them with structured guidance and professional development in teachers' primary areas of need, such as lesson planning. Most teachers indicated that they get enough support from their respective SA, who come to their schools and hold professional development workshops for their clusters. **Figure A2.6** shows te extra teacher support needs, as reported by teachers.

FIGURE A2.6. TEACHER SUPPORT



Note: 14 Grade 3 teachers and 13 Grade 6: teachers were observed.
Source: UNESCO GEM Report team school observations

Assessment

The principal, SGB and SA interviews did not address assessment. The findings from the teacher interview related to assessment are summarised below.

The assessment of learner progress is a critical aspect of educational practices, and interview findings show that 24 (92.3%) of the teachers place a significant emphasis on continuous monitoring through ongoing learner work and classroom tests or quizzes. This approach gauges and tracks learners' academic development over time. Additionally, the interview data indicate that 19 teachers (73.1%) assign major or moderate importance to national or regional tests to monitor learner progress. These national or regional assessments contribute to a broader evaluative framework, providing insights into learners' overall academic performance within a broader educational context. The combined utilization of ongoing classroom-based assessments and standardized tests reflects a comprehensive strategy employed by educators to effectively monitor and assess learner progress.

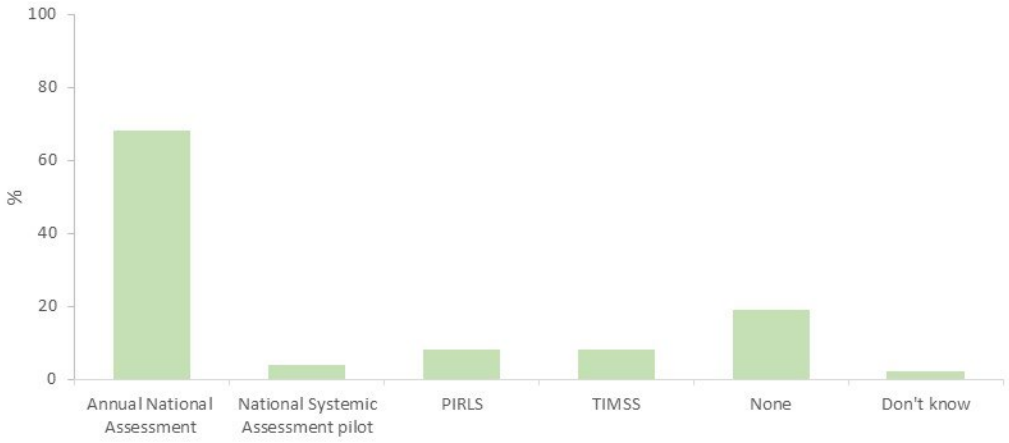
Most teachers indicated that they use the South African School Administration and Management System (SA-SAMS) to enter learner marks. Specifically, 16 teachers (61.5%) reported that school administrators are responsible for entering learner marks into SA-SAMS. In contrast, a smaller number of teachers (8, or 30.8%), acknowledged taking the initiative to independently enter learner marks and capitalize on the functionalities offered by SA-SAMS. This discrepancy highlights varying levels of engagement with the system among educators. Two teachers expressed concerns regarding technical issues within SA-SAMS, characterized as "glitches" and updates in the form of "patches". These technical challenges were flagged as problematic, potentially influencing the user experience and overall efficacy of SA-SAMS as a tool for managing learner assessment data. These findings underscore the significance of addressing technical functionalities and user-friendliness to optimize the utilization of SA-SAMS in educational institutions.

When asked about the frequency of formal learner assessments, teachers' responses differ widely. Most teachers (13.8%) reported conducting assessments weekly, 3.8% bi-weekly, 11.5% monthly, 19.2% once a term and 11.5% twice a term. Noteworthy is the distinction that this question specifically pertains to formal assessments. As per the National Assessment Policy, only four formal assessment tasks in Grade 3 mathematics are mandated annually. The variation in responses may be attributed to the ongoing nature of formal assessment tasks, leading teachers to count components of these tasks as independent assessments. In response to inquiries regarding the types of activities incorporated in formal assessments, 96.2% of the surveyed teachers (n=25) indicated the utilization of tests, 50.0% (n=13) the inclusion of quizzes, 76.9% (n=20) the integration of practical exercises and 61.5% (n=16) the inclusion of oral exercises. Notably, most teachers incorporated diverse forms of formal assessments.

Informal assessment activities, though not consistently documented, may involve the use of checklists, written records in learners' books and anecdotal notes when recorded. Such recorded evidence serves as a basis for the teacher's professional judgment, particularly in instances of illness or contextual factors affecting learner performance. Notably, 80.8% of the surveyed teachers (n = 21) maintain a checklist accompanied by notes documenting informal assessments. All teachers affirmed the incorporation of a baseline assessment, with the majority utilizing it at the commencement of the first term and one teacher opting for its implementation at the outset of each term.

Regarding national, regional and international assessments, 15 teachers (57.7%) reported their involvement in the Annual National Assessment before its suspension in 2017. Additionally, two teachers (7.7%) participated in the Progress in International Reading Literacy (PIRLS), another two (7.7%) engaged in TIMMS and one teacher (3.8%) took part in the pilot of the National Systemic Assessments. This is shown in **Figure A2.7**.

FIGURE A2.7. SCHOOL INVOLVEMENT IN NATIONAL SYSTEMIC TESTS



Among the 13 Grade 3 educators', the assessment practices exhibit linguistic diversity, with 4 teachers (30.7%) conducting assessments exclusively in English. Another cohort of four teachers (30.7%) employed a dual-language approach, assessing in both English and an African language. Notably, five teachers (38.4%) reported conducting assessments exclusively in an African language. However, the exact correlation between the language of assessment and the language of learning and teaching remains ambiguous, particularly concerning the subset of teachers assessing solely in English. The potential influence of code-switching and translanguaging strategies in this dynamic is apparent, suggesting a complex interplay of languages in the assessment milieu. Further exploration is warranted to elucidate the intricacies of these language practices within the assessment context. Code-switching and translanguaging in teaching mathematics in South Africa involve using multiple languages in the instructional process to facilitate learning and communication. Both practices recognize the linguistic diversity present in South African classrooms and aim to leverage this diversity for effective teaching and learning.

All 11 Grade 6 teachers indicated that they use only English in assessing learners. This indicates a strict adherence to the language policy, where learners are taught (and assessed in English) from Grade 4 onwards.

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Annex 3. Relevant quotes from interviews

Table A3. Relevant quotes

Thematic area	Relevant quotes
Teacher training and support	'I would like to attend workshops on how to work with decimals.' (teacher) 'Given the number of students I have on average, I need support in the classroom to ensure that all children receive the same amount of attention from the teacher, and also to ensure that we are able to cover all activities that are meant to be covered in a lesson.' (teacher) 'If I have a question, I can contact the subject advisor or request guidance. There are termly meetings, which we use to share ideas' (teacher)
Lesson preparation	'The TMU lesson plans provided are detailed enough.' (teacher)
School leadership	'We meet quarterly, the meetings held after the June examinations focus on discussing student performance, based on the examination results.' (school governing body [SGB]) 'We meet quarterly for an accountability meeting with the circuit manager.' (SGB) '… for the checking the teaching learning, … the circuit manager would collect books from learners and see how they perform. If it is a district official they will monitor the building, if they are there regarding nutrition they will monitor the kitchen, with regards to health they would inspect the toilets.' (SGB) 'Teachers try their best to do what is needed, they are encouraged by the principal. Also, the school has received medals for various activities.' (SGB)
Learning and teaching support materials	'We need the Learner Activity Book for each term for each student.' (teacher) 'We are supposed to use the Learner Activity Books, but for Term 1 and 2, 2023, books were delivered 6 months late.' (teacher) 'Subject advisors have tried their best to make sure that we receive TMU materials, but they are also facing challenges with the TMU itself that are beyond their control.' (teacher) 'Subject advisors have … been very supportive to us teachers … because they see the difficulty of not having materials and still being expected to implement.' (teacher) 'I would like to have technological resources such as a projector and a whiteboard.' (teacher) '… the implementation of the TMU programme seems to be boosting their performance because they like the use of the visual aids and other things to better understand maths.' (SGB)
Other relevant quotes	'… there is often more than one class in one classroom, which means that classrooms are overcrowded and working in an environment like that is sometimes tricky.' (teacher) '… sometimes we do extra lessons that finish at 4pm or we do extra lessons on Saturdays and Sundays.' (SGB)

Annex 4. Consultation highlights

Consultations on this report were held during an online Teacher Development and Curriculum Management committee meeting on 14 February 2024 and at a meeting at the Department of Basic Education (DBE) headquarters with DBE staff, provincial actors, National Education Collaboration Trust experts and academics from the University of the Witwatersrand on 1 March 2024. The second consultation focused on unpacking three of the recommendations with participants. This annex details the question discussed and the key feedback from participants discussions.

Breakout Room 1: Strengthen teacher development programmes to enhance teacher content knowledge and pedagogical skills in primary mathematics

- How do teachers address learner misconceptions in mathematics using the Teaching Mathematics with Understanding (TMU) content?
- In what ways does the TMU Learner Activity Book's design elements (mental activities, teaching approach, classwork activities, homework) assist teachers to scaffold mathematics content to suit learner needs?
- How do TMU teacher development initiatives support teachers to:
    - Improve their mastery of mathematics content?
    - Reflect on their teaching approaches (during and after a mathematics lesson).

Summary

The South African curriculum is currently being strengthened, including through the TMU. The teacher support programmes that are pertinent to the strengthened curriculum should be implemented after the curriculum has been strengthened. Teachers need to master the mathematical concepts they are expected to teach. Currently, subject advisors and DBE provincial coordinators conduct teacher development activities, with TMU funding these activities.

Questions for further research informed by the Spotlight's findings:

- To what extent are teachers following the TMU lesson plans and teachers' guides?
- How should South African universities modify their pre-service teacher curricula to include the TMU strategies after the TMU pilot phase?
- How should TMU strategies be incorporated into in-service teacher development?
- How are the subject advisors capacitated to provide teachers with sufficient support?

To enhance teacher development, it is necessary to profile the current teachers to determine what is required to produce teachers who use TMU strategies in a particular way.

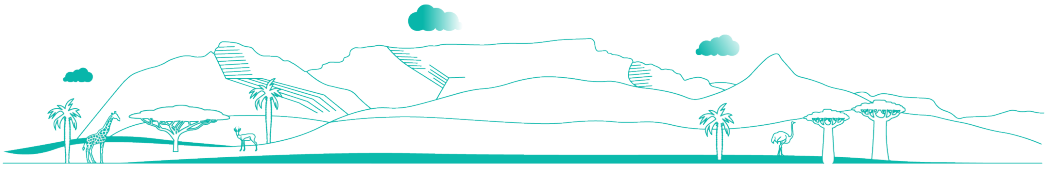
Breakout Room 2: Enhance teachers' use of manipulatives and materials, including TMU maths kits and games, to support student learning

- Do teachers use maths kits provided by the TMU effectively?
- How do teachers integrate manipulatives into the teaching of (complex) mathematics concepts?
- How do teachers draw connections between manipulatives used and the mathematics concepts taught?
- What plans are underway to build on TMU teacher development initiatives to:
    - Enhance the use of mathematical manipulatives distributed to schools?
    - Support teachers to develop supplementary mathematics manipulatives for classroom use?

Summary

Manipulatives must be logical, relate to actual situations and encourage play-based learning. The use of manipulatives must progress from concrete to pictorial and, as learners advance through the grades, they should be able to use their newly acquired knowledge to solve abstract mathematical problems. For example, start with bottle tops, then use 10 strips and 100 squares to illustrate the idea on paper before moving on to the abstract concept of column addition.

To help teachers mediate learning in an engaging way, it is necessary to give them clear instructions on how to use manipulatives and to be specific about the kind of manipulatives that should be used. Best practices are needed for using manipulatives from other countries in the region to assist South Africa in developing its use of



manipulatives. In addition to utilizing technology-based manipulatives like simulations, cost-effective manipulatives must also be used.

Breakout Room 3: Strengthen assessment 'for learning'

- What is assessment 'as learning'? How does it relate to competency-based assessment?
- How is assessment 'as learning' implemented in South Africa?
- What and how can resources (human as well as learning and teaching support materials) be mobilized to:
    - Strengthen the use of assessment 'for learning'?
    - Strengthen the use of assessment 'as learning'?
- In what ways are teachers using evidence about students' knowledge, understanding and skills to inform their teaching?
- How can we make better utilization of learner responses in learning assessments to improve teaching practices?
- To what extent can subject advisors be leveraged to support assessment 'as learning'?

Summary

Assessment 'as learning' and assessment 'for learning' are frequently used synonymously. Learner responses are used in assessment 'for learning' to guide pedagogy. To implement assessment 'for learning', the teacher must undergo training in error analysis. Teachers can use guidelines provided by the diagnostic assessments; teacher support must enable teachers to implement these guidelines. A dashboard that assists teachers in identifying the types of mistakes learners make must be incorporated into SA-SAMS. Assessment 'as learning' involves learners participating in practical tasks like projects as part of the assessment process. This mostly happens in private schools now. Learners should be able to evaluate themselves while participating in project-based learning when utilizing assessment as a teaching tool.

Questions for further research:

- Is there an adequate supply of subject advisors in South Africa to support teachers?
- Can subject advisors proficiently perform error analysis?
- Can subject advisors advise teachers on what to teach once they have identified the errors learners make?
- How do we apply the information (trends) emanating from the assessments?
- Misconceptions held by learners are not addressed by reteaching the material. How can teacher professional learning communities be used to address learners' misconceptions?
- What kinds of new assessment practices will South Africa require moving forward?

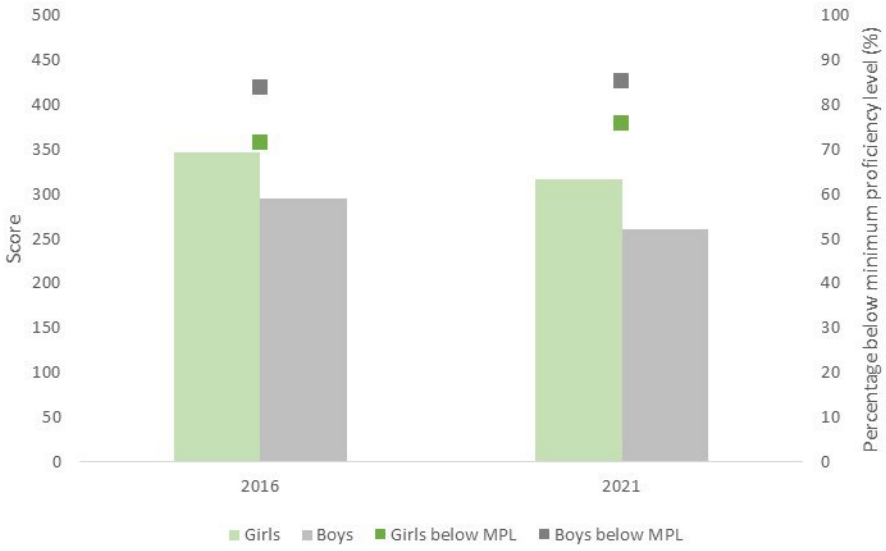
Annex 5. Further PIRLS findings

Reading scores by gender

In South Africa, boys perform lower than girls (almost 0.5 standard deviations lower) and the share of boys not reaching the minimum proficiency level (MPL) in reading is higher (by around 10 percentage points).

The gap between girls and boys did not significantly change between 2016 and 2021. However, the share of girls not reaching the MPL has increased significantly, by 4 percentage points, while the share of boys not reaching the MPL has only increased by 1 percentage point.

FIGURE A5.1. READING SCORES BY GENDER



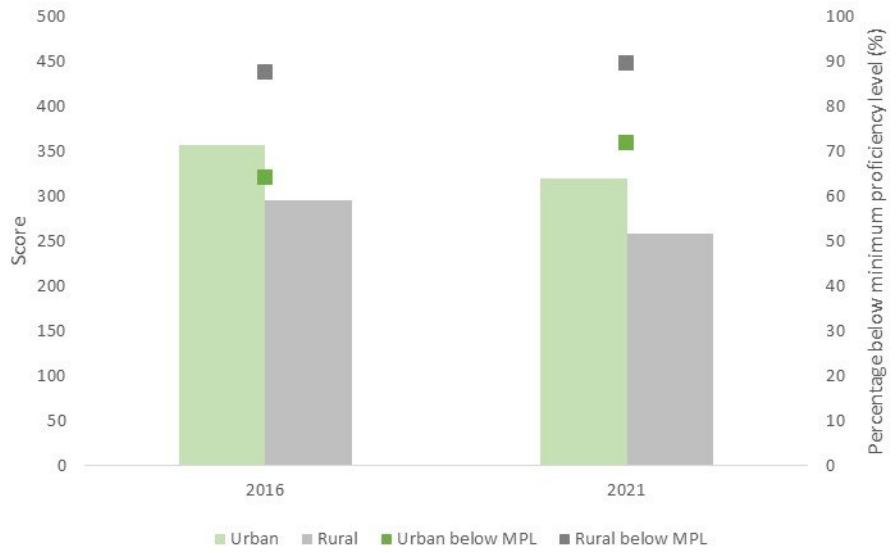
Note: MPL: minimum proficiency level.

Reading scores by location

Children from rural areas score significantly lower than children from urban areas (around 0.5 standard deviations lower), and the share of children from rural areas not reaching the MPL in reading is higher (by around 20 percentage points).

The gap between children from rural and urban areas did not significantly change between 2016 and 2021. However, the share of children from rural areas not reaching the MPL has increased significantly, by 2 percentage points, while the share of children from urban areas not reaching the MPL has increased by 8 percentage points.

FIGURE A5.2. READING SCORES BY LOCATION



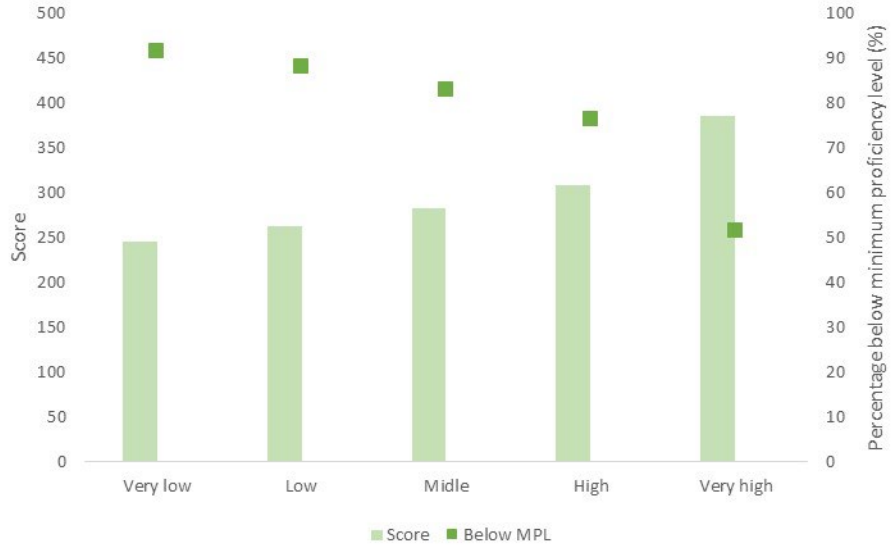
Reading scores by socioeconomic status

In 2021, PIRLS introduced the Home Socio-Economic Status scale (HSES). The distribution of reading scores along this scale shows that children from lower quintiles of socioeconomic status (SES) score lower. For instance, in 2021, children from SES Q1 scored 1 standard deviation lower than children from SES Q5, and the share of children from SES Q1 not reaching the MPL was higher by 40 percentage points than the share of children not reaching the MPL from SES Q5 **(Figure A5.3)**.

To obtain trends between 2016 and 2021, we computed our own SES based on different characteristics, such as highest educational attainment and the available learning resources in the household. While the HSES provides information in 2021 for around 80% of the sample, our own scale only provides information for around 30% of the sample in 2016 and 2021 due to missing data on the household characteristics. However, the distribution of reading scores along the HSES scale is similar to the distribution of reading scores along our own scale in 2021, which lends credibility to the trend analysis exercise.

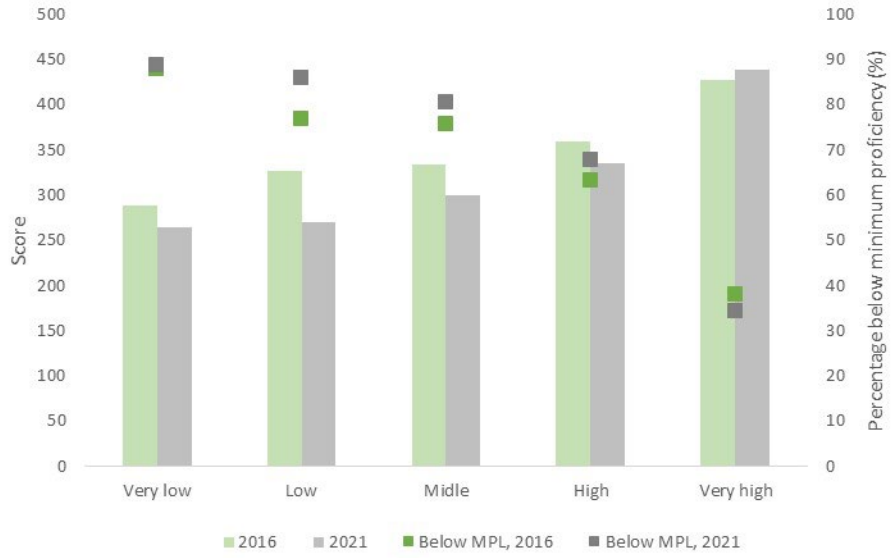
Between 2016 and 2021, the gap between children from SES Q1 and SES Q5 significantly increased, but the difference in the share of children not reaching the MPL between SES Q1 and SES Q5 did not significantly evolve. Across the distribution of SES, children's scores have significantly decreased, except from the highest quintile of SES, and the increase in the share of children not reaching the MPL in learning was borne by the median SES quartiles (Q2-Q4) **(Figure A5.3)**.

FIGURE A5.3. READING SCORES BY SES QUINTILE, PIRLS HSES SCALE



Note: SES: socioeconomic status.

FIGURE A5.4. READING SCORES BY SES QUINTILE, COMPUTED SES SCALE



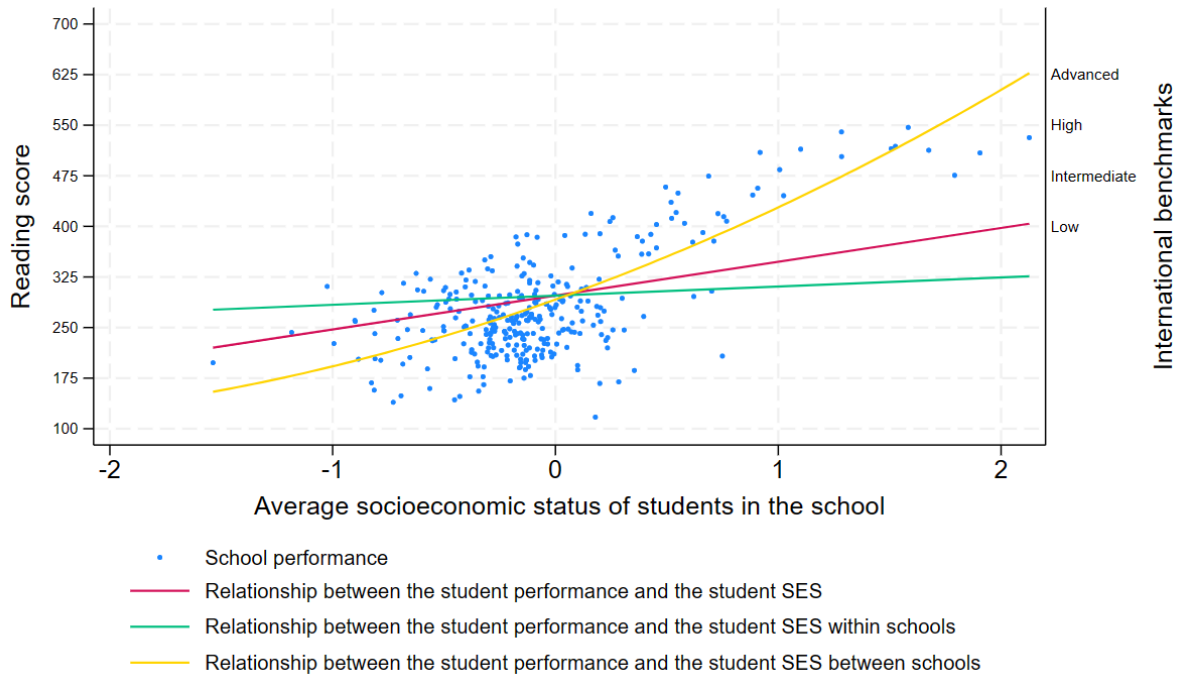
Note: SES: socioeconomic status; MPL: minimum proficiency level.

Reading scores by school socioeconomic quintiles

Socioeconomic status is a strong predictor of children's performance. But to what extent can differences in performance be attributed to differences in SES within and between schools? In other words, what matters more, having a high SES or entering the right school?

Figure A5.5 shows there is a linear relationship between a school's average SES and its average performance. Compared to the school's average SES (yellow line), a learner's relative SES within a school is lowly associated with learner performance (green line), which means that schools are quite stratified and enrol learners from rather similar SES. This suggest that social and academic inclusion are low, and that compensatory interventions targeting the most deprived schools may contribute to lifting academic performance.

FIGURE A5.5. READING SCORES BY SCHOOL SES, PIRLS HSES SCALE



Note: SES: socioeconomic status.