Primary Mathematics LTSM and Assessments Review

SYNOPSIS 2023

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Read to Lead
A Reading Nation is a Leading Nation

2030 NDP

STAY SAFE
PROTECT SOUTH AFRICA

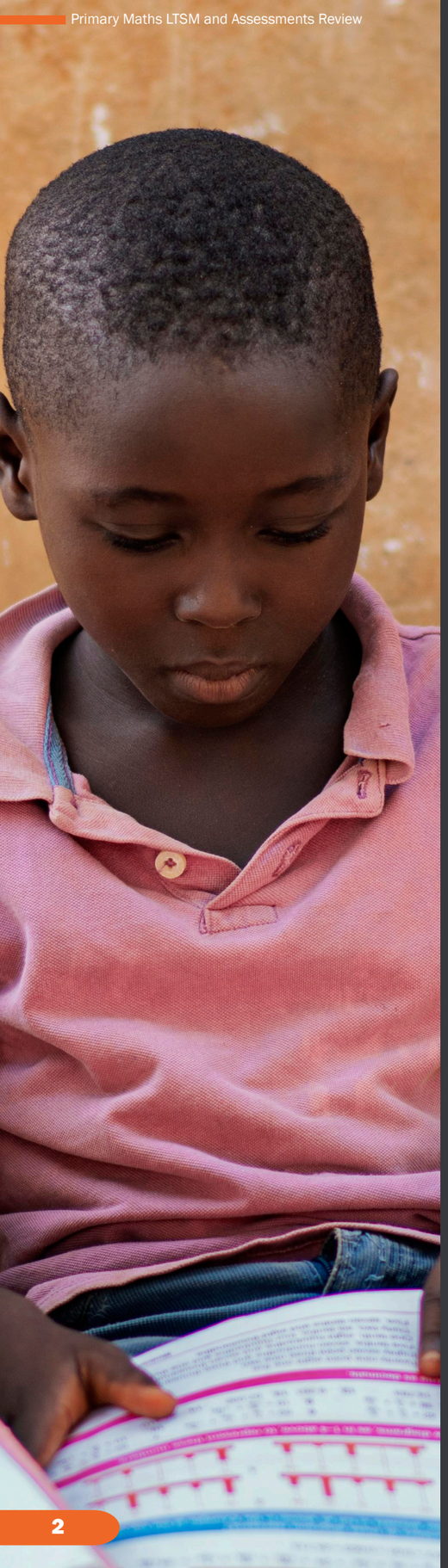
SYNOPSIS

This intervention has been made possible through collaboration with the Department of Basic Education and funded by the Zenex Foundation and Epoch and Optima Trusts

Commissioned by DBE

Date of publication: July 2023

Suggested citation:
Roberts, N., Tshuma, L., Moloi, Q., and Sommerdyk, S. (2023) Primary Maths LTSM and Assessments Review: Synopsis, Kelello: Johannesburg.



SYNOPSIS

This is a summative rather than an exhaustive report which offers a high-level overview of the research conducted relating to Learning and Teaching Support Materials (LTSM) and Assessment for primary school (Grades R to 7) mathematics in South Africa.

It offers a bird's eye view of the research elements which have been undertaken for the Department of Basic Education, and points to the supporting documentation which have informed this summary.

Policy makers, programme implementers, researchers, subject advisors, and provincial departments of education may find this useful when choosing to invest in, or make selections from, existing LTSM and assessment offerings.

INTRODUCTION

The LTSM and Assessment Reviews, commissioned by the Department of Basic Education, and funded by Zenex Foundation and Epoch and Optima trust, sought to provide an overview of available LTSM and Assessments as these are the key ingredients for improving learner outcomes in primary school mathematics. The terms of reference for this review recognised the high variation of practices in terms of what and how LTSM is used, across South African schools.

In addition, the knowledge that many primary schools only make use of DBE workbooks (which were designed as supplementary resources) was noted with concern. The review of current practice and analysis of selected offerings, as summarized here, is intended to assist educational stakeholders to make informed decisions about their selections of the LTSM.

Those seeking more detail, beyond this synopsis of the summative report, ought to consult the following working papers which complement this summary:

- A primary mathematics **LTSM learning brief** of 10 LTSM offerings.
- A primary mathematics **Assessment learning brief** of 9 assessment offerings.
- A primary mathematics **LTSM and Assessment summative report** with findings and recommendations emerging from:
  - A literature review
  - An in-depth analysis of 3 Assessments
  - An in-depth analysis of 6 LTSM
  - A deep dive into 3 LTSM workbooks

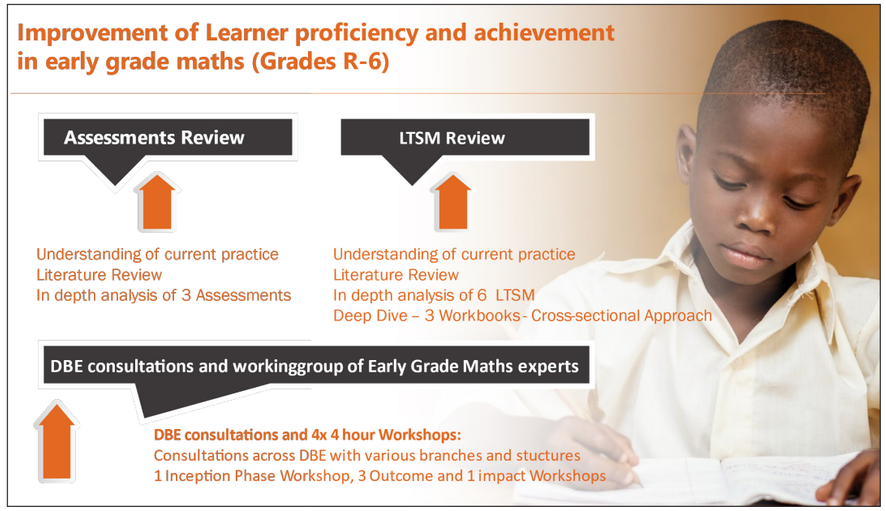


Figure 1: Reviews supported by engagements with South African primary maths experts (DBE and beyond)

PURPOSE

This report summarises the high-level findings of the assessment review and LTSM review which were informed by and discussed with early grade mathematics experts of DBE officials across various branches and forums. Each review developed an initial understanding of current practice which was then refined, drawing on literature and then an in-depth analysis of selected assessment instruments and LTSM offerings were given. The **LTSM research** was extended further with a cross sectional analysis of one topic – whole number division – to analyse a particular conceptual thread across the 3 selected LTSM offerings.

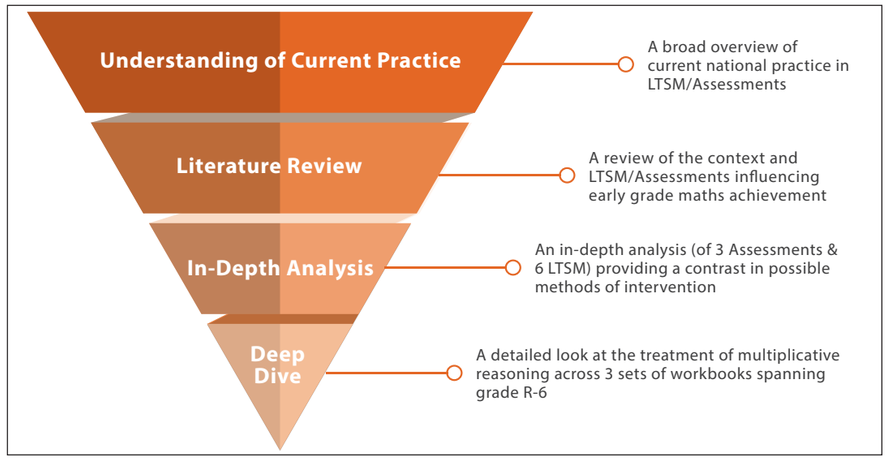


Figure 2 Research process: 4 sets of enquiries

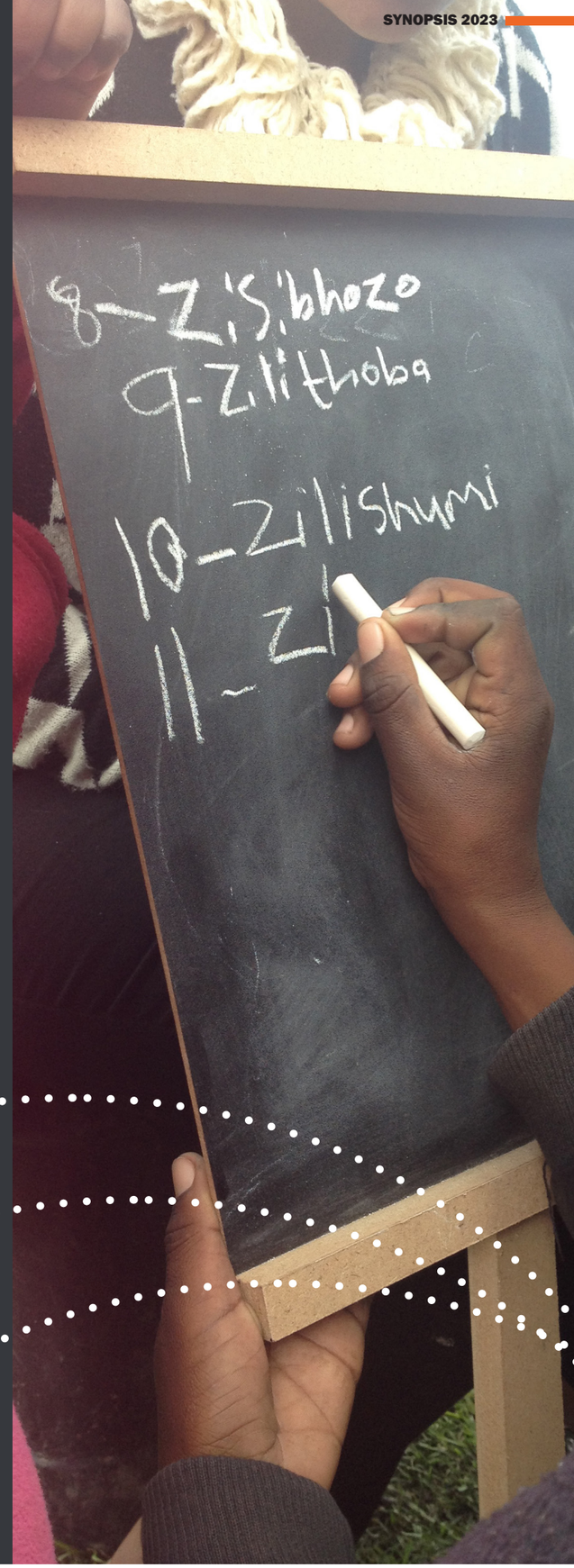
This **in-depth analysis of assessment** gives an detailed account of what the purpose of the assessment is, the theoretical underpinnings that characterize the assessment, empirical evidence on the validity and credibility of the instrument, how the instrument has been used and includes excerpts of the structure and administration protocols of the assessment instrument.

The **learning briefs** – for primary mathematics LTSM and assessment – offer a high-level synopsis of critical features of each offering. They are intended to offer a 'menu', for making decisions about available LTSM suitable to a particular context, and available assessments suitable for a particular purpose. Further, they provide an indication of the different types of materials and assessments which have been developed and make clear the areas requiring further investment to further improve these products.

ASSESSMENT REVIEW

The key observations emerging from the assessment review were:

- **No evidence of perceived "over-assessment"** of the system at primary school level since the discontinuation of the Annual NationalAssessments (ANA).
- The **DBE Systemic Evaluation** process and instrumentation is applauded. Most of the other assessment instruments that have been developed are for AfL purposes and are linked to relevant LTSM.
- Concern relating to compliance requirements in relation to the **SA-SAMS capture of maths assessments**. This has resulted in assessment of all 5 content areas in every term in every grade. Using "-1" allows to exclude an SA-SAMS field.
- Evidence of **a range of investments**, which are largely uncoordinated initiatives in instrument design, to **develop validated assessment instruments** for various purposes (Marco-D, EGMA, standardized CAPS tests). Lack of maths benchmarks/norms.



LTSM REVIEW

The key observations emerging from the LTSM review were:

- The DBE learner workbook is welcomed and available in schools as a primary resource. It was developed as a supplementary resource but is being as a primary resource.
- Other maths LTSM has been developed (some of which have shown impact on learning outcomes) and impact evaluations are occurring (e.g. GPLMS, TMU pilot, NECT lesson plans, Number Sense, Bala Wande, NMI).
- Therefore, there is duplication of resources. Budget and printing required for the DBE workbooks as well as the particular Learner Activity Book

Therefore, the DBE should completely redesign the DBE workbook to be the primary LTSM resource (taking into account the lessons from GPLMS, NECT, TMU pilot and interventions which have evidence of impact). The redesigned DBE workbook set should comprise of a learner activity book, teacher guide and maths kit. The learner activity must include:

- **A rhythm of engagement:** Term by term and week by week Learner Activity Book and teacher guidance;
- Carefully designed **conceptual threads** (learning trajectories for each topic or content area);
- A **limited number of key representations** which are systematically developed across each phase. Carefully selected “go-to” strategies that develop number sense and build towards flexibility;
- **Support for bilingual and multilingual learning e**.g. Let’s talk maths sections, bilingual assessment elements, multilingual dictionaries for teachers; and,
- **Instructional prompts for teachers** in the LAB (through **worked examples** and instructional signaling) and detailed pedagogical support in the **teacher guide**.

The **teacher guide** must provide additional pedagogical guidance, termly conceptual checkpoints, with Formal Assessment Tasks for teacher administration and marking.

Recommendations for the minimum requirements for **maths kits** – specific to each grade level – are provided.

DISCUSSION

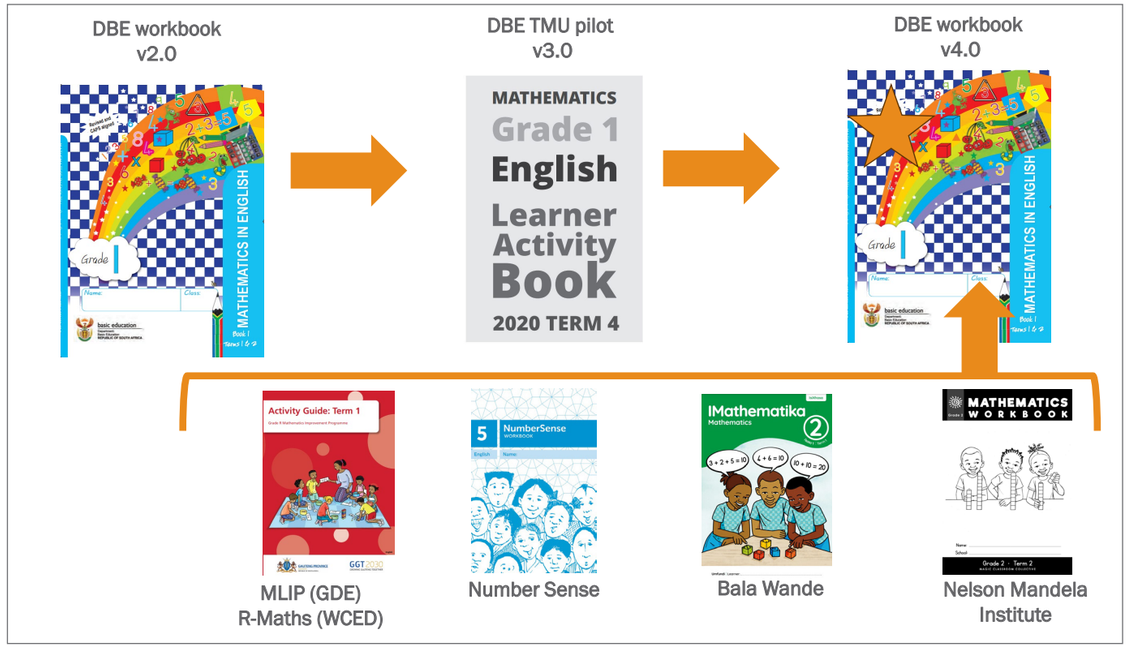


Figure 3 DBE Workbook v2.0

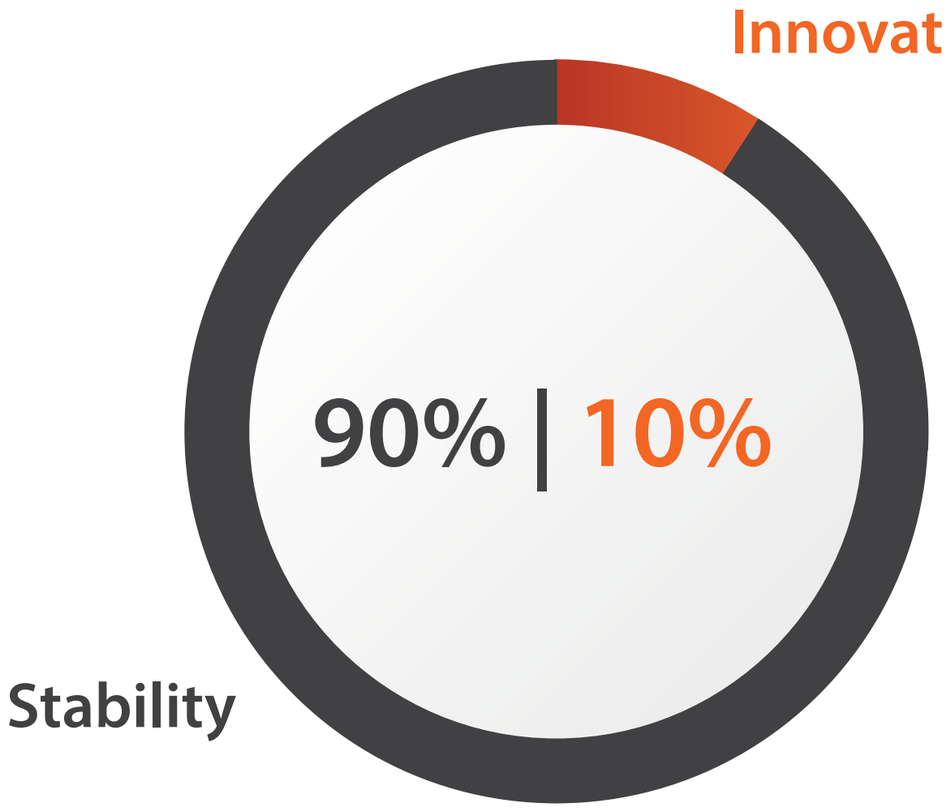
When looking across the assessment review and the LTSM review, several general observations stand out:

- The DBE workbook represents and major positive shift in South African schooling;
- **Too many mathematics interventions** can distract teachers and instructional leaders with completing messages;
- The last decade has seen **significant advances in how to work to improve mathematics learning outcomes at scale** in primary schools;
- Following significant curriculum change in early democratic period, there has been decades of stability. Curriculum reviews have been seen as "disruptions" to the system, or emergency responses (e.g. to Covid). There is related **a lack of alignment between mathematics Curriculum**, **LTSM and assessment instruments.**

In response to these general findings, it is recommended that the **DBE publish and invest in predictable and well-planned cycles of revision for curriculum, assessment and LTSM in 5 and 10 year cycles. It is further recommended that these revision cycles be aligned with curriculum reviews of operational cycles.** These revision cycles must be given substantive time and involve detailed research work (and not be short term responses to immediate threats). The **predictable cycles of curriculum-assessment-LTSM strengthening and review**, will allow time to harvest the lessons emerging from evidence of successful implementation in schools.

Alignment between curriculum-assessment and LTSM that is informed by evidence of what works is critical. For this to take place in predictable cycle (which are not threatening as disruptive, as there is inevitable strengthening of the existing approaches), decisions must be informed by:

- **Assessment data** generated through systemic evaluations and other validated instruments; and
- **Impact evaluation findings** (generated through research and innovation interventions on curriculum, assessment, LTSM design, and ongoing teacher support interventions.



To ensure the stability of primary school system, carefully planned and coordinated changes to curriculum, LTSM, and assessment are recommended for incremental improvement to take place. A goal of **90% stability to 10% research and innovation** is envisaged.

This would mean that **each school engages in only one LTSM pack** (Learner activity book, teacher guide and maths kit) for a 5 to 10 year period.

90% of schools would use the National DBE offering (the revised DBE workbook described above), **while up to 10% of schools would participate in research and innovation studies**.

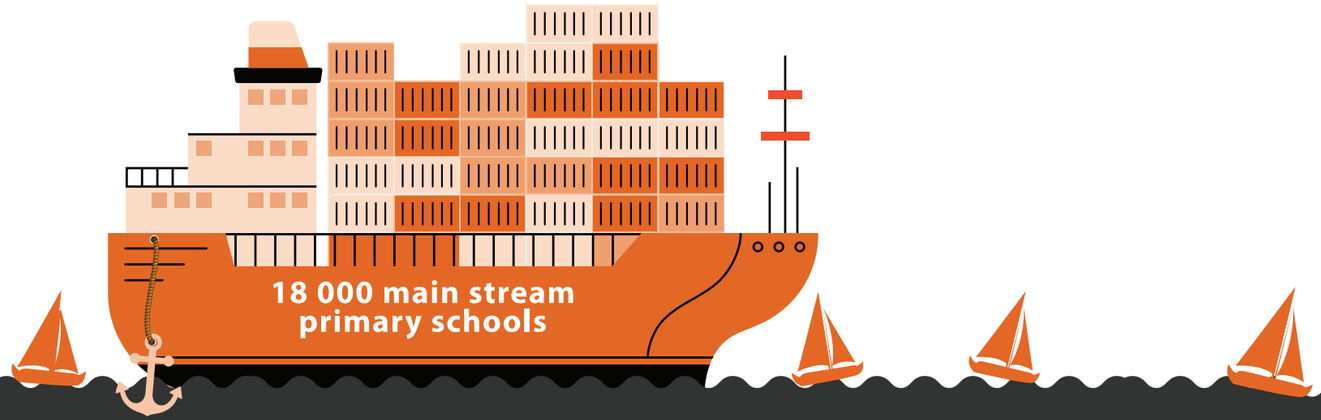
Such innovation studies would be designed to test curriculum, assessment, and LTSM innovations. Learning outcomes would be monitored in innovation studies, and if improved learning outcomes are not evident after 3 years, the study would be stopped. If learning outcomes improve, the study would continue, and its findings inform the next curriculum-assessment-LTSM review cycle.

CONCLUSION

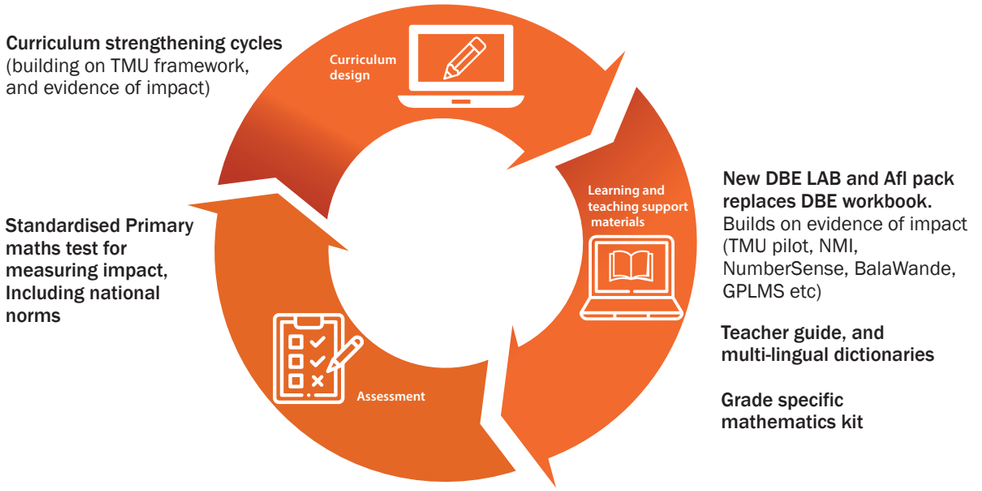
In sum, the LTSM and assessment reviews found:

- **Much positive work on LTSM and assessment from the DBE** (workbook, NECT LABS, Revised trackers, TMU framework, TMU pilot, systemic evaluation, AfL practices)
- **Much positive work and research in the mathematics eco-system** (GPLMS, NumberSense, MCC,Bala Wande, Numeracy chairs, NMI FATs, EGMA etc.)

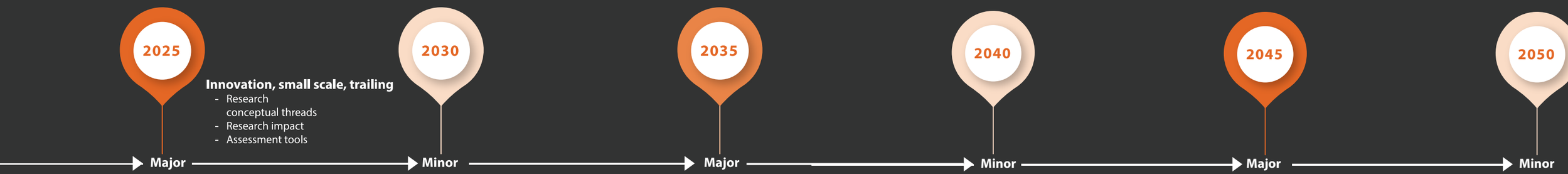
Now the time is ripe to bring these together in coordinated and predictable **5- and 10-year cycles of curriculum, assessment and LTSM review**, that draw on local evidence of impact. As such the DBE should encourage a **90-10 split of stability and innovation**, drawing on the research lessons and commissioned research on mathematics conceptual threads and language issues.



The proposed next steps for the EGMRP project are organised in terms of issues relating to assessment; issues relating to LTSM, and issues informing both.



EGMRP:
Coordinates EGM activity of 10% innovation that feeds into predictable cycles of LTSM, assessment and curriculum review for mathematics



Issues on assessment:

1. Publish the **Systemic Evaluation findings** and ensure these findings feed into curriculum and LTSM processes, so there is a feedback loop into curriculum, LTSM and teacher development (90% stability).
2. Create and maintain a **repository of quality mathematics formal assessment tasks** (such as the NMI FATS) (90% stability). Use the learning briefs and assessment evaluation framework from this review.
3. **Publicise use of SA-SAMS** relating to use of "-1" to exclude a topic in assessment data capture (90% stability).
4. Support/commission the **design of validated mathematics assessment instruments to measure impact** (building on the EGMA, but expanding this for Grades 3, 6 and 9) (10% innovation). Establish national norms/benchmarks.
5. **Evaluate the impact of M-SAP intervention** at Grade 3, and if evidence is positive, expand to include Grades 1&2

Issues on LTSM

6. **Extend and fully update the DBE workbook (v 4.0) to be a LAB and AfL pack**. Shift it from a supplementary resource to be THE primary resource (90% stability). Include multi-lingual dictionaries and teacher guides (90% stability).
7. Complete the **impact evaluation (qualitative and quantitative) for the TMU pilot** (v3.0). Use these findings to inform the DBE workbook (v.4.0) (10% innovation).
8. Collect findings and/or commission impact evaluations of **maths LTSM and training interventions showing promise, at district-level scale** (10% innovation).
9. Encourage use of the **LTSM evaluation framework** developed for this review (for new and updated versions of maths LTSM) (10% innovation).

Issues informing curriculum, LTSM and assessment:

10. Commission and support research on **maths conceptual threads (learning trajectories)** relating to a limited number of representations, 'go-to' calculation strategies, geometry and measurement. This should extend and support the curriculum strengthening work. Trial and research innovations in schools (10% innovation)

11. Commission and support the development of communities of practice and research on the **expression of mathematics in African languages** (bi-lingual and/or multilingual) LTSM and teacher training. This should extend and support the work on mother tongue instruction in mathematics. Trial and research innovations in schools (10% innovation)

12. **Continue the quarterly EGMRP activities (including indabas) to ensure that DBE:**

    - **leads the research agenda;**
    - **maintains 90% stability; and**
    - **responds to the 10% innovation** which then informs the evidence informed cycles of curriculum, assessment and LTSM review

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