

Building Strong Foundations in Early Grade Mathematics

Emerging lessons

UNDERSTANDING THE PROBLEM



Learners perform poorly in early grade mathematics

- There is a lack of recent national data on mathematics performance.
- Data from the 2014 ANA indicated that only 16% of Grade 3 learners were at Grade 3 level (Spaull and Kotze, 2015).
- Recent smaller scale studies show that 51,6% of learners in Grade 3 passed mathematics in 2023 (Western Cape Systemic Tests), and a range of Zenex projects show similar learner results at baseline.

The nature of the problem

LEARNERS

- Learners in early grades don't develop a sense of number. They struggle to make the shifts from concrete counting to more abstract practices which impede learning of more complex mathematical thinking and reasoning.
- This results in backlogs which accumulate over time becoming insurmountable in later years.
- The problem is exacerbated by language issues.

TEACHERS

- Only 30% of BEd students enter university with mathematics as a subject. Most took Mathematical Literacy instead.
- Pre-service education institutions do not provide adequate mathematics knowledge (quality and quantity).
- In-service teachers' mathematical knowledge is a significant barrier to improving learning outcomes.

ZENEX FOUNDATION PROJECTS

Zenex Foundation supports a range of projects:

- Smaller scale pilots as well as large-scale systemic initiatives
- Interventions and research

Our focus is on programmes that:

- Support teachers to implement
 - » the whole curriculum: all mathematics domains
 - » targeted areas: specific needs such as operations or mental maths
- Support ITE institutions to implement new quality mathematics modules



WHAT WE'VE LEARNED

LEARNER PERFORMANCE



What worked

- Our interventions showed improvements in basic procedural tasks such as simple addition and subtraction.
- Games and other mental maths exercises show potential to improve fluency (speed and accuracy) if implemented regularly.

What didn't work

- Learners continued to struggle with:
 - » Complex number operations
 - » Word problems
- Learners who started behind stayed behind:
 - » The poorest performing learners did not benefit from the interventions.
 - » Particularly in the Grade R project, underage learners perform very poorly.

Recommendations

- Set improvement targets that are realistic and achievable.
- Engage robustly about designing interventions for the poorest performing learners.
 - » Because of the extent of backlogs, low intensity interventions are unlikely to significantly impact learning outcomes.
- Learners need more quality time on task.
 - » More work and more conceptually grounded work is needed in our interventions.



CURRICULUM AND CURRICULUM COVERAGE

- Time on task:
 - » Schollar has indicated that there is a disjuncture between time available and required curriculum.
 - » CAPS allocates 40 weeks (200 lessons), however, there effectively is only 28 weeks (140 lessons) to cover the 40-week curriculum.
- There is some concern that the curriculum may be overloaded or designed inefficiently.

Recommendations

- Review the curriculum.
- Align the Annual Teaching Plan (ATP) to available time.
- Reduce time loss due to inefficiencies in administration, examinations, and other school activities.



TEACHERS

- Most teachers lack understanding of number which affects how they teach.
 - » They are not able to deliberately/explicitly move children from concrete to abstract mathematical approaches.
 - » They struggle with mathematical reasoning and thinking.
 - » They do not sufficiently use learners' language as a resource to maximise learning.

Recommendations

- Consider increasing dosages for teacher interventions, gradually reducing over time.
- These must take into account cost/sustainability and impact.
- Focus on conceptual rather than technical approaches.
- Make strategic choices about the few big ideas to focus on, such as moving from concrete to abstract.



RESOURCES

- Well-designed mathematical learner workbooks can be a powerful lever of change in class and build the homework culture.
- These workbooks must provide pacing, progression and language signalling to scaffold teaching and learning.

Recommendations

- The DBE workbooks have a strong footprint in schools. They were designed as a supplementary resource.
- Workbooks need to be redesigned to be more systematic and comprehensive, as the core classroom resource.
- Consider bilingual resources.



ASSESSMENT

- Dearth of assessment data on learner performance in mathematics at early grades in South Africa.
- There is a lack of benchmarks for measuring mathematical achievement.
- The EGMA instrument which is used in projects is limited to assessing one area of mathematics.
- This limits what we know about the extent of problems in mathematics.

Recommendations

- There is a need for developing reliable instruments to assess mathematics competence for classrooms, for projects and for the system.

