



**What are successful ways
to improve
teaching, learning,
and student
outcomes
in mathematics?**

For children to thrive while in school and later on in life, they need a solid learning foundation. Unfortunately, by age ten, nearly nine out of ten children in sub-Saharan Africa (SSA) struggle to acquire basic math skills. At the same time, classroom math instruction faces a range of challenges. The recent data from [PASEC 2019](#) shows that teachers have significant knowledge gaps in this subject: only a third of them reach the top proficiency level in mathematics.

It is also worrying to note that only a quarter to a half of teachers are in a position to diagnose students' needs or choose the most appropriate pedagogical tools for teaching math.

This short document highlights some of the latest evidence from low- and middle-income countries, offering insights into what has proven effective in supporting teachers and improving the teaching and learning of mathematics.

What are successful ways to improve classroom math instruction?

How can I do this?

Develop students' understanding of procedures and concepts: They must understand how to use mathematical procedures and methods, but must also grasp the relationships between math concepts and ideas and how to apply mathematics to real life.

01

Through thoughtful questioning and discussion; drawing links between formal and informal mathematics; and using materials that give concrete examples and include pictures/diagrams so students can "see" math before moving on to more abstract ideas using symbols. It is important for students to see and discuss math in order to build confidence.

Actively engage students: For students to develop their math skills, they need ample opportunities to apply what they have learned, putting it into practice individually, in small groups, and with the whole class.

02

When planning courses, be sure to allow enough time for independent learning and practice by assigning a variety of independent exercises, pair work, and group tasks.

Use multiple representations and models to support learning

03

When planning and teaching courses, as above, teachers should expect to use a variety of affordable, easily accessible, concrete materials, images, and symbols, explicitly tied to the concepts the students are learning.

Use evaluation to meet students' differing needs

04

Use formative assessment strategies such as questions to check comprehension, track students' progress, and foster students who need more support or more challenges.

For teachers to make these changes effectively and ensure students' solid progression from the simplest to the most complex mathematical concepts, teachers need a robust framework and strong support in the form of effective continuing professional development.

Recent international studies on improving math education

[The Science of Teaching project](#) and the [Learning at Scale](#) study are two innovative research projects conducted by [RTI International](#) with support from the Bill and Melinda Gates Foundation. These initiatives explore and summarize international evidence so as to identify the most effective approaches for enhancing learning outcomes in basic reading, writing, and math skills. The Science of Teaching [research](#) has produced, among other things, [how-to guides](#) offering a well-informed perspective on key issues, ranging from numeracy to language of instruction to remediation. Moreover, the Learning at Scale study focuses on the vital components to consider regarding the classroom, teachers, and the system as a whole, with the aim of fostering significant performance improvements [in mathematics](#) and in [reading and writing](#).

Although certain tactics are context-specific, there are some winning strategies for learning math, such as using a sequence of manipulation/ visualization and abstraction, developing number sense, and early introduction of a sense of key procedures.



[Structured pedagogy](#), along with [remediation](#) activities such as [Teaching at the Right Level \(TaRL\)](#), can help educators enhance their teaching of math through clear, guided ongoing support.

Below are three case studies showing how, according to stringent research, some effective pedagogical strategies promoted better math learning outcomes on the African continent.

Case Study #1



Effective Mathematics Teaching through Structured Pedagogy in South Africa by Funda Wandu

The [Funda Wandu](#)'s mathematics curriculum, titled "Bala Wandu," provides educators with a detailed teacher's guide. This sets out the course's daily and weekly objectives and specifies the type of teaching and learning activities necessary to meet the learning objectives. It offers guidelines for incorporating "manipulatives" into the lesson and suggests what type of assessment to use for the subject being taught.

[Teachers have access to further support through videos](#) showing master teachers teaching the content. Additionally, a section on concept development explains the specific mathematical concept targeted by all the classroom activities.

This section includes the vocabulary that teachers should use and the math-specific behaviors they should monitor carefully as students progress towards the target concepts.

Case Study #2



Effective Mathematics Teaching through Structured Pedagogy in South Africa by the Western Cape Education Department (WCED)

To support teachers and classes, the [Grade R program](#) supplied resources, training materials, and teacher's guides that support a conceptual approach to teaching and learning mathematics.

The program's materials were designed to align with the existing curricula and are available in the three main languages of the Western Cape: Afrikaans, isiXhosa, and English. They include a teacher's guide, a concept guide, activity guides, and posters, as well as materials for students. The activity guide contains learning objectives and activities for one lesson per day of each

marking period. Each lesson involves whole-group teaching as well as small-group instruction at workstations, one of which involves support from the teacher and informal monitoring.

The teachers also took part in school-based professional development communities and received ongoing support through coaches who were already subject matter consultants. Further information is available [here](#).

Case Study #3



Improved Math Instruction in Madagascar through Remedial Education (Teaching at the Right Level – TaRL) – TAFITA Project

The cornerstones of the TAFITA project are:

Special emphasis is placed on basic skills such as number identification, understanding place value, and the four basic operations. This is meant to solidify the foundations needed for further progress in mathematics. Teachers were given detailed teacher's guides to orient them in this process. It is an extracurricular TaRL intervention lasting up to 2 hours for 12 weeks, structured around the specific context of each school.

Regular assessments are performed, through which students are reassigned to groups every 10 sessions based on performance, as measured using Madagascar's [ASER](#) tool.

Teachers received additional support through ongoing coaching, communities of practice, and school management committees within the schools. Training and support come from the national educational system, through master trainers from TAFITA, specially trained by experts from Pratham TaRL. Further information is available [here](#).

Supplementary readings/resources:

Here is a list of some supplementary readings and resources:

1. **Consensus Conference - Teaching and Learning Mathematics in Elementary Schools** - <https://www.confemen.org/en/>
2. **21 Key Steps for Teaching Mathematics** – A Report on Math Instruction in France, Submitted to the French Minister of Education - <https://www.education.gouv.fr/21-mesures-pour-l-enseignement-des-mathematiques-3242>
3. **Note on the findings of the "Numeracy at Scale" study: TAFITA Program in Madagascar** - https://learningatscale.net/wp-content/uploads/2023/07/Numeracy-at-Scale_TAFITA-Madagascar_En.pdf
4. **A How-To Guide: Designing Effective Numeracy Programs in Low- and Middle-Income Countries** - https://scienceofteaching.site/wp-content/uploads/2023/08/PROJ_12_SoT-Practical-Guide-for-Numeracy_15AUG23.pdf
5. **Remediation in Foundational Literacy and Numeracy: A How-to Guide** - https://scienceofteaching.site/wp-content/uploads/2023/08/Remediation-How-To-Guide_15AUG23.pdf
6. **A How-to Guide: Assessment-Informed Instruction: Classroom Level** - https://scienceofteaching.site/wp-content/uploads/2023/08/Assessment-Informed-Instruction_Class_15AUG23.pdf
7. **FLN Hub** - <https://www.flnhub.org/>
8. **Teaching at the Right Level (TaRL Africa)** - <https://teachingattherightlevel.org/>
9. **Learning at Scale: Numeracy** - <https://learningatscale.net/numeracy-findings/>
10. **Twinkl France – A Gold Mine of Teaching Material**

Sources

A How-to Guide: Designing Effective Numeracy Programs in Low- and Middle-Income Countries - https://scienceofteaching.site/wp-content/uploads/2023/08/PROJ_12_SoT-Practical-Guide-for-Numeracy_15AUG23.pdf

Sitabkhan, Y., Davis, J., Earnest, D., Evans, N., Ketterlin-Geller, L., Lutfekali, S., Ngware, M., Perry, L., Pinto, C., Platas, L., Ralaingita, W., Smith, K. and Srikantaiah, D. (2019). Instructional Strategies for Mathematics in the Early Grades. A Working Paper Developed by the Mathematics Working Group.

Sitabkhan, Y. and Platas, L.M. (2018). Early Mathematics Counts: Promising Instructional Strategies from Low- and Middle-Income Countries. RTI Press publication No. OP-0055-1807. Research Triangle Park, North Carolina: RTI Press.