



From Commitments to Results: Delivering Foundational Numeracy at Scale in Kenya.

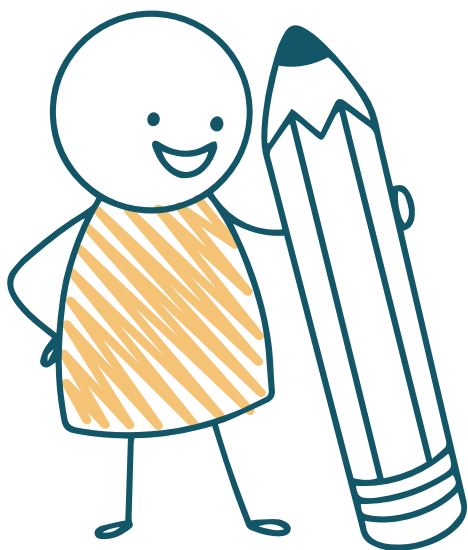
Evidence, Lessons and Pathways for System Transformation

The Challenge: Foundational Numeracy as a System Delivery Issue

Across Africa, improving foundational learning remains central to achieving quality education and reducing learning poverty. While access to schooling has expanded significantly, learning outcomes have not kept pace. In Kenya, many learners continue to progress through the education system without mastering foundational numeracy skills such as number sense, place value, basic operations, and mathematical reasoning.

Evidence from national assessments and implementation studies shows that these learning gaps are not merely learner-level challenges. They reflect broader system constraints, including gaps in teacher pedagogical content knowledge, limited use of assessment data, inconsistent instructional support, weak accountability structures, and fragmented implementation efforts.

The challenge therefore requires a shift from isolated interventions to system-wide solutions that strengthen teaching, learning, accountability, and policy coherence.



What Evidence Reveals

Three key messages emerge from recent research and implementation experiences

1. Numeracy learning gaps remain significant

Many learners continue to rely on concrete counting strategies well beyond grades where abstract reasoning should emerge. Evidence from recent assessments shows that 75% of Grade 3 learners made factual errors in basic numeracy concepts, while 74.5% still rely on concrete objects and body-based counting (manipulatives) to solve mathematical tasks. In addition, 47% continue to conceptualize addition as simply "putting together" (count all) and subtraction as "taking away," indicating limited progression to more sophisticated strategies. Consequently, conceptual understanding, procedural fluency, and mathematical reasoning remain weak, particularly in subtraction and place-value concepts.

Teacher assessments reveal important gaps in pedagogical content knowledge (PCK). Only 11% of assessed pre-primary and Grades 1-3 teachers met PCK benchmarks. Teachers demonstrated apparent gaps, particularly in instructional sequencing, concept development, geometry, measurement, and the diagnosis of learner misconceptions.





2. Instructional practice remains the critical bottleneck

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3. System support structures need strengthening

Fragmented and weak coordination among education actors, inconsistent implementation of existing policies, limited use of evidence in decision-making, and insufficient accountability for learning outcomes continue to constrain progress.

The evidence points to a clear conclusion: foundational numeracy outcomes improve when the entire instructional ecosystem works together around a shared goal.

What Works: Lessons from the Kenyan Error Analysis Initiative

Evidence from a trial of the Error Analysis Initiative in Bungoma West, Kenya, shows that significant improvements in numeracy can be achieved when teachers are supported in using learners' errors as diagnostic tools for instruction. The initiative, which targeted Grades 2 and 3, strengthened teachers' use of formative assessment and helped them tailor instruction to learners' specific misconceptions and learning needs.

Implemented through collaboration between the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEAM)¹, and Mizizi Elimu Afrika, the initiative achieved substantial gains within ten months:



Addition mastery increased from

9% ➔ 42%

Subtraction mastery increased from

4% ➔ 43%

Overall task mastery rose from

0% ➔ 34%

The prevalence of factual errors decreased from

Baseline	▶	Midline	▶	Endline
84.0%		63.0%		30.1%



Demonstrating sustained improvement in learners' recall of basic number facts.



- Learners progressed from concrete counting strategies to abstract reasoning and mental computation. For instance,

The use of place-value strategies increased from

5.8%	▶	81.2%
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In Addition tasks

6.1%	▶	82.5%
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In Subtraction tasks

Over the ten-weeks intervention, reflecting substantial progression from concrete to abstract mathematical thinking. The intervention also promoted equitable learning gains, with girls outperforming boys

Girls

Boys

36% vs. 32%

Overall task mastery

Girls

Boys

47% vs. 34%

Addition

Girls

Boys

(44% vs. 42%

Slightly in subtraction

The intervention also improved teaching practice by strengthening teachers' ability to identify misconceptions, use formative assessment, provide targeted remediation, and support individual learner progression.

The experience reinforces four important lessons for scale:

- **Effective instruction matters:** Improved outcomes are achieved when teaching focuses on conceptual understanding, place-value reasoning, multiple representations, and differentiated instruction. Additionally, the use of Concrete-Pictorial-Abstract (CPA) enhances conceptual understanding and mathematical reasoning.
- **Continuous teacher support is essential:** Teacher Professional development is most effective when combined with coaching, mentoring, classroom observation, and communities of practice (CoPs).
- **Assessment should inform teaching:** Regular formative assessment enables early identification of learning gaps and timely remediation, essential to informing classroom teaching practices.
- **Leadership drives implementation quality:** Strong instructional leadership and school-level accountability contribute significantly to improved learner outcomes.



From Evidence to Action: Kenya's Numeracy Reform Agenda

Drawing on emerging evidence and stakeholder consultations, Kenya is developing a long-term, foundational numeracy roadmap aimed at delivering learning gains at scale. **The vision of the roadmap is that by 2035, at least 70% of learners can calculate with confidence by Grade 3.**

The roadmap is anchored in four mutually reinforcing pillars.

Pillar 1: Teacher Capacity and Pedagogy:

Strengthen teachers' subject knowledge, pedagogical content knowledge, and confidence through institutionalized continuous professional development, mentorship, coaching, and communities of practice (CoPs).

Pillar 2: Curriculum and Teaching-Learning Materials:

Improve access to high-quality, curriculum-aligned numeracy resources while strengthening teachers' capacity to effectively use teaching-learning materials to promote conceptual understanding and procedural fluency.

Pillar 3: Data, Partnerships and Accountability:

Strengthen assessment systems, learner tracking, performance monitoring, and evidence-based decision-making while fostering collaboration among government, development partners, teacher training institutions, researchers, civil society, and communities.

Pillar 4: Policy and System Alignment:

Strengthen implementation of existing policies, improve coordination across national and county levels, institutionalize remediation mechanisms, and reinforce accountability for learning outcomes.

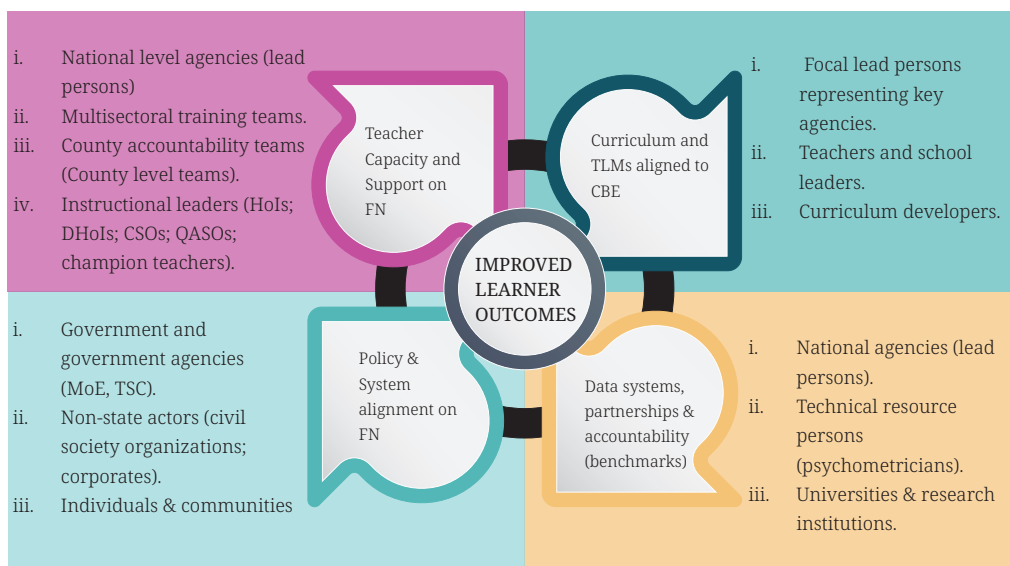
Together, these pillars provide a coherent framework for translating evidence into sustainable system change.

Foundational Numeracy's Improvement Drivers

Teacher Capacity and Pedagogical Support - Continuous professional development. - Coaching and mentorship. - Communities of practice. - Strengthened pedagogical content knowledge.	Curriculum and Teaching-Learning Materials - Quality numeracy resources. - Curriculum alignment. - Digital learning content. - Strong conceptual learning pathways.
Data, Assessment and Accountability - Formative assessment systems. - Learner tracking and feedback loops. - Evidence-based decision-making. - Accountability for learning outcomes.	Policy and System Alignment - Coordinated implementation. - Government leadership and ownership. - Cross-sector collaboration. - Sustainable institutional structures.

GOAL At least 70% of learners can calculate with confidence by Grade 3 by 2035.

PROGRAM MONITORING



Research, Evaluation and Learning for Scale

Sustained improvement requires continuous learning. The roadmap therefore embeds research, evaluation, and learning within implementation to generate actionable evidence on:

- How does strengthening teachers' capacity to interpret curriculum and use teaching-learning materials influence classroom practice and learner outcomes over time?
- How do communities of practice and continuous teacher professional development improve instructional quality and numeracy teaching effectiveness?
- How can inclusive and responsive teaching approaches improve numeracy outcomes for learners with diverse learning needs?

These questions reflect an important shift from measuring activities to understanding what drives sustainable improvement and scalable impact. The goal is to build a culture where evidence continuously informs policy, implementation, resource allocation, and accountability.

A Call to Action

Kenya experience demonstrates that foundational numeracy improvement is achievable when evidence, policy, implementation, and accountability are aligned around a common goal.

The challenge before policymakers, development partners, researchers, and implementers is not simply identifying what works, but creating systems capable of delivering it consistently, equitably, and at scale.

Moving from commitments to results requires sustained political commitment, coordinated investment, strong partnerships, and relentless focus on classroom practice. Only then can every learner acquire the foundational numeracy skills necessary to thrive in school, work, and life.

As African countries pursue the shared ambition of ending learning poverty and improving foundational learning, the central lesson is that sustainable change occurs when evidence, policy, implementation, and accountability work together.

While reforms begin with people, they require collective effort and should be government-led for scaling and sustainability. In addition, scale and equity must be designed from the start to address the needs of all learners and stakeholders. It is thus critical to underscore the fact that a system driven and government aligned initiative is central to sustained uptake and adaptation.



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