Strengthening the Teaching of Primary School Mathematics in Malawi: Insights from a Pilot Evaluation Study

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CAMBRIDGE EDUCATION

UKaid from the British people

MINISTRY OF EDUCATION Republic of Malawi

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Session: Supporting teacher growth in primary mathematics: Lessons from multiple contexts

Agenda

1. Background

2. Main Findings

3. Recommendations & Key Takeaways

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Why?

- Numeracy is an essential skill for later life outcomes (Parsons & Brynner, 2005)

- Early grade mathematics achievement has been shown to predict secondary school graduation as well as earning potential (Jordan et al., 2009)

- Yet, teachers struggle to teach foundational skills in math effectively, often relying on techniques such as rote memorization and procedural fluency (Pryor et al., 2012)

- For instance, a survey across African countries revealed that over 90% of teachers were able to solve basic addition problems but **only 11%** were able to interpret data in a graph and **only 15%** were able to solve word problems (Bold et al., 2017)

- Specifically,

The SACMEQ IV data show that Malawian learners perform well below the regional average, with only 3.3% of Standard 6 learners achieving competent numeracy levels

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What is the National Numeracy Programme?

- Four-year Government of Malawi programme,
- Led by the Ministry of Education and funded by UK Aid from the UK government,
- Aims to improve student learning outcomes in mathematics, so girls and boys have a solid foundation in basic skills to succeed in the rest of their schooling and fulfil their potential.

How?
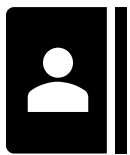
Student and Teacher Material
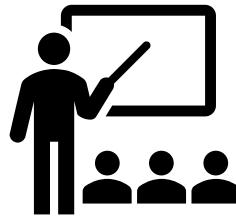
Professional Development

Institutionalize Reform

Pilot Evaluation Study

Purpose

- participants' views about the programme,
- assess the mathematics skills of learners,
- examine how teachers have changed their approach to mathematics instruction,
- and provide insight into the efficacy of NNP materials and the in-service teacher training methodology.
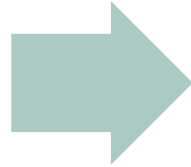
Design

- Pre-post test mixed methods evaluation
- 4 timepoints:
  - Baseline Evaluation
  - Ongoing Data Collection A
  - Ongoing Data Collection B
  - Endline Evaluation
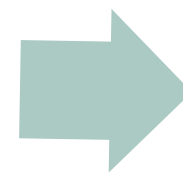
Tools

- Learner:
  - EGMA
  - Learner Questionnaire
  - Focus Group Discussion
- Teacher
  - Questionnaire
  - Teacher Key Informant Interview (KII)
  - Teacher Learning Circle Observation
- Coach KII
- Trainer KII
- Classroom Observation

Sample

75
schools

40 comparison
35 treatment

4
standards

EGMAs differ for
Standards 1-2 & 3-4

5-6
learners per
standard

1,489 learners total

1
teacher per
standard

296 teachers total

Districts with comparison schools

Districts with treatment schools

Districts with both types of schools

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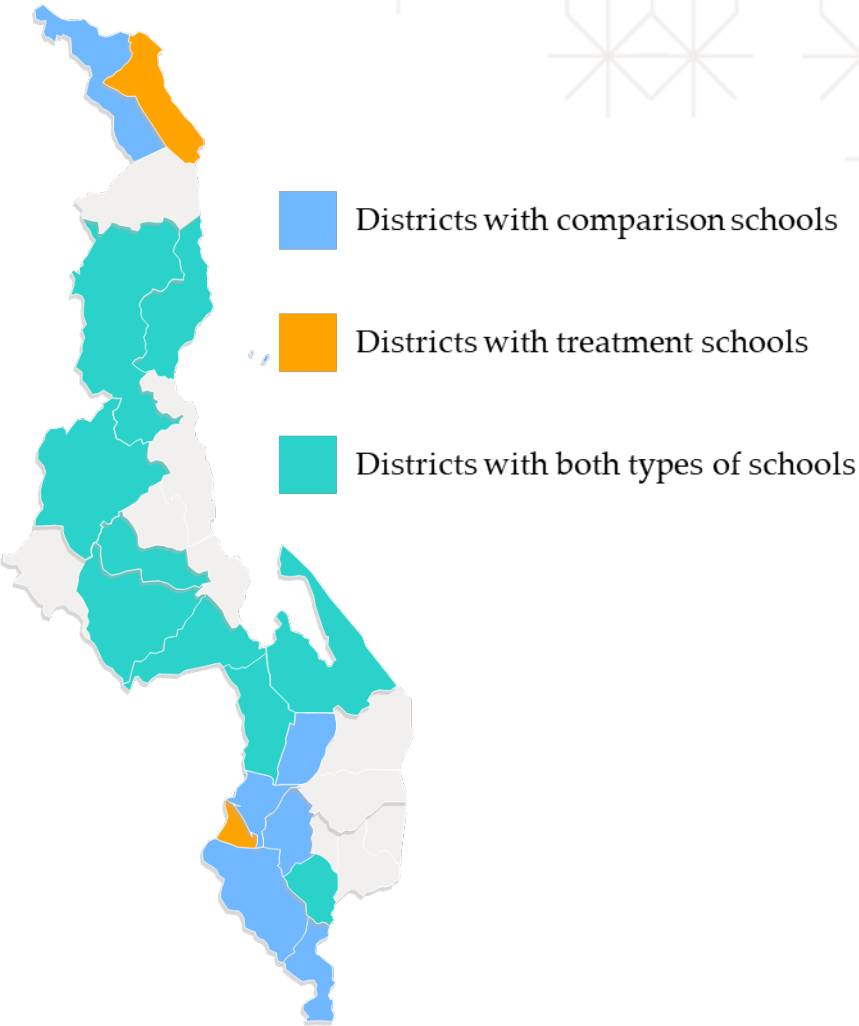
Main Findings: Student and Teacher Learning Materials

Teacher Responses: Teacher Guides, Learner Workbooks, Training Videos

- Teachers strongly agree that the **teacher guide** provides sufficient guidance on how to implement the three parts of the lesson routine (teacher-led activity, independent learner activity, and reflection) **(47.8% Endline, 28.4% Baseline)****

- Most teachers strongly agree **(44.8% Endline, 25.9% Baseline)**** that the **NNP materials** are valuable and feel very well prepared to implement the NNP **(66.9% Endline, 49.6% Baseline)****

- More than **90%** of the teachers report that **NNP** has changed their teaching approach **(**)**

Baseline   Endline

- **Learners who have the NNP learner workbook** — Baseline: 57.0%, Endline: 89.0% **
- **Learners engage with the workbook during lesson** — Baseline: 41.5%, Endline: 59.7% **
- **Learners enjoy working in the workbooks** — Baseline: 88.9%, Endline: 97.8% **
- **Workbook is adequate in level for learners** — Baseline: 55.4%, Endline: 76.7% **
- **Workbook is too difficult for learners** — Baseline: 38.4%, Endline: 14.2% **

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Training Videos

- Most teachers find the teacher guide and learner workbooks to be more useful than the training videos, not changed since baseline

- Limited access to smartphones for videos

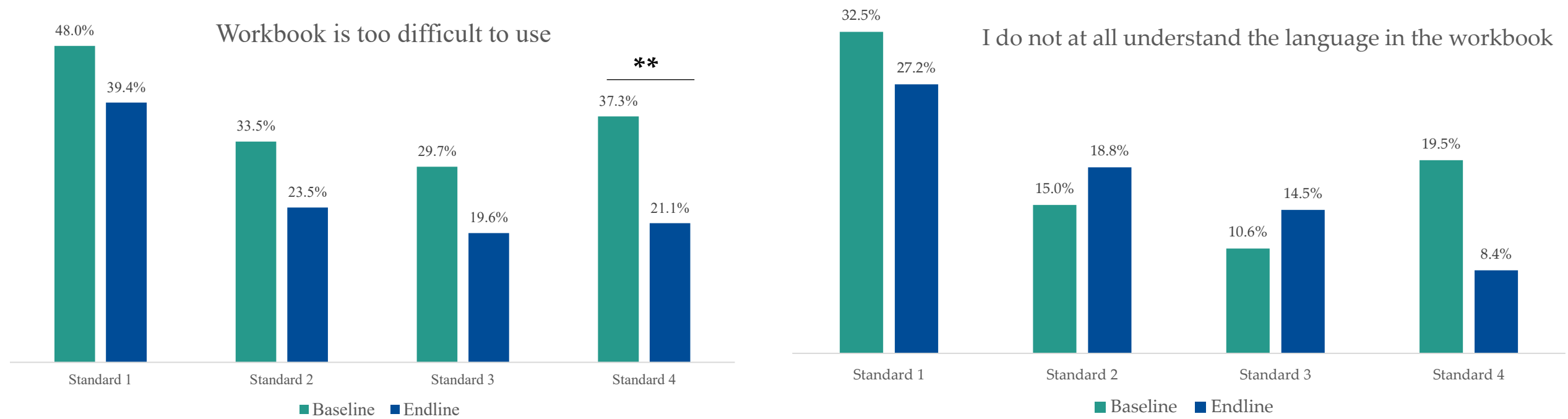- Unrealistic depiction of class sizes in the videos

- According to teacher KIIs, the videos do not contain all the information/issues that the teacher need support with, this has not changed much from baseline

Learner responses: Learner Workbooks

- **Workbook is fun to work in.** At endline, more learners find the workbook fun to work with. **2.2%** learners selected "The workbook is not at all fun" at Endline as compared to **14.9%** at Baseline**

- Most learners still **struggle to understand the language** used in this workbook

Workbook is too difficult to use

Standard	Baseline	Endline
Standard 1	48.0%	39.4%
Standard 2	33.5%	23.5%
Standard 3	29.7%	19.6%
Standard 4	37.3% **	21.1%

I do not at all understand the language in the workbook

Standard	Baseline	Endline
Standard 1	32.5%	27.2%
Standard 2	15.0%	18.8%
Standard 3	10.6%	14.5%
Standard 4	19.5%	8.4%

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Main Findings: Continuous Professional Development

Teacher Learning Circles

have helped me understand what I can do or say to encourage my pupils to find different ways of solving a problem or doing a…

have helped me understand why pupils need to find different ways of solving a problem or doing a calculation

have taught me new math games I can do in my classroom

have taught me how to explain or do the activities in the Learner Workbook

have taught me how to do the activities in the Teacher's guide

have taught me how to better explain math to my pupils.

Classroom Observation: Quality of Instruction

	(0)	(1)	(2)	(3)
Artefacts / manipulatives	No manipulatives are used, the lesson would have benefited from using manipulative(s).	The teacher uses manipulatives; however, the link to the mathematical task(s) of the lesson is unclear.	The teacher uses manipulatives, they help to clarify the mathematics task/concept	The teacher uses manipulatives, they help to clarify the mathematics task/concept and the learners can use them independently to complete the same/similar mathematics task(s) OR The teacher did not use manipulatives because learners are able to complete the mathematics task(s) confidently without manipulatives.
Writing	No writing by the teacher on the board or on a chart	There is writing on the board or on a chart; however; it does not support concept development (e.g. date; register; exercise to be completed; etc.)	There is writing on the board or on a chart; the writing supports concept development; however, it includes mathematical errors that go unnoticed.	There is writing on the board or on a chart; the writing supports concept development. The writing may include mathematical errors which are noticed and addressed
Methods / procedures	No discussion (telling) of methods or procedure for mathematical task	A single mathematical method/procedure is provided, the method only applies to a specific problem/task	A mathematical method/procedure is provided together with an explanation of why/how the method/procedure works	Alternative mathematical methods/procedures, including learner productions, for the same mathematical task are discussed, including explanations of why/how they work as well as the advantage of each
Connections	Mathematical examples/tasks are dealt with through guessing/chorusing	Mathematical examples/tasks are treated in isolation	Mathematical examples/tasks are treated in relation to similar examples/tasks	There is discussion of the connections between different representations of the mathematics examples/tasks (e.g. similar previous examples/tasks; the manipulatives and/or writing used in the lesson)
Justification of learner responses	No mathematical responses are invited from learners	Learners' mathematical responses are invited, but not evaluated	Learners' mathematical responses are invited, and evaluated in terms of yes/no; correct/incorrect etc.	Learners' mathematical responses are invited, and evaluated in terms of why/how they are correct/incorrect

Developed by Aarnout Brombacher; Fraser Gobede; Justina Longwe; and, Mercy Kazima based on:

Venkat, H. & Askew, M. (2018). Mediating primary mathematics: theory, concepts and a framework for studying practice. Educational Studies in Mathematics, 97, 71–92.

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Main Findings: Student Achievement on EGMA
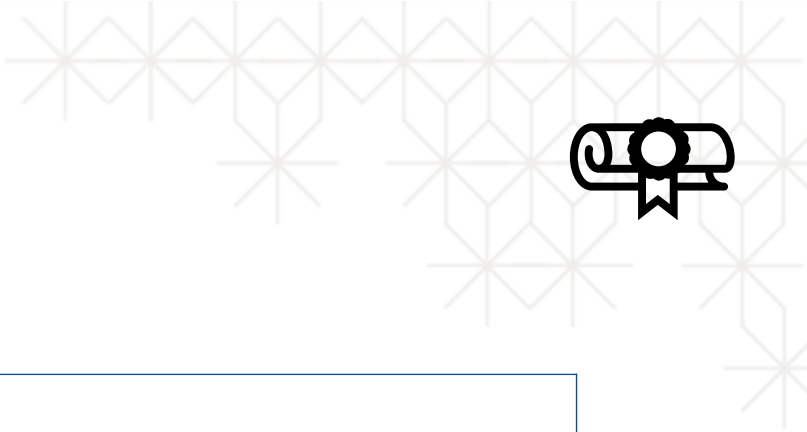
Standard 1	No significant difference
Standard 2	No significant difference
Standard 3	On average, EGMA scores increased by 4.9% over time.
Standard 4	On average, EGMA scores increased by 5.1% over time.

Teacher Interviews

"In the past, teachers used to memorize on what to do, but now they are thinking critically, and this has helped them to **prepare lessons well**"

"Teachers have realized that learners were denied chances to express themselves; NNP is giving **more freedom to learners** to express themselves freely in mathematics."

"There is **too much content** compared to the time given and the age of learners, especially in **standards 1 and 2**, because the majority of the learners never attend ECD classes before joining primary education. Standards 1 and 2 are given more work to do just like standards 3 and 4. There is no difference among them."

"This **has promoted critical thinking in learners and teachers**. Learners have developed a sense of confidence in expressing their views."

Recommendations & Future Direction

- Overall, the NNP has helped teachers develop a better understanding of both content knowledge and pedagogical skills

  - NNP materials (Teacher Guides and Learner Workbooks) are viewed as helpful resources by both teachers and learners
  - Positive perceptions of teachers around professional development (TLC's)
  - Classroom observation data reveals how teachers in intervention schools are engaging with resources and strategies efficiently to promote mathematical reasoning

- Going forward, minor changes to the program might be helpful in increasing student outcomes
  - Too much content for Standard 1 and 2 learners
  - The TLC steps could be improved to focus more on feedback, reflection, and accountability
  - Training Videos could be improved to reflect the average classroom in Malawi
  - Language of instruction remains an issue, providing materials in Chichewa and English might help eliminate this barrier (mother tongue education)

Thank you!

2/9/2026

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Extra Slides

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PROJECT IMPACT	Children's test scores in mathematics improve in lower primary grades
OUTCOMES	Lower primary school teachers demonstrate required knowledge and skills for teaching mathematics

OUTPUTS

New teaching and learning materials developed, approved and distributed to primary schools in Malawi

Lower primary school teachers have access to relevant professional development, including coaching and other school-based professional development activities to help them use new approach to teaching mathematics in their classrooms

The new Mathematics curriculum and teacher training approach are embedded and institutionalised in MoE systems.

More supportive environment at school and at home to enable all children to succeed in mathematics

KEY ACTIVITIES

REVISE, ADAPT, FINALISE CURRICULUM and MATERALS

Revise curriculum, develop student materials and teacher guides

CREATE A SUSTAINABLE SYSTEM TO TRAIN TEACHERS

Develop training approach for teachers, PEAs, section heads; orient teachers; create cadre of MoE Master Trainers to lead CPD; integrate into PRESET

INSTITUTIONALISE REFORM

Establish new vision to teach mathematics St I-IV; integrate new approach into PRESET; identify resources for supply of Learner Workbooks;

CREATE DEMAND AND SUPPORT FOR LEARNING MATHEMATICS, especially for girls

Design and test SBCC campaign to promote positive attitudes to learning mathematics

PROBLEM STATEMENT

Student achievement levels in mathematics are low. Malawian learners perform well below the regional average and most Standard 4 students are confident only with Standard 1 numeracy. The Malawian mathematics/numeracy environment is characterised by limited and limiting expectations of students. The focus of teaching is on processes and procedures rather than understanding, application and reasoning. Expectations of students in the Malawian assessments of mathematics fall well below regional and international benchmarks. Low expectations are compounded by negative attitudes towards learning mathematics among some groups of students, and among some teachers: girls are not expected to do well in mathematics.

Elements of the Program

1. Routines

2. Student Learning Materials

3. Teacher Guide

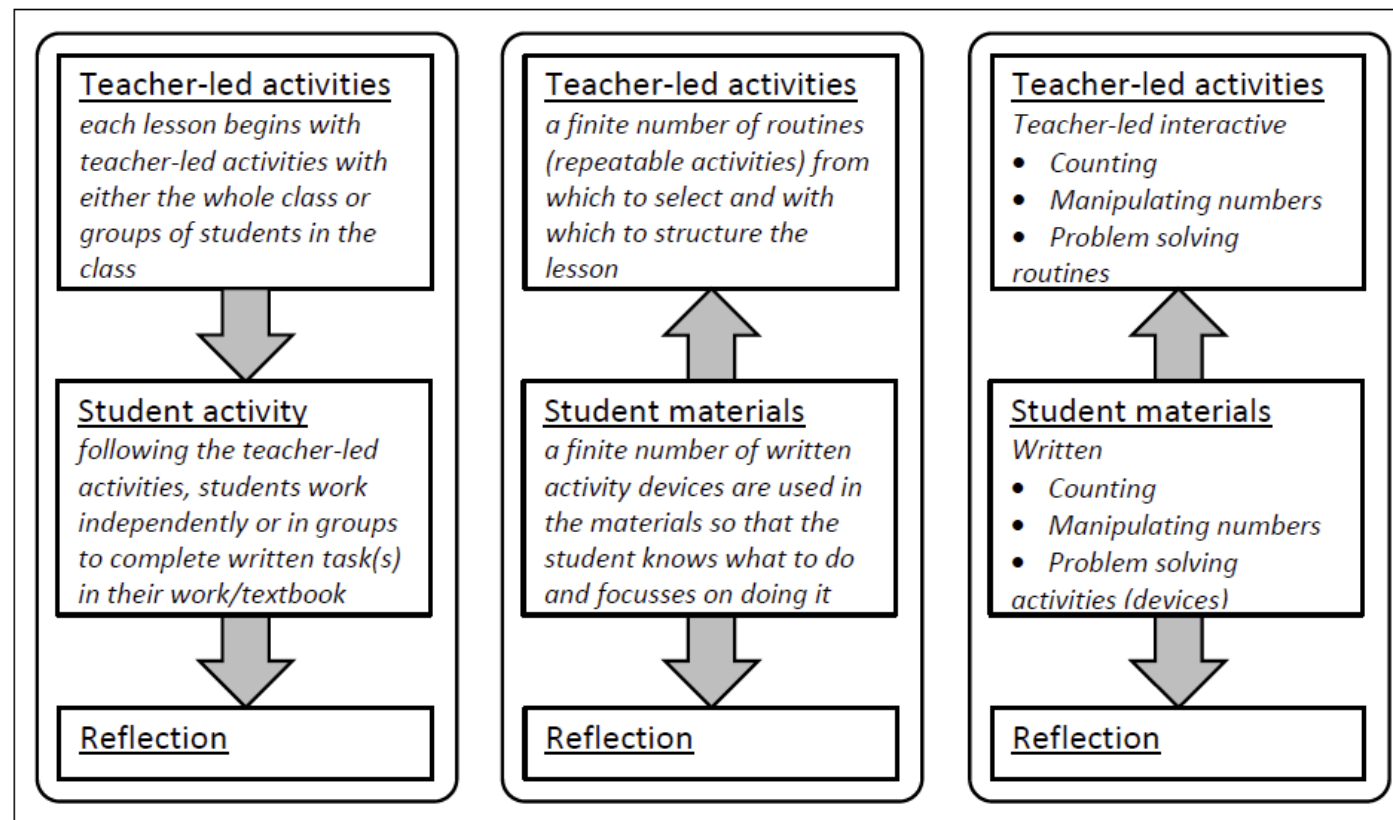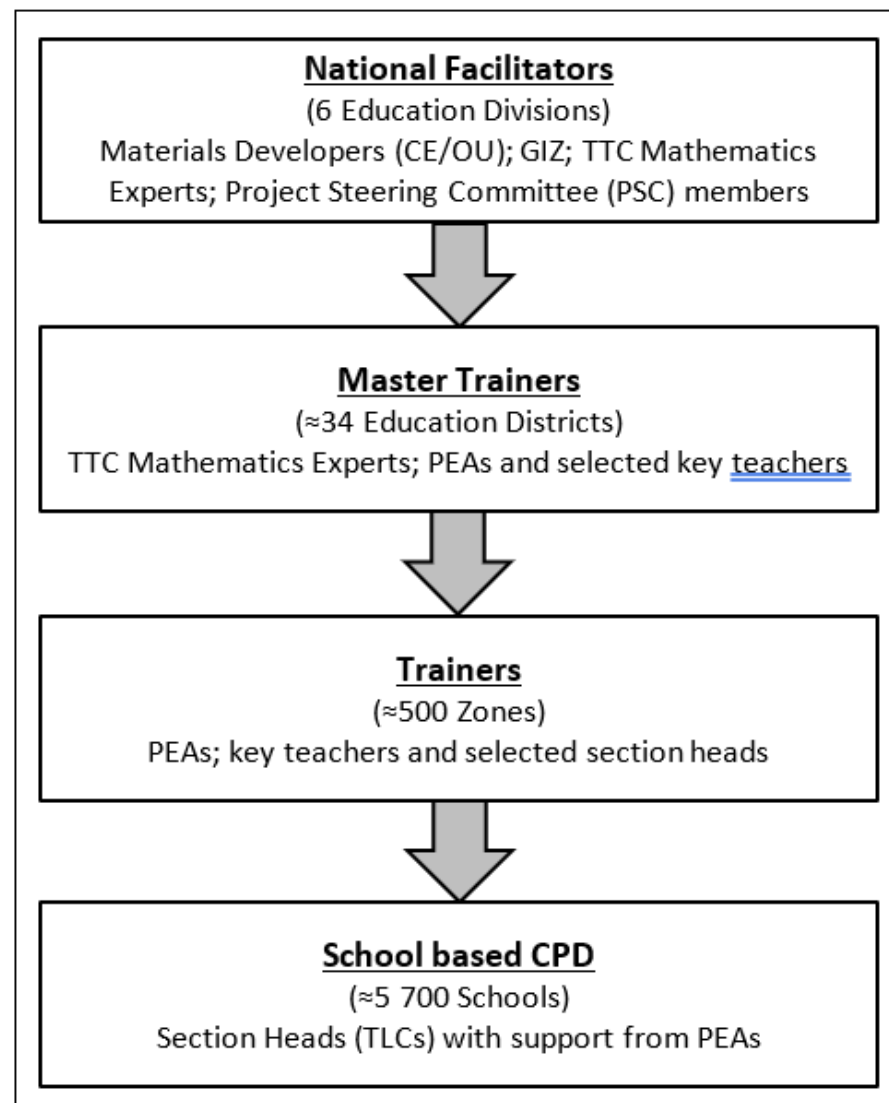**Figure 1: The proposed (routinised) lesson structure**

Figure 1a: The general lesson routine (structure)

Figure 1b: Nested routines for each lesson element

Figure 1c: Application to Numbers, Operations and Relationships

Cascade Model of Teacher Training

Figure 3: Three-tier cascade training model

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│  │           National Facilitators           │  │
│  │            (6 Education Divisions)         │  │
│  │  Materials Developers (CE/OU); GIZ; TTC    │  │
│  │  Mathematics Experts; Project Steering     │  │
│  │  Committee (PSC) members                   │  │
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│                       ▼                           │
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│  │              Master Trainers               │  │
│  │           (≈34 Education Districts)         │  │
│  │  TTC Mathematics Experts; PEAs and         │  │
│  │  selected key teachers                     │  │
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│  │                 Trainers                    │  │
│  │               (≈500 Zones)                  │  │
│  │  PEAs; key teachers and selected           │  │
│  │  section heads                             │  │
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│  │             School based CPD                │  │
│  │               (≈5 700 Schools)              │  │
│  │  Section Heads (TLCs) with support         │  │
│  │  from PEAs                                  │  │
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	Comparison	Treatment	p- value (total)
Artefacts/manipulatives	1.96 (1.74-2.19)	2.23 (2.04-2.41)	0.085
Writing	2.39 (2.25-2.57)	2.45 (2.27-2.61)	0.68
Methods/Procedures	1.47 (1.32-1.62)	1.8 (1.64-1.98)	0.004**
Connections	1.81 (1.65-1.96)	2.07 (1.94-2.21)	0.015**
Justification of Learner Response	2.17 (2.05-2.28)	2.43 (2.32-2.55)	0.003**