



# SCIENCE OF TEACHING

**MATH COMMUNITY OF PRACTICE WEBINAR #5**

SOT NUMERACY RESEARCH STUDIES:

SHARING FINDINGS

July 31, 2025



WELCOME!



# AGENDA

- ▶ INTRO TO SoT Math CoP
- ▶ MEET THE PRESENTERS
- ▶ PRESENTATIONS
- ▶ Q&A
- ▶ BREAKOUT GROUPS
- ▶ FINAL COMMENTS & CLOSING REMARKS





# INTRO: SCIENCE OF TEACHING & THE MATH COP

- Science of Teaching focuses on compiling, generating, and sharing evidence for FLN instruction
  - The math COP was formed to promote:
    - resource sharing, networking and discussion
    - Foster opportunities for collaboration
    - Garner sustainability and growth of the community beyond the end of SoT
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# MEET THE PRESENTERS



**Ernest Ampadu,**  
Associate Professor of  
Mathematics Education  
KTH- The Royal Institute of  
Technology



**Mercy Kazima**  
Professor of Mathematics  
Education  
University of Malawi



**Yasmin Sitabkhan**  
Senior Mathematics  
Education Researcher



**Lynn Bowie**  
Director of Mathematics, OLICO  
Mathematics  
Research Associate, Wits  
University



**Anthony Essien**  
South African Numeracy Chair,  
Wits University



**Parnika Bhatia**  
Senior Technical Advisor  
School-To-School International



# PRESENTATIONS

# Co-creation: A paradigm shift in teaching and learning problem-solving in basic mathematics

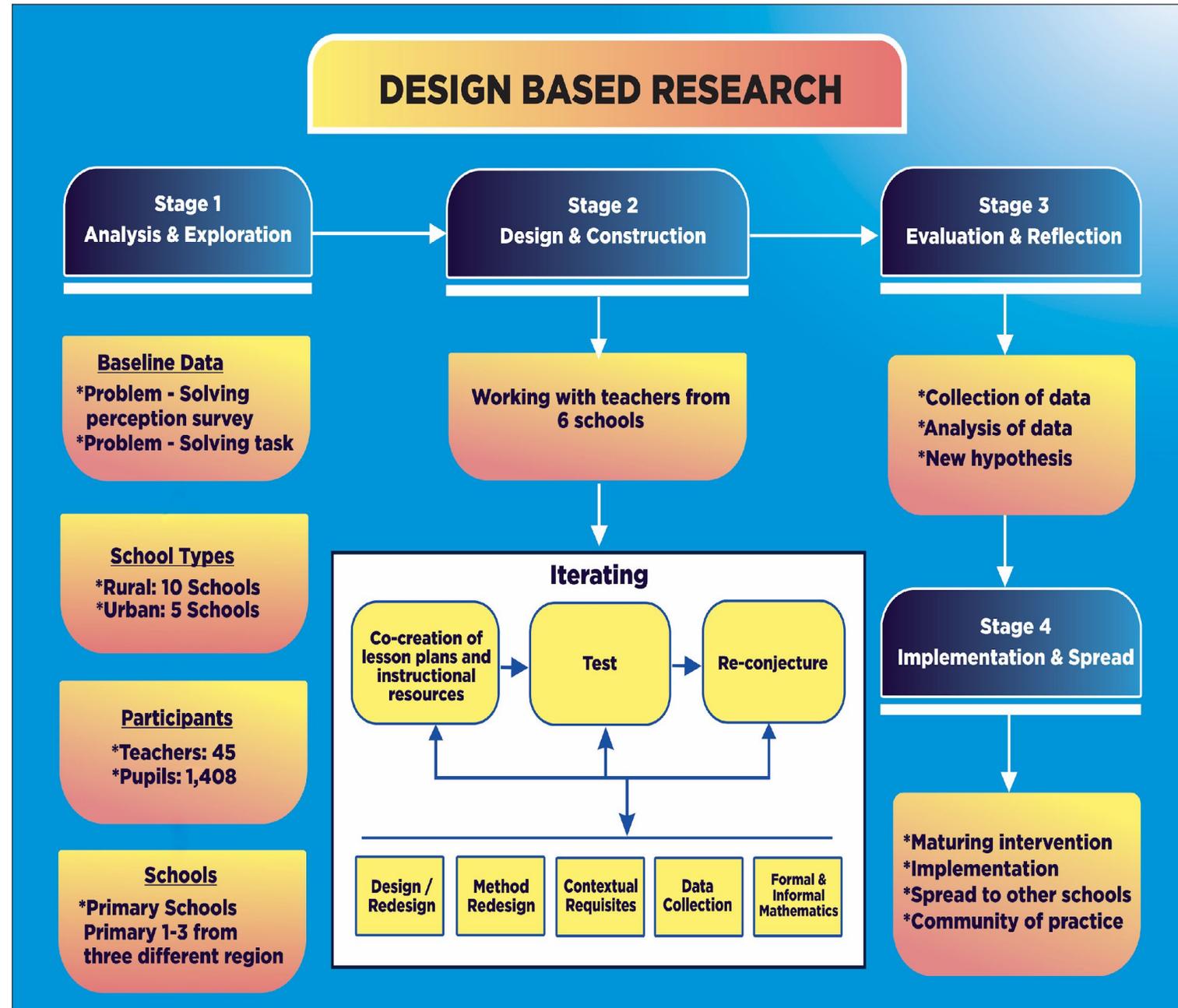
Ernest Ampadu ([ernesta@kth.se](mailto:ernesta@kth.se))

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# Purpose and Methodology

- Adopts the core objective of co-creation in mathematics competence development;
- The design and integration of low-cost instructional materials in harnessing mathematics teaching and learning in schools.



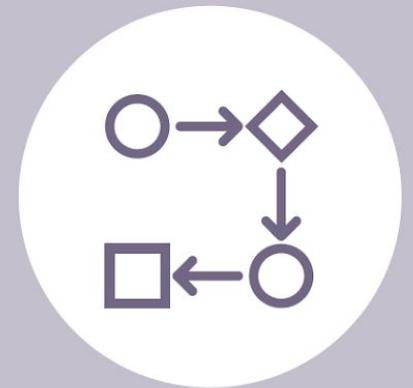
# High-Level Findings

- Female pupils' performance increase was more significant in geometry and measurement, data strands.
- A mean increase of 0.46 and 1.31 for rural pupils in number and algebra, and geometry and measurement strands, respectively, is above that of urban schools.

# Conclusions and Recommendations

- Pupils have varied challenges working with non-routine problems.
  - The challenges observed varied from pupils' ability to comprehend, abstract, and translate the text into mathematical symbols.
- Co-created lessons and materials significantly enhanced teachers' ability to deliver hands-on, context-specific instruction using appropriate resources.
  - This impact was reflected in the pupils' performance.
- Expanding such collaborative efforts to other schools, especially in rural areas where students often face diverse challenges in learning mathematics and problem-solving, could significantly boost pupils'

# Teachers' Understanding of Learning Progressions in Foundational Numeracy in Malawi



Mercy Kazima, Yasmin Sitabkhan and Wendi  
Ralaingita

# Purpose and Methodology

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- Context:
  - Primary mathematics curriculum/teacher guides/learner workbooks introduced in Malawi in 2024-2025
- Research questions:
  - (i) In what ways does the Malawi National Mathematics Curriculum for Grade 1 sequence content?
  - (ii) How do teachers understand learning progressions in Grade 1 when teaching number sense and basic operations?
- Participants:
  - 6 Grade 1 teachers from two schools in Zomba rural; teaching experience between 8 to 30 years.
- Analysis:
  - Analysis of old and new curricula
  - Qualitative interviews with teachers around 2 areas: number sense and basic addition and subtraction.

# High-Level Findings

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## **Number sense:**

- Key difference:
  - Number Range: old curriculum: 0-9; new curriculum 0-30
  - Introduction of numbers: old: numbers one at a time with eight to ten lessons per number;; new: numbers 1, 2 & 3, 4&5, and 0 across 10 lessons total
- Teachers:
  - All believed numbers should be introduced one at a time; support the old curriculum introducing one number for some lessons before moving on to the next/another number
  - Appreciated the larger number range in the new curriculum

## **Addition and subtraction:**

- Key difference:
  - Old: Addition and subtraction (0-9) are introduced as separate topics.
  - New: Addition and subtraction (0-20) are introduced together using part part whole model
- Teachers:
  - Believed addition and subtraction should not be taught together, saying it confuses the learners

# Conclusions and Recommendations

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- Teachers make decisions constantly based on what they know about their students and how they learn.
  - When designing reforms, this information is crucial to know and integrate into the design of the reform to ensure success.
- Teacher training is key. It is not simply enough to tell teachers to use a new curriculum without explaining the key differences and why they are made.
  - What kind of training might teachers need to be able to not just implement a new curriculum but understand and embrace it?
- More research is needed.
  - Future studies should explore how teachers talk about changes in the curriculum as well as how they enact these changes, using classroom observations.
  - A follow-on study may also probe how teachers resolve discrepancies between what they believe and what they are being asked to do.

# DEVELOPING TEACHERS' COMPETENCE IN TEACHING MENTAL MATHEMATICS IN GRADES 2 AND 3

**ANTHONY (TONY) ESSIEN**  
**WITS UNIVERSITY, S. AFRICA**

July 31 2025

Wits Maths Connect Primary – Project  
Team: Sameera Hansa; Kate Sehowa; &



# Purpose and Methodology

- To enhance teachers' efficacy in teaching mental mathematics through the base-ten thinking (BTT) framework, addressing persistent challenges in early grade mathematics education in South Africa
- To investigate learning gains through pre- and post-testing of learners in the classes of participating teachers compare to non-participating teachers (control group).
- 120 teachers in Grades 2 and 3 – Experimental group; 5 Schools – Control group □ 12,423 students in experimental, with 1,416 in the control group ; Pre- and post-tests; classroom observations

# High-Level Findings

- Findings reveal a positive, statistically significant impact of Base Ten Thinking mental starter strategies on students' numerical understanding.
- “High-fidelity” schools in our study demonstrated stronger gains in student performance, particularly in jump strategy tasks, compared to schools with moderate, low, or no fidelity.

# Conclusions and Recommendations

- These results demonstrate the potential of targeted, evidence-based interventions to address foundational gaps in early mathematics education
- Findings highlight not only the importance of the role of implementation fidelity but also the importance of structured and a well-researched coherent intervention model (for mental maths)
- The need for on-the-ground support (coaches) during (and after) intervention programmes

# To what extent can a WhatsApp API-based course develop primary teachers' mathematics knowledge for teaching (MKT)

Lynn Bowie, OLICO Mathematics Education, Wits University

Carien Groenewald, OLICO Mathematics Education

Patrick Iroanya, OLICO Mathematics Education

with Hamsa Venkat, Dublin City University

# Purpose and Methodology

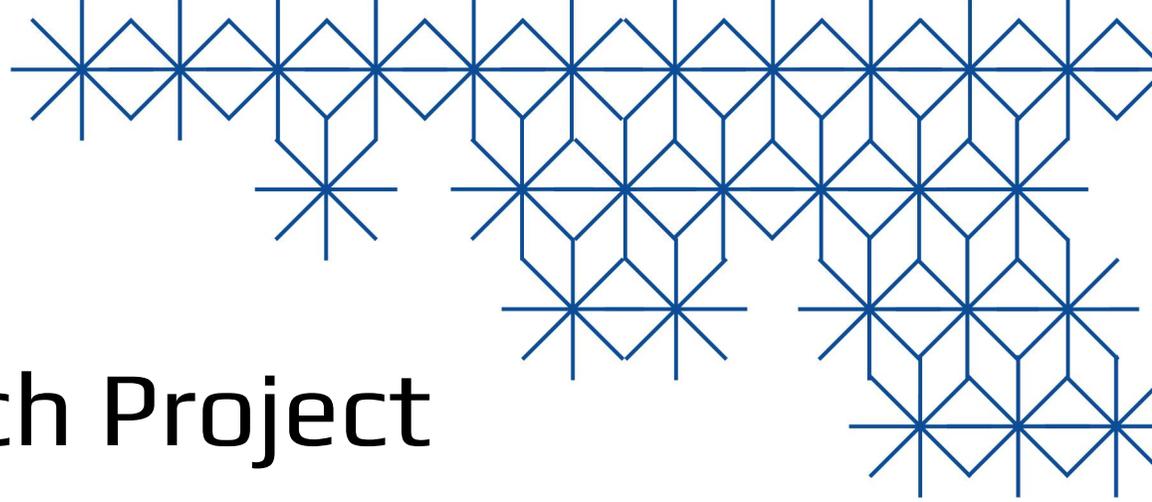
- Purpose of course was to support teachers implementing an after-school mathematics programme focused on basic concepts in number and operations to grade 4 learners.
- Geographical dispersion and financial constraints make in-person training difficult so question was “Can we use the WhatsApp API to create an accessible remote course to support teachers.”
- Used design research methodology with the research being reported here the first iteration of the design research cycle.

# High-Level Findings

- Survey and interview feedback from teachers who participated in the course was very positive and there was a statistically significant improvement in teachers scores on the MKT test from pre- to post-test.
- Teachers' responses to questions and uploads of brief videos highlighted gaps in awareness of working with models of situations and difficulties with coherence in explanations.

# Conclusions and Recommendations

- In-person on-boarding and supported initial engagement is required for many teachers. Keep the structure and demands simple to encourage participation and engagement
- The development of teachers' MKT takes time and we are excited by the potential of the WhatsApp course to cost-effectively provide support for the teachers over a number of years and thus continued growth for the teachers.



# Tanzania Numeracy Research Project

**Dr. Parnika Bhatia (Co-PI)**  
**Amani Nicolas (Co-PI)**  
**Dr. Mark Lynd (Advisor)**



# Purpose & Methodology

## **Study Objective:**

Explore Foundational Math Knowledge for Teaching (FMKT) in the context of flexible Ability Grouping (AG) to determine whether this combination could strengthen teachers' ability to teach effectively in the early grades in Tanzania.

Examine teachers' attitudes toward their roles as student-centered instructors.

**Intervention:** In close collaboration with the Arusha District Education Office (DEO), provided:

***2-day training + support materials***

***Follow-up on-site support visit + Head teacher follow-up***

Grade 1-3 teachers & head teachers from **8 high needs schools** selected by the DEO



# High Level Findings

**Ability Grouping:** How well can teachers implement flexible ability grouping during numeracy instruction?

The overall fidelity of AG implementation was moderate. While most teachers successfully adopted the initial steps of the AG model, assessment-driven regrouping and consistent use of trackers were reported in only about 30% of classrooms. This limited the potential for data-informed instruction.

**FMKT:** Do teachers use selected elements of FMKT?

Teachers in all classrooms used concrete materials, and most modeled their use and allowed students hands-on practice (90%). Teachers identified and addressed student errors as an opportunity for student learning (17 of 21), often encouraging reasoning and the use of multiple strategies to explore alternative solutions.

**Attitudes:** How do teachers view their role as teachers?

Teachers' perceptions and pedagogical practices tend towards facilitators of learning rather than just transmitters of knowledge, as measured by the MTEBI tool

# Conclusions and Recommendations

- ✓ **Teacher Effort & Intent were evident. For sustained motivation and engagement, consistent head teacher coaching on classroom observation, and providing constructive feedback to teachers is recommended.**
- ✓ **Gaps in AG Implementation (assessment and regrouping) due to the large classroom size and difficulty using the tracker, recommend support to provide the “how” of AG strategies in large classes, similar to the checklist that was provided for FMKT.**
- ✓ **Piloting tools for context and clarity (similar to piloting FMKT and MTEBI). Planning for multiple observation time points enables more robust triangulation of findings and accurate assessment of implementation fidelity.**



# BREAKOUT GROUPS

30 MINS

GROUPS WILL DISCUSS THE FOLLOWING QUESTIONS

What questions do you have about the studies?

How do you think you might use findings from these studies to inform your own work? In what ways might these findings be useful to you?



WELCOME BACK

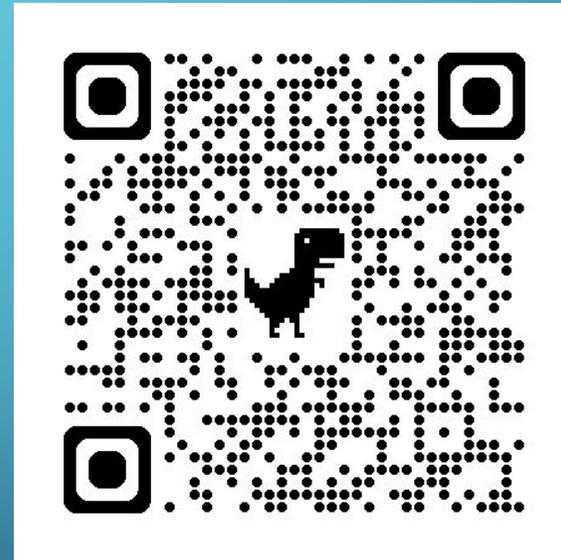
# WHAT'S COMING?

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