# WHAT WORKS TO IMPROVE NUMERACY AT SCALE IN INDIA?

Findings from Nanhi Kali and Ganitha Kalika Andolana

4 October 2023

# NUMERACY AT SCALE:

# PARTNER INTRODUCTIONS

# NUMERACY AT SCALE: NANHI KALI

**Radhika Yelkur**

National Head, Project Nanhi Kali

**Rohan Katepallewar**

Project Director, Ei Mindspark

# Nanhi Kali-Mindspark program: Journey so far

*Since 2020, Ei & Nanhi Kali have been working together for education reform, leveraging their specific strengths*

**Naandi Foundation**

**Ei Mindspark**

**Naandi x Ei Mindspark**

**Girl-focused** holistic program run every school day in **Academic Support Centres** by **Community Associates**

**+**

Providing an **evidence** and **research backed** EdTech product

**=**

Providing gender-safe space & improving student learning outcomes for *Nanhi Kalis* across 5000 government schools

**Large Scale Execution**

The program is running across 8 states and 20 locations across rural, tribal and urban fringe areas

**Proven Solution**

Ei's Mindspark is a proven solution to improve learning outcomes for students with independent recognition and evidence

| 2020-21 | 2021-22 | 2022-23 | 2023-24 |
|---|---|---|---|
| 166k Nanhi Kali 5.9k ASCs | 173k Nanhi Kali 6.8k ASCs | 166k Nanhi Kali 6.6k ASCs | 124k Nanhi Kali *(as of start of AY)** 5.5k ASCs** |

*Some of the NKs have been promoted to grade 10
**Likely to add more ASCs with 50K Nanhi Kali

# Mindspark, a proven personalized adaptive learning solution

*Based on research insight and misconception data, EI introduced Mindspark in 2009 – a personalized learning tool for mathematics and language. It leverages the TaRL principal and addresses the problem of heterogeneity in the class.*

**Interactive framework with emphasis on questions - answers, instructional games, videos, and activities.**

- Adopts inquiry-based learning approach and emphasizes on 'learning questions'
- Provides instant and detailed feedback based on student response
- Programmatic nudges like 'sparkie' to promote accuracy
- Leverages remedial trajectories & scaffolding to strengthen the fundamentals

**DIAGNOSE** **PREDICT** **RECOMMEND** **EVALUATE**

## AVG LEARNING IMPROVEMENTS – MATH (AY 2022-23)

LEVELS
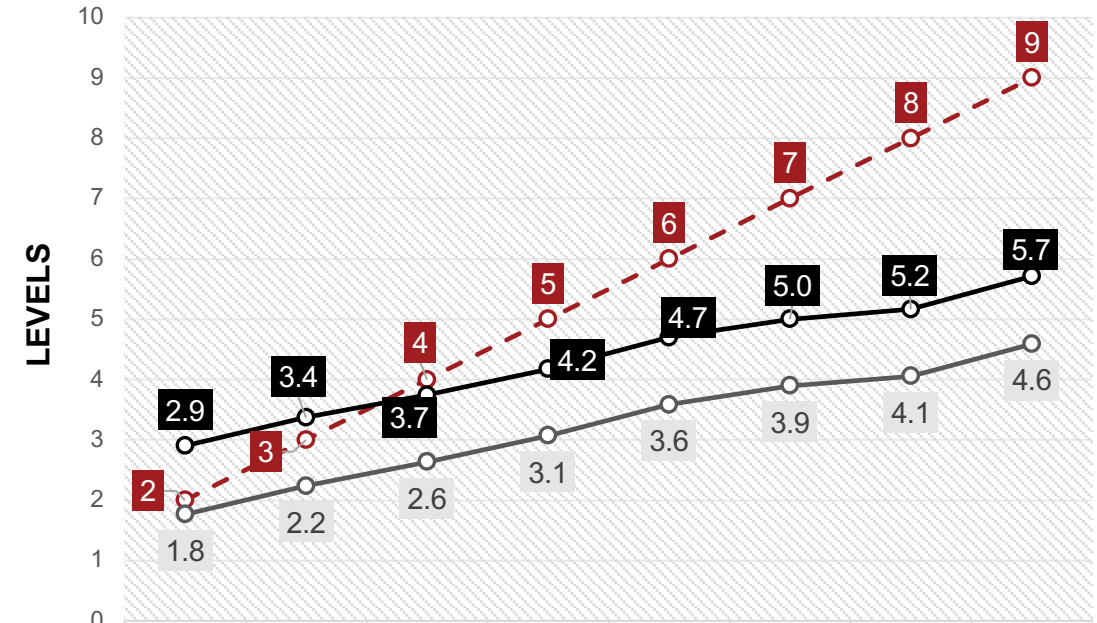
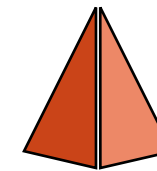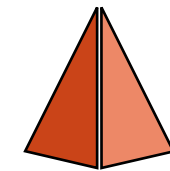| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| Grade(s) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Level at start of AY 2022-23 (Math) | 1.8 | 2.2 | 2.6 | 3.1 | 3.6 | 3.9 | 4.1 | 4.6 |
| Current Level 2022-23 (Math) | 2.9 | 3.4 | 3.7 | 4.2 | 4.7 | 5.0 | 5.2 | 5.7 |
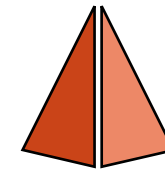
- Avg 18 Hours of Mindspark-Math Engagement
- 34% NKs achieved Level Improvements
- 135k NKs remained engaged throughout the year

Nanhi kali
for the girl child

Ei

# Key takeaways and goals



**1**

**Takeaway: Community Associate is key**

The presence of a trained local tutor in the classroom helps Nanhi Kalis get timely help with conceptual understanding.

**2**

**Takeaway: Remedial vs Aspirational**

Most additional academic support in the country is in the form of remedial classes. The 'yellow tab' breaks the negative stereotype and makes the ASC aspirational.

**3**

**Goal: Focus on STEM for girls**

Due to gender stereotypes girls across the country lack opportunities in STEM despite their high interest. Our goal is to strengthen Math fundamentals, so that girls are more likely to opt for STEM in future.

**4**

**Goal: Increasing reach while improving impact**

Reaching 1 million girls while simultaneously improving impact via learning data analysis and iteration of content.

Nanhi kali
for the girl child

# NUMERACY AT SCALE: GANITHA KALIKA ANDOLANA

**Ashok Kamath, Akshara Foundation**

Chairman

**K. Vaijayanti, Akshara Foundation**

Research & Evaluation Director

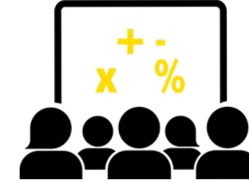Akshara Foundation
EVERY CHILD IN SCHOOL AND LEARNING WELL

# THE GANITHA KALIKA ANDOLANA (GKA) MODEL

**GOVERNMENT BUY-IN** is essential for roll out at scale. It is a combination of public commitment, backed with financial investment
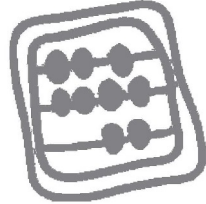
**METHODOLOGY** supplemented by scientifically-designed teaching/learning material

**TRAINING** and field support for the teacher, state and district Resource Persons (RPs) in a cascade mode
**All training is now available digitally**

Innovative and efficient **MONITORING TOOLS** and processes to support roll-out at scale

**COMMUNITY ENGAGEMENT** to sustain the public school system over the long term
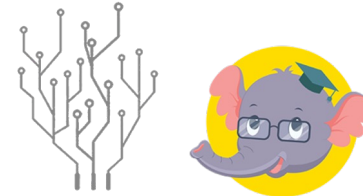
**TECHNOLOGY** that facilitates timely assessment and creates a learning environment at home

*Akshara works on the principles of Creative Commons and creates all resources for social good.*
*All content developed by Akshara is available as Open Source content for everyone to use at no cost.*

# IMPACT OF GKA



The **Enabling Environment has been empowered** in multiple ways:

1. Teachers now have a scientifically-designed GKA Maths kit which helps them transact the maths textbook in a classroom with up to 30 children.

2. Teachers now have detailed training in the GKA methodology both for face-to-face training and online training using the state's Diksha Platform.

3. There is a very child-friendly maths learning app called Building Blocks that is linked to the curriculum and also connects to "energized" textbooks via QR codes. Available online and offline.

4. All schools now have at least one GKA maths kit and one GKA trained teacher.

5. State buy-in is significant – in terms of financial resources, in terms of acceptance of GKA at all levels in the State Education hierarchy.

6. GKA finds mention in the NIPUN Bharat document and in NEP 2020

7. Community has been galvanized behind GKA in the form of a large number (>50k in Karnataka) of unpaid Education Volunteers who devote 2 hours per month of their time.

8. The Gram Panchayat Level Math Contest has been an eye-opener for all.

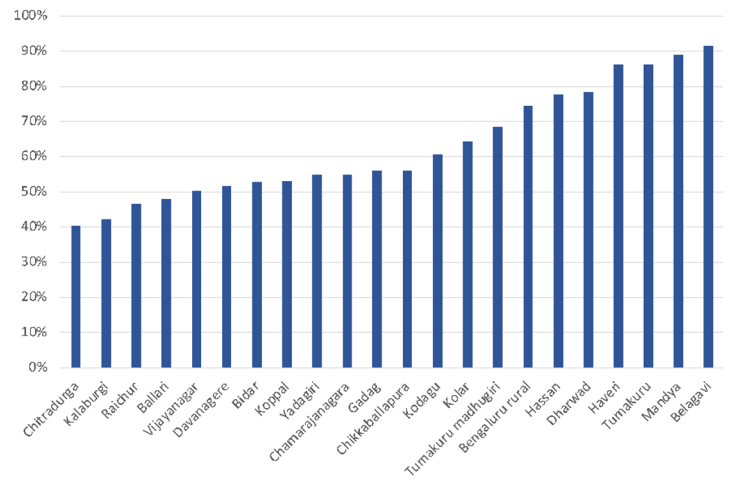Akshara Foundation

EVERY CHILD IN SCHOOL AND LEARNING WELL
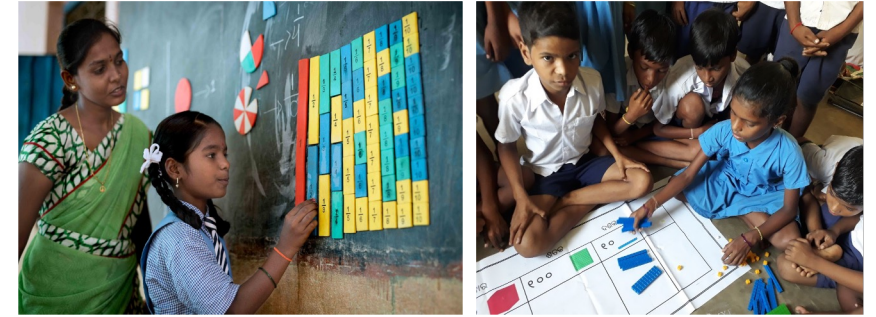
# WHAT DO WE LEARN FROM THE GRAM PANCHAYAT MATHS CONTESTS?
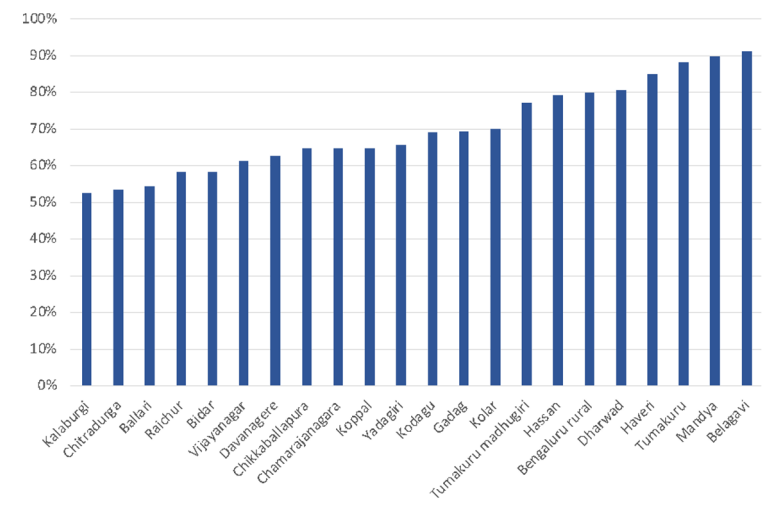
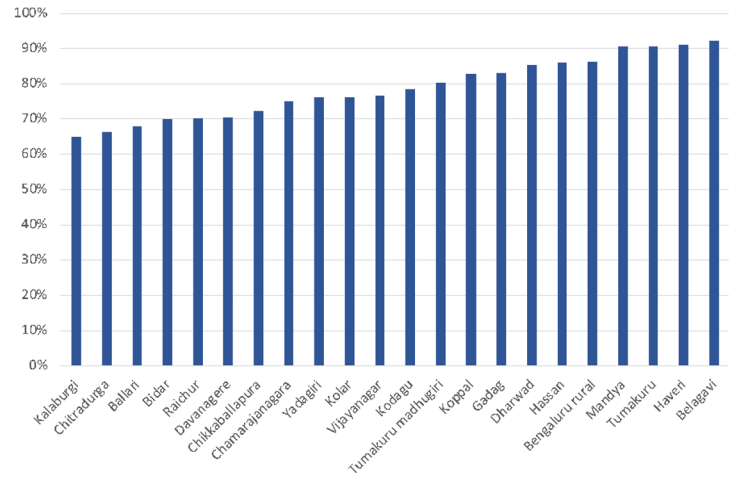## Grade 4

Performance of Children > 40%



## Grade 5

Performance of Children > 40%



## Grade 6

Performance of Children > 40%

# KEY TAKEAWAYS ON SCALING

**MULTIPLE FACTORS ARE KEY TO SCALING:**

- Strong government buy-in
- Programme launched through state resources both financially and human resources.
- Teachers and Education Department officials fully engaged and invested in the success of this programme.
- Good engaging Teaching / Learning Materials
- Children found the Building Blocks games very attractive and engrossing
- Capacity Building of the teachers and good field support to the teachers
- Teachers were trained and supported by State Resource Groups and Akshara Field Coordinators
- Monitoring of the rollout process by state resources and Akshara staff

- Community awareness high and very engaged.
- Any programme meant for the greater good should be designed for scale from the beginning.
- If one wants to implement a programme at scale, then one should be open to working with the government.
- Working with government - an exercise of this nature comes with its share of challenges, but an open mind and a good dose of patience will reap huge rewards.
- It takes a lot of time, but also benefits a lot of people/children ultimately.
- One should constantly upgrade and innovate on their models.

Akshara Foundation

# THANK YOU
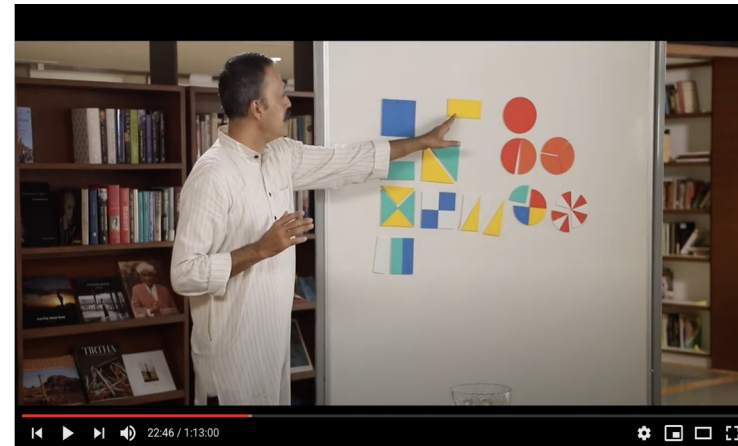
# NUMERACY AT SCALE: KEY FINDINGS

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**Kellie Betts**

Researcher in International Education, RTI International

# ABOUT THE NUMERACY AT SCALE STUDY

# 6 EFFECTIVE LARGE-SCALE MATH PROGRAMS (2022-2023)



**Jordan**

Early Grade Reading and Mathematics Initiative (RAMP)

RTI International USAID / FCDO

**India**

Ganitha Kalika Andolana

Akshara Foundation

Nanhi Kali

Nanhi Kali / Educational Initiatives (Mindspark), K.C. Mahindra Education Trust & Naandi Foundation

**El Salvador**

ESMATE

Ministerio de Educación, Ciencia y Tecnologia with JICA

**South Africa**

Grade R Maths

Western Cape Department of Education

**Madagascar**

TAFITA

Japan International Cooperation Agency

# RESEARCH QUESTIONS

**1** What **classroom ingredients** (e.g. teaching practices, classroom environment) lead to learning in programs that are effective at scale?

**2** What methods of **training and support** lead to teachers adopting effective classroom practices?
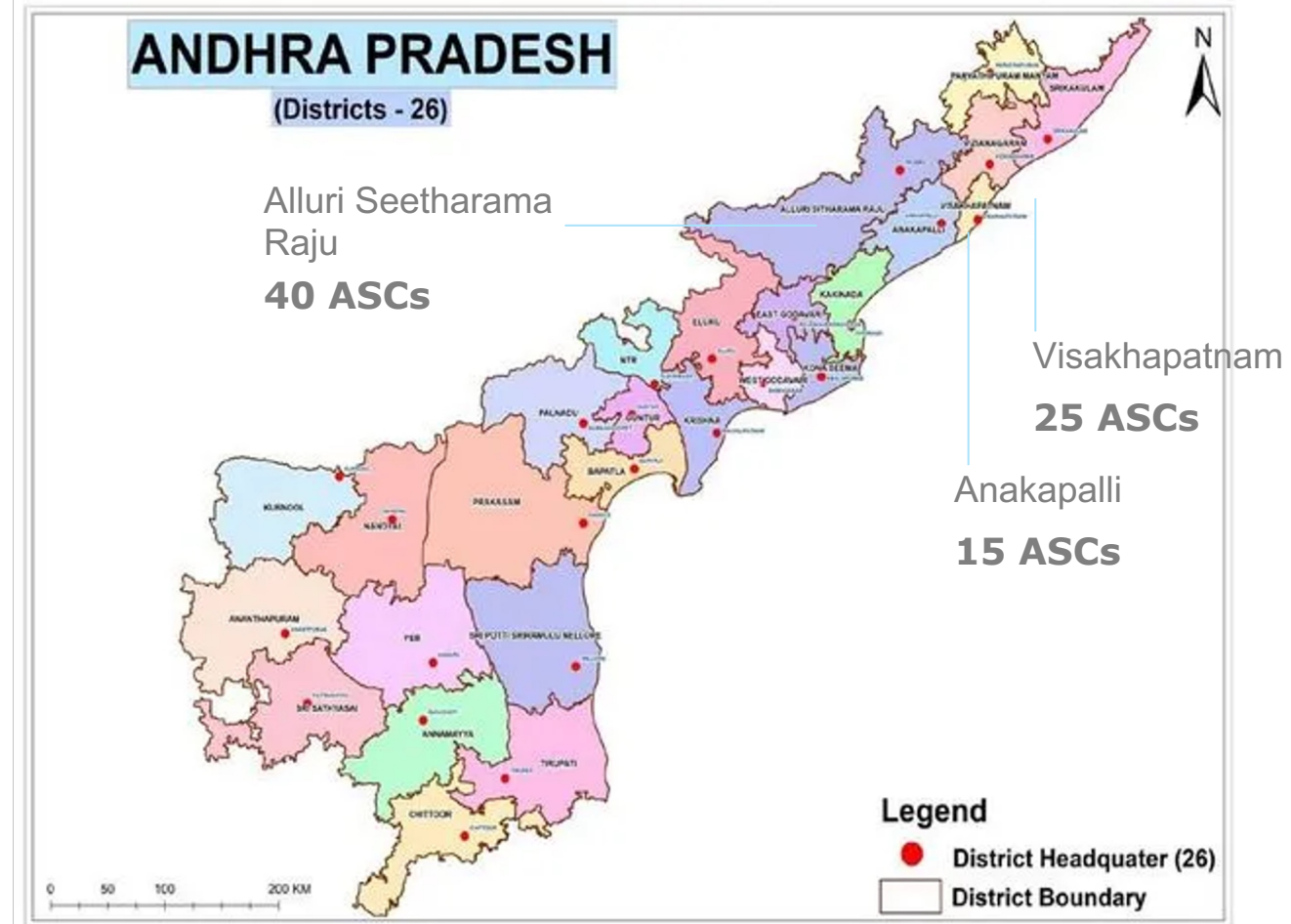
**3** What **system support is** required to deliver effective training and support to teachers and to promote effective classroom practices?

# FINDINGS FROM NANHI KALI

# SAMPLE: NANHI KALI

| Quantitative Data collection | |
|---|---|
| Academic Support Center /Student Observation | 57 |
| Community Associate Interview | 79 |
| Bi-monthly Review Meeting Observation | 6 |
| Program Officer Interview | 5 |
| Headteacher Interview | 79 |



ANDHRA PRADESH
(Districts - 26)

Alluri Seetharama Raju
**40 ASCs**

Visakhapatnam
**25 ASCs**

Anakapalli
**15 ASCs**

Legend
● District Headquater (26)
□ District Boundary

# NANHI KALI AND MINDSPARK: OVERVIEW


Photo credit: Nanhi Kali

## Nanhi Kali

- After school
- 7,000+ Academic Support Centers (ASCs)
- 185,759 girls (Nanhi Kalis) reached
- 9 regions

## Mindspark

- Gamified application used to deliver instructional content via tablets
- Used for math 2x per week, for an average of 28 – 30 minutes per session
- This adds up to ~ 60 minutes more time on math and 62 to 82 additional math problems completed per girl, per week (average)

# NANHI KALI: LEVERS FOR SUCCESS

**1** Girls learn at their own level and at their own pace through instructional approach based on questioning

**2** Community associates provide essential instruction support to students learning on tablets

**3** Initial training and continuous development via professional learning communities may be particularly important for facilitators (CAs) with more limited education and training

**4** Program staff use data to inform ongoing, positive monitoring and support

# WHAT INGREDIENTS LEAD TO LEARNING?

**Additional time on math:**

**When asked what part of Mindspark they like best, girls noted the opportunities to PRACTICE (with CA support).**

| What parts of Mindspark application helps you with learning math? | |
| --- | --- |
| I practice solving problems/answering questions | 79% |
| I can ask the CA for help if I am not sure how to solve a problem | 39% |
| I get to work on my own and at my own pace or work with a partner/group of students | 33% |
| Mindspark (the application) explains concepts (when I get the answer wrong) | 26% |
| The problems are at my own level | 18% |
| I practice solving problems/answering questions using different/multiple strategies | 11% |

# WHAT INGREDIENTS LEAD TO LEARNING?

## Additional time on Math:

- Girls reported that going to Nanhi Kali after school and using Mindspark has increased their ability and confidence in doing math.

- Learning is happening in a relaxed, fun, peer to peer setting.

**84%** of girls said they like math more now, than before they started Nanhi Kali

**81%** of girls said they understand math better now, than before they started Nanhi Kali

In **49%** of ASCs observed, girls were working in pairs or groups

**59%** of girls talked to another student while actively working on tablet

# WHAT INGREDIENTS LEAD TO LEARNING?

**CAs supporting learning of math content delivered via Mindspark:**

**CAs played an important role in helping girls to both operate Mindspark and work through math content.**

- **69%** of girls observed asked the CA to help them troubleshoot or operate the tablet/Mindspark
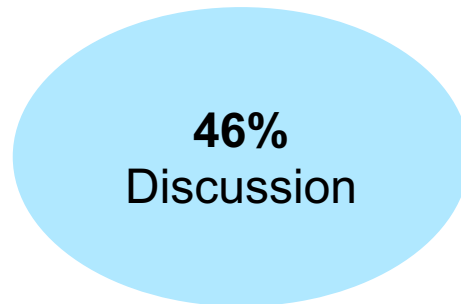- **67%** of girls observed asked the CA a question about the Mindspark content

| How did the CAs respond to student questions about Mindspark content? | |
|---|---|
| CA gave the correct answer and explained/modeled how they got the answer | 77% |
| CA explained/modeled the concept and/or gave a hint | 25% |
| CA provided general encouragement to student (e.g., just do your best) | 19% |
| CA gave the correct answer to student without explaining or elaborating | 14% |
| CA didn't provide any help | 2% |

# WHAT METHODS OF TRAINING AND SUPPORT LEAD TO CA ADOPTION OF EFFECTIVE PRACTICES?

**Training:**

According to CAs, the <u>most useful</u> training methods were:

**46%**
Discussion

**41%**
Small Group Practice

The most useful content presented was:
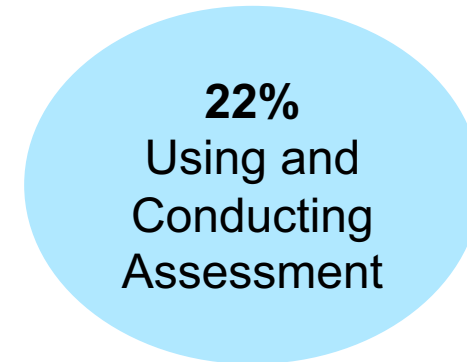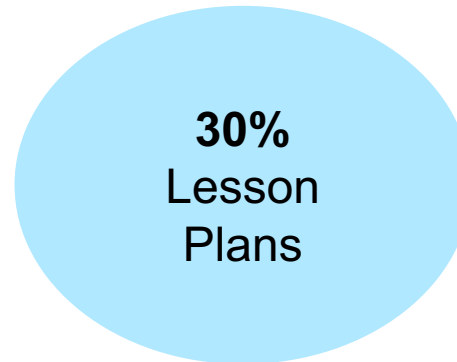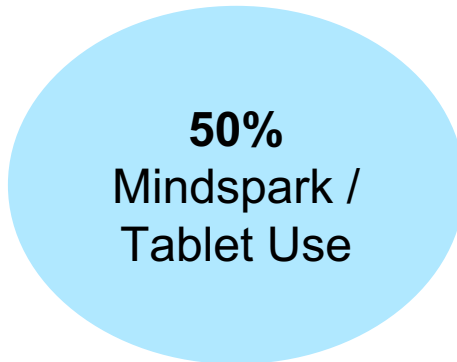
**50%**
Mindspark / Tablet Use

**30%**
Lesson Plans

**22%**
Using and Conducting Assessment

**Professional Learning Communities:**

**Observations during twice monthly review meetings revealed they were well-organized and interactive.**

| | |
|---|---|
| Agenda and materials were prepared and available | **100%** |
| CAs had an opportunity to ask questions | **100%** |
| CAs were able to tell or talk about their successes | **100%** |
| CAs were able to tell or talk about their challenges | **50%** |
| CAs had an opportunity to respond to others | **83%** |
| Facilitator was able to answer CAs questions | **83%** |
| CAs discussed student learning | **100%** |
| ASC and student usage data/reports were referenced or presented | **67%** |

# WHAT METHODS OF TRAINING AND SUPPORT LEAD TO CA ADOPTION OF EFFECTIVE PRACTICES?

## Site visits and use of data for monitoring:

- **Weekly dashboard reports are aggregated by block and shared with CAs in each block's WhatsApp group.**
- **CAs reported several helpful activities during site monitoring visits conducted by program staff.**

| | |
|---|---|
| Program officer observes my teaching | 83% |
| I ask the program officer questions about my teaching and how to improve | 57% |
| Program officer provides positive feedback on my teaching | 52% |
| Program officer and I discuss progress from last observation | 48% |
| Program officer provides areas of improvement for my lessons | 43% |
| Debrief with other community associates | 43% |
| Program officer and I agree on skills/practices to focus on moving forward | 35% |
| Discussion of expectations at start of visit | 30% |

# FINDINGS FROM GANITHA KALIKA ANDOLANA

# SAMPLE: GANITHA KALIKA ANDOLANA

| Quantitative Data Collection | |
|---|---|
| Schools | 80 |
| Teachers | 80 |
| Headteachers | 80 |

| Qualitative Data Collection | |
|---|---|
| Schools | 9 |
| Teachers | 9 |
| Students | 45 |
| District/local officials | 4 |
| Region/central officials | 12 |
| Program/partner staff | 7 |

# GKA: OVERVIEW


Photo credit: GKA

- Multi-stakeholder initiative designed by Akshara Foundation
- Focused on improving mathematics learning outcomes in 3 states – Karnataka, Odisha, Andhra Pradesh
- Study focused on G4 and G5 in Karnataka
- Approach:
  - **Materials:** Math kits provide students with hands-on opportunities to build and apply math knowledge
  - **Teacher training:** In person teacher training at district level, cascaded to block and cluster level
  - **Teacher support:** School visits from trained education volunteers; use of maths contests at community level
  - **Pedagogical approach:** Active, dynamic, and social learning through hands-on experiences where learners can apply their math knowledge

# WHAT CLASSROOM INGREDIENTS LEAD TO LEARNING IN PROGRAMS THAT ARE EFFECTIVE AT SCALE?

Use of **multiple representations** (including concrete materials and abstract symbols) to help students understand mathematical concepts and link these to abstract notations
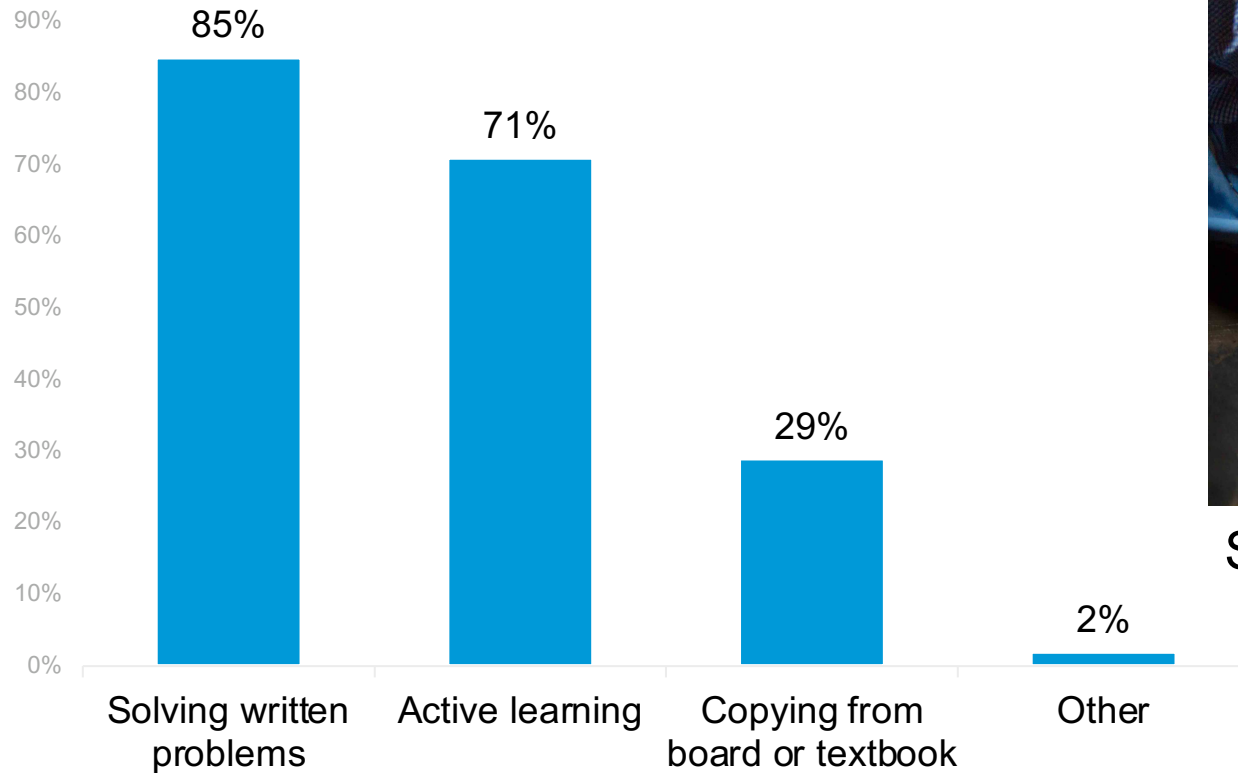
Connections with **real-world contexts and students' experiences** to help learners understand math concepts and increase their motivation and engagement

Active **engagement of students** – with lots of opportunity for independent or group work where they could use concrete materials to aid in problem-solving

**Use of assessments** to track student progress

# WHAT CLASSROOM INGREDIENTS LEAD TO LEARNING IN PROGRAMS THAT ARE EFFECTIVE AT SCALE?

## Student tasks during independent/groupwork



| Category | Percentage |
|---|---|
| Solving written problems | 85% |
| Active learning | 71% |
| Copying from board or textbook | 29% |
| Other | 2% |



Student use concrete materials to solve problems

# WHAT METHODS OF TRAINING AND SUPPORT LEAD TO TEACHERS ADOPTING EFFECTIVE CLASSROOM PRACTICES?
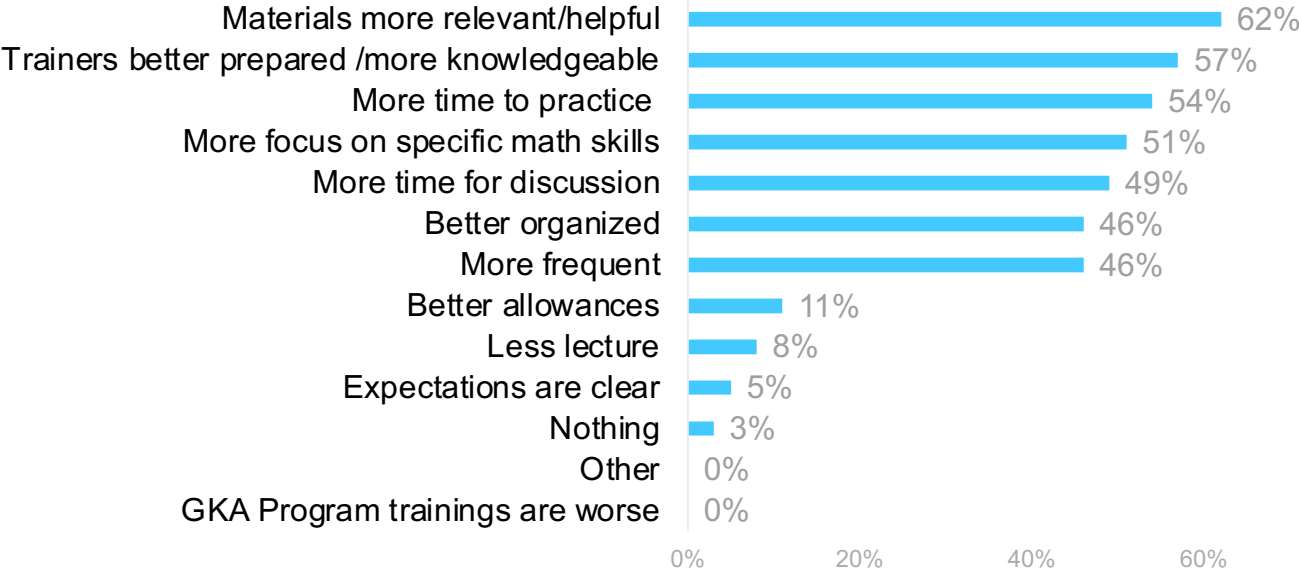
**Teaching aids and student materials** aligned to the curriculum and provided in sufficient numbers so that all students can be engaged and focused on activities

**Relevant and well-organized teacher training** supported by helpful materials and knowledgeable and better prepared facilitators, with amply opportunities for practice
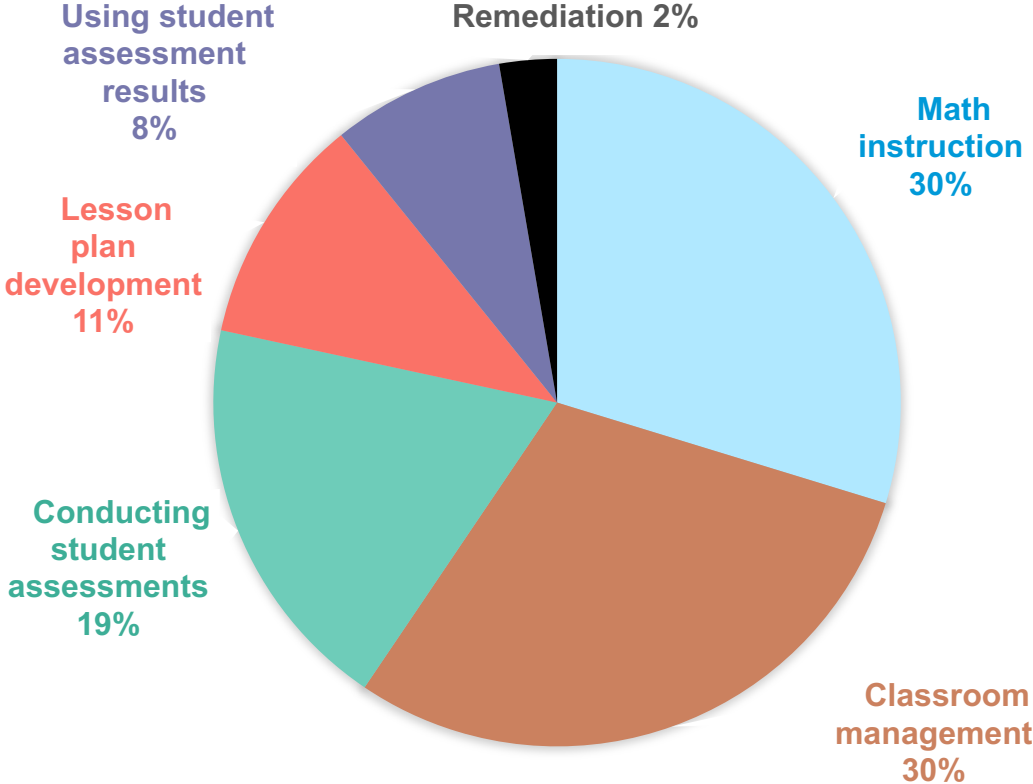
**High levels of parent and community engagement -** with functioning school management and development committees with a strong focus on instruction

# WHAT METHODS OF TRAINING AND SUPPORT LEAD TO TEACHERS ADOPTING EFFECTIVE CLASSROOM PRACTICES?

**Most useful training content, according to teachers**

**Biggest differences in training (according to teachers)**

| Category | Percentage |
|---|---|
| Materials more relevant/helpful | 62% |
| Trainers better prepared /more knowledgeable | 57% |
| More time to practice | 54% |
| More focus on specific math skills | 51% |
| More time for discussion | 49% |
| Better organized | 46% |
| More frequent | 46% |
| Better allowances | 11% |
| Less lecture | 8% |
| Expectations are clear | 5% |
| Nothing | 3% |
| Other | 0% |
| GKA Program trainings are worse | 0% |

Using student assessment results 8%

Remediation 2%

Lesson plan development 11%

Math instruction 30%

Conducting student assessments 19%

Classroom management 30%

# WHAT SYSTEM-LEVEL SUPPORT IS REQUIRED?

Strong focus on **securing government buy-in from the start** to ensure scalability and sustainability; the program benefits from state funding

Buy-in possible because of GKA's **alignment with existing curriculum and addressing of teachers' needs** (kits not seen as additional work and are easily adaptable to individual classrooms)

The program is **implemented through existing government systems**, relying on state infrastructure, personnel and processes in order to implement at scale

# OVERALL NAS FINDINGS

# WHAT CLASSROOM INGREDIENTS LEAD TO LEARNING IN PROGRAMS THAT ARE EFFECTIVE AT SCALE?

**1**

Instruction is focused on both **conceptual understanding and procedural fluency**

**2**

Teachers encouraged **active engagement and participation of all students**

**3**

Teachers incorporated **multiple representations** and both teachers and students used them

**4**

**Assessment** was incorporated into programs and teachers **helped struggling students**

# WHAT METHODS OF TRAINING AND SUPPORT LEAD TO TEACHERS ADOPTING EFFECTIVE CLASSROOM PRACTICES?

**1**

Teacher supports **focused explicitly on math content and improving instruction**

**2**

Trainings emphasize **modeling and practice** over lecturing, giving teachers opportunities to practice and discuss

**3**

Teacher materials provide **explicit guidance for instruction**

**4**

Ongoing support emphasizes **mentoring, coaching, and collaboration** over inspection and evaluations

# WHAT SYSTEM-LEVEL SUPPORT IS REQUIRED?

**1**

Active **collaboration** with and among key stakeholders

**2**

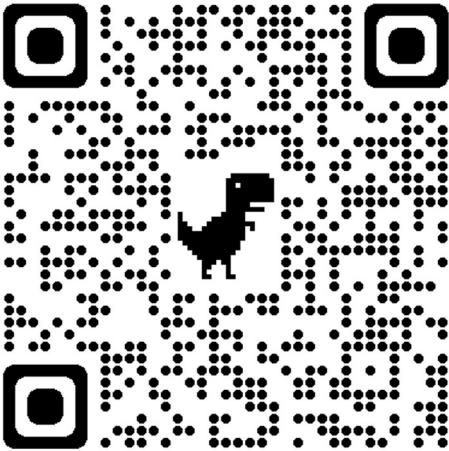**Investment in resources** to improve quality classroom instruction

**3**

**Continuous monitoring** and use of data for system improvement

**4**

Systematically **embed and institutionalize** best practices for sustainability

# FOR MORE INFORMATION



https://learningatscale.net/



*Photo credit: GKA*

# THANK YOU!