



Case Study: In Service Teacher Professional Development (Rural)

Understanding Mathematics through Modeling and Inquiry: With Dialogue, Models, and Thinking

SEF Team members, who are designers, trainers, and certified teachers, collaborate with government-appointed Resource Persons (RPs) to enable them to conduct teacher training workshops and facilitate monthly mentor-led peer learning groups for teachers. We strengthen the capacity of Resource Persons by introducing them to high impact practices, helping them conduct demonstrations, and training them to carry out effective school visits and coaching conversations.

Context:

Guide and Strategy Used:

- Instructional Approach to Numeracy| Tier 2, Strategy: questioning and other interactive approaches to build student understanding
- Student Engagement | Tier 2, Strategy 3: Using questioning to build understanding of new content

Guide Sections Used:

Strategy benefits (why does it matter), Strategy description, Tiered Strategies for Promoting Student Engagement, and Numeracy lesson plans with strategy integration

Format:

Orientation space for resource persons, then demonstrations by resource persons

Audience:

10 Resource Persons
25 Teachers

Objectives of the Orientation space:

1. Teachers will observe how effective questioning can support deeper student engagement and conceptual understanding in numeracy classrooms.
2. Teachers will understand how to connect prior knowledge and students' real-world experiences while introducing new concepts.
3. Teachers will build confidence in using questioning as an instructional tool within existing numeracy lesson structures.
4. RPs will practice demonstrating strategy use through peer learning group spaces using structured Practice Cards.



Design



Since implementing a decision tree in the form of a conversation was not possible, the team used 'previous spaces' experience and also drew from their experience of interacting with the Resource Persons and Teachers to select the tier.



A practice card was created in Hindi which explained the strategy and had two lesson plans to demonstrate the strategy. SEF team oriented the Resource Person in an online space of its usage.



The Resource Persons then used the practice card during their monthly cluster meeting to demonstrate the Tier-II numeracy strategy to the teachers.

Implementation

Here are some key ways in which we managed to meet all considerations while incorporating the guide:

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Math Learning through Modelling and Questions: Deepening understanding of learning

What?

- Deepening understanding of learning through **questioning and interactive activities**
- Teacher continuously asking directive questions during modelling.



Why?

- Studies have shown that when teachers clearly state the learning objective, explain new ideas with examples, and provide sufficient time for practice, students learn better.
- Research also indicates that participating in activities, discussions, and question-answers deepens students' understanding and helps them apply what they've learned more easily.

How?

Step-by-Step Translation to English:

Step 1: Write a problem on the board / Ask students a question related to the lesson

(Example: "How can we measure the length of this line on the blackboard without a ruler?")

Interactive: 1-2 students stand up and share their ideas ("hand span" / "fingers").

Step 2: Ask students deeper questions related to that problem, such as...

(Example: "What would change if we used hand spans instead of fingers?")

Step 3: Model the same process with another example-question.

(Example: "Now I'm measuring this book—one...two...three hand spans.")

1. "Why did I start from here?"
2. "What would be different if I started measuring from the other end?"

Step 4: Give students questions/problems to solve independently.

(Example: Students estimate the size of an object, measure it with hand spans, then verify with a ruler.

"Why was your estimate larger/smaller?"

"What would you do differently next time?")

Points to Keep in Mind for Student Participation:

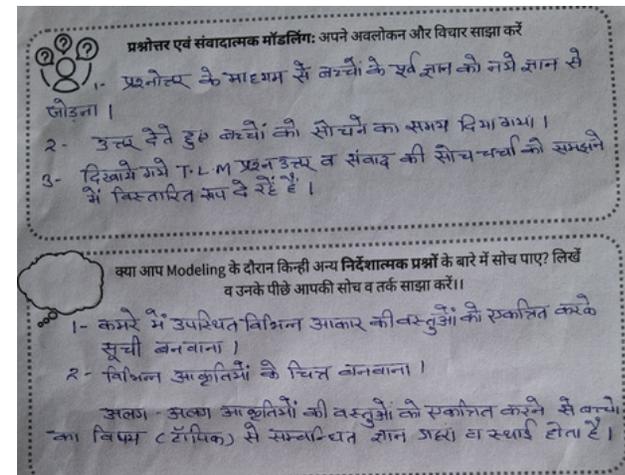
- Ask all students to think about the question for 20 seconds.
- Ask all students to raise their hands (so they know someone will be called on).
- Ensure you ask more questions; include questions at varying levels to encourage maximum student participation.
- Simplify the questions if students are facing difficulty.
- Keep asking follow-up questions to deepen students' understanding.



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3



The team created a practice card using the two guides. (Fig.1) The resource persons were oriented on how to use this in their classes. Two resource persons then volunteered to share these strategies in their community of practice during their monthly cluster meetings.

A resource person demonstrating the strategies in their monthly cluster meeting. (Fig. 2)
A teacher's feedback post cluster meeting (Fig.3)



Teachers observed how engagement increased when students were asked open-ended questions that required reasoning or explanation rather than recall. These demonstrations also served as a form of capacity-building for RPs, equipping them to lead reflective discussions with teachers and identify practical ways to integrate similar strategies in daily teaching.



User Experience



As seen in Fig 3, a teacher shares, “Through questioning, students were able to connect to their previous knowledge, and they were given the opportunity to think and understand deeply [Translated].”



SEF team member’s testimonial - ‘Earlier, our cluster meeting planning did not explicitly focus on differentiated practices, content, or a tiered approach for participants. However, with the introduction of the HITs strategy, we were able to think more strategically—identifying where teachers currently stand, what strategies would be most effective for each tier, and aligning the content closely with the academic calendar.’

We look forward to seeing the teachers and Resource Persons take the skill of ‘Questioning in Numeracy in Peer Learning Groups’ to their students!



Additional resources:

[Link to adapted Instructional Approach to Numeracy guide](#)