CAPACITY BUILDING PROGRAM FOR PRIMARY TEACHERS OF DOE, GNCTD AND TEACHER EDUCATOR OF DIET/SCERT FACULTY, DELHI

14 Oct to 18 Oct 2024 (Five Days)

Aavishkar, Palampur

Details of the Program:

- **No. of proposed participants: 30**
- **No. of participants attended: 29**
- **Stakeholders: DoE Teachers, SCERT, Aavishkar**
- **Transaction Methodology: Activity-based, demonstration**
- **Name of Coordinator: Rajeev Kumar Jha**
- **Report by: Rajeev Kumar Jha**

Objectives of the Program:

- **To promote hands-on Experiential Learning**
- **To nurture Creativity and Conceptual understanding through real-life examples**
- **Toy-based Experiential and Inquiry Learning**
- **To increase exposure and knowledge of Alternative Teaching Pedagogies**

Program Design - NEP 2020 & NCF 2023 Aligned

Conceptual Understanding	**Content Specific Teacher Practices**	**Teacher Mindset**
In-depth understanding in:	Teacher skills that enable students to think critically:	1. Math & Science can be visualized
Math	1. Use of visualization tools and models	2. Justification deepens understanding
1. Number Sense	2. Encouraging justification in class	3. Everybody can do Math & Science
2. Place Value	3. Using contextual stories & examples	4. Math & Science can be done in multiple ways
3. Addition	4. Use of games in classrooms	5. Math is a language
4. Subtraction	5. Enabling students to find answers / make their own conclusions	6. Math & Science is everywhere
5. Multiplication	6. Creating and executing Charchaa	7. Asking questions enables curiosity and discovery
6. Division	7. Asking guiding and open-ended questions	

Workshop Schedule

Timing Date	Oct 14th	Oct 15th	Oct 16th	Oct 17th	Oct 18th
9:00 am - 9:15 am	Introduction + Pre-workshop Form	Morning Meeting	Morning Meeting	Morning Meeting	Morning Meeting
9:15 am - 11:00 am	Ganit Charcha: Building Number Sense	Combine vs Compare: Addition & Subtraction	Sum It Up: Multiplication	Divide & Conquer: Division	Questioning in Science Classroom
11:00 am - 11:30 am	Tea Break	Tea Break	Tea Break	Tea Break	Tea Break
11:30 am - 1:00 pm	Building Blocks: Grouping & Regrouping	Exploring Place Value	Multiplication Techniques	Exploring Matter	Ganit Mela
1:00 pm - 1:45 pm	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
2:00 pm - 3:30 pm	Number Sense Activities	Addition & Subtraction	Multiplication Games	Science Experiments	Ganit Mela
3:30 pm - 4:00 pm	Practice Time	Practice Time	Practice Time	Practice Time	Closing & Feedback
4:00 pm - 5:00 pm	Reflection & Discussion	Reflection & Discussion	Reflection & Discussion	Reflection & Discussion	Group Photo

Training Program - Brief Overview (Day-wise and Session-wise)

Day 1 (14/10/2024)

The day started with the formal introduction of the participants and Aawiskar team. There were three sessions held on first day.

First Session: After formal introduction, *Ganit Charcha* started on the mindset of the teacher for teaching Mathematics in which the following points emerged:

1. **Maths can be done in many ways**
2. **Mathematics is a language**
3. **Maths can be visualized**
4. **Justification deepens our understanding**
5. **Maths is the study of pattern**

Activity: A paper shown to participants in which some dots were made and they were asked to respond how many dots they had seen and what pattern they had observed?

The answers of all the participants were different, which shows that every child has a different perspective of seeing the pattern. The activity was done to imply that maths can be done in many ways.

Second Session: (Graphic organiser)

TOPIC	CONCEPTUAL UNDERSTANDING	TEACHING METHODS	TLM USED	TEACHER MINDSET
NUMBER SENSE	PATTERN	PLAY WAY	*MEL KA KHEL*	Maths can be visible
	UNIT AND TENS PLACES	LEARNING BY DOING	*JHAPATTA MARO*	All children can do maths
		ACTIVITY CENTRED	*PANSE KA KHEL (Game of dice)*	Maths can be done in many ways

Activity: For consolidation of number sense, participants played a game called *'Mel ka Khel'*. Cards were given to the participants. Cards were having some dots, lines and fingers printed on them. The rule of the game was that each participant would throw a card. Suppose the first participant's card came with a six finger symbol and after that the second participant threw six dots card, then he would say 'Mel ka Khel' and both cards would go to him. The game continued in this way with the rule that if the number appearing on any card resembles with the previous card he would win all the previous cards. The game would go on in this manner and at the end of the game the participant who had the most cards would be the winner.

Third Session:In the third session grouping and regrouping concept was explained with the help of TLM five strips, ten strips and card. Method used to explain the concept was play way, activity centered, and Write, Build and Draw. The concept was explained through the help of the game *Panhucho to Jane.* An attempt was made to develop teacher mindset thatMaths can be made visible, and Maths can be done in many ways. A Graphic Organizer was used to demonstrate the concept.

Takeaways:

- **Maths can be done in many ways.**
- **Justification deepens our understanding.**
- **Maths is a language.**

Pictures of Day 1:

Day 2 (15/10/2024)

The second day started with the recap of first day's activities and then number of activities were done.

Session 1 : Maths Bingo Activity - Number Identification

Through the activity it was demonstrated that students could identify and recognize numbers in a fun and engaging way. The activity could help students improve their number identification and recognition skills in an engaging and interactive manner while also fostering quick mental responses.

Session-2:Activity: Understanding the Relationship Between Addition andSubtraction Using Tape Diagrams

Through this activity conceptual understanding of relationship between addition and subtraction was explained by storytelling and learning by doing method using tape diagram and base 10 blocks. It was proven through the activity that logic deepens the understanding.

This activity could help students understand that addition and subtraction are inverse operations. Using tape diagrams, they can visually see how parts and wholes are related, reinforcing the connection between these two fundamental arithmetic concepts.

Session 3 Title: Number Exploration with Stones (Grades 2-3)

Through the activity it was shown that such activity would help students recognize patterns in numbers, develop an understanding of place value, and apply logical reasoning using physical objects (stones) and a number chart. The concept was explained with the help of five Es--- Engage, Explore, Explain, Extend and Essence.

Takeaways:

- Activities help us to understand concept.

  Through activities maths can be taught in fun and engaging way**Pictures from Day 2:**

Day 3 (16/10/2024)

Day 3's session focused on building a deeper understanding of multiplication and multiplication techniques, addressing common misconceptions in mathematical concepts. The objective was to introduce effective teaching methods for teaching multiplication and explore hands-on activities that enhance students' learning experience.

Key Topics Covered:

1. **Addressing Misconceptions in Mathematical Concepts**

Teaching Method: Flashcards featuring common misconceptions in number operations were used to highlight and address misunderstandings. This method helped teachers identify areas where students struggle with certain concepts.

Teacher's Mindset: Mathematics can be visualized in a variety of ways. It's essential to present multiple perspectives to ensure that students fully grasp mathematical concepts.

2. **Introducing Multiplication (Times Tables)**

Teaching Method: Storytelling was used to make the process of multiplication engaging. Teachers employed cards and playful stories to simplify multiplication and make it relatable to students.

Teacher's Mindset: Teachers are encouraged to make mathematics a part of daily life, showing students how math is present everywhere and that it can be visualized and applied in everyday scenarios.

3.**The "Diamond" Method for Teaching Multiplication Teaching Method**

Teachers introduced the "Diamond" method, where foam blocks , Bindi chart and visual tools were used to explore multiplication concepts in a unique, engaging way.

Teacher's Mindset: Mathematics is everywhere, and breaking down multiplication into simpler visual components can help students understand the subject more clearly. The focus is on making math less intimidating and more approachable.

Learning Outcomes:

1.Flexible Addition: Students understood that addition can be performed in multiple directions (right to left or left to right), offering flexibility in problem-solving.

2. Enhanced Observational Skills:The use of play-based activities, like storytelling and visual aids, improved students' ability to observe patterns and understand the core concepts faster.

3'Student-Led Understanding of Multiplication:By guiding students through exploration tasks, teachers encouraged students to develop their own definitions and understanding of multiplication, fostering independent learning.

4.Understanding Factors and Multiples:The activities also helped students understand the relationship between factors and multiples, a key concept in mathematics, through exploratory tasks.

5Es Teaching Approach was used to clarify the concept.

1. Engage:The session started with a multiplication chart, prompting students to identify patterns and fill in missing cells. This method piqued their curiosity and engaged them in the learning process.
2. Explore:Students were encouraged to correct their mistakes in the filled chart, identify differences, and use cubes to explore number patterns, leading to a more interactive understanding of multiplication.
3. Explain:After each task, students were asked to explain the patterns they observed, which reinforced their understanding and provided teachers with an opportunity to assess comprehension
4. Extend:Students were guided to identify repeating numbers, explore non-repeating patterns, and extend their learning by applying these observations to other mathematical concepts.

5. Essence:By the end of the session, students developed a clear understanding of factors and multiples. Teachers used guided questioning to help students come to these conclusions, encouraging them to explore rather than simply providing answers.

Key Takeaways:

Guided Exploration:Encouraging students to find solutions through guided exploration fosters critical thinking and deepens their understanding of mathematical concepts.

Active Engagement:Through the use of storytelling, visual aids, and hands-on activities, students remained actively engaged and were able to develop a stronger grasp of multiplication and related concepts.

Mathematics in Daily Life:

Teachers were reminded that presenting mathematics as a part of everyday life can make the subject more approachable and meaningful for students. By integrating relatable stories and real-life examples, students can connect with the subject more easily.

Pictures of day 3

Day 4 (17/10/2024)

Day 4's Focus: Exploring Symmetry and Problem-Solving Through Cutting Activities along with session on Science why tiny particles attract each other?

The session revolved around hands-on activities designed to explore the concepts of symmetry and problem-solving, challenging teachers to think creatively and practically in the context of geometric shapes.

Activities:

Cutting the Square in One Cut

The first activity presented by the instructor was a challenge where participants were given a piece of paper with a square drawn on it. The task was to cut the square in one continuous cut.Some participants successfully managed to cut the square in one cut, while others found the task difficult. This activity highlighted the importance of visualizing symmetry and planning a precise cut.

Cutting the Star, Obtuse Triangle in One Cut

In the second activity, teachers were given a paper with a star shape and asked to attempt cutting it in one cut.

This activity emphasized the need for precision and understanding of symmetrical patterns to achieve the desired result and led a discussion on why certain shapes can be cut easily based on their symmetry, while others pose more difficulty.

Introduction of Erik Demaine and His Theory

After the hands-on activities, Resource Person introduced Erik Demaine, a professor from Japan who proposed an intriguing theory:

Erik Demaine's Theory: It is possible to cut any shape in one continuous cut, provided the right approach is used. This fascinating idea opened up a new perspective on problem-solving, encouraging teachers to explore different methods and angles when approaching similar challenges in the classroom.

Science Session:

In the science session the concept 'why particles stay together' ,'why do not they fall apart,' and 'water cycle' were explained with the help of activities. The session focused on developing scientific mindset, critical thinking, and connecting to real life in primary classes. The objective was to how to teach scientific topics in classes in an interesting and innovative way.

Some real life objects like (rope, rope dust, rust iron pieces, pebbles) were shown for clear understanding of particles. An experiment with coin and water dropper was done to show adhesive properties of water.

The session focused on understanding the role of symmetry in problem-solving and introduced a new way of approaching geometric challenges. Primary science should develop pupils' understanding of the world, nurture their curiosity and teach essential skills, including enquiry, observation, prediction, analysis, reasoning and

explanation. In class rooms the students should have opportunity to listen, see, explore, conclude, experiment, visualize, think, predict and find each aspect of the topic going on in the class.

Learning Outcomes:

Understanding Symmetry: Teachers learned that shapes with symmetrical properties are easier to divide with a single cut. This understanding can be applied to teaching geometry and problem-solving to students.

Creative Problem-Solving: The activities encouraged teachers to think creatively and use visual-spatial reasoning to solve challenges related to cutting shapes. This approach can be helpful in fostering critical thinking in students.

Incorporating Practical Challenges in the Classroom: Teachers were inspired to incorporate hands-on activities like these in their lessons to engage students in thinking about geometry and symmetry in a fun and practical way.

Key Takeaways:

Symmetry plays a critical role in solving geometric problems efficiently.

Problem-solving can be enhanced by thinking creatively and approaching challenges from different angles. Teachers were introduced to Erik Demaine's theory, which suggests that with the right method, any shape can be cut in one continuous cut, encouraging innovative thinking.

Pictures of Day 4:

Day 5 (18/10/2024)

On the final day of the Capacity Building Programme, teachers were engaged in activities designed to foster critical thinking, practical learning, and hands-on exploration in Science and Mathematics.

The aim was to provide teachers with methods to make these subjects more interactive and encourage students to develop deeper thinking abilities.

The day started with an energizer. It was based on the concept of multiples along with a funny rule. It really increased participants'enthusiasm for the upcoming sessions.

There were two sessions along with a visit to Ganit Mela

First Session: It started with a discussion that how in a science class journey from asking questions to find answers should move to develop critical thinking among students. The concept was explained with the help of activities.

Activity 1 : Participants were asked to draw the picture of an ant. Everyone drew the ant differently based on their observation.

Activity 2 : Participants were asked to find an insect from their surroundings and observe it without touching or harming the animal. Then they have to make an sensational headline on that insect.

Activity 3 : After that participants had to discuss in groups to think about any information they would like to find out about that animal and how would they do it.

Second Session: The session was on introduction of decimals in primary classes where Fractions and Decimals were explained, adding and subtracting numbers with decimal with the help of a game *Aadhe Badhe.* The concept of ones, tens, hundreds, tenths and hundredths were explained through Playway methods. Itwas demonstrated that maths can be visualized and all children can do maths.

Ganit Mela:

Ganit Mela was organised by the Aavishkar team . It involved a number of games-

Musafir: Finding distance between two points and their displacement between initial and final position.

Udte Sitare: Making a specific number using the different cards shown to us.

Rangometry: Making different shapes using cutouts of different shapes.

Aadhe Badho: A Ludo game to develop understanding of fraction

Ganit Mala Ki Daud: Hanging different numbers on currect place. The concept was Counting in groups.

Mel Ka Khel: Matching cards with numbers to the card objects which have same objects .

Chhap Chhap Chhapak: A Ludo game on multiplication

Tute Sitaare: Making different fractions using cards

Tangram:Making square using different shapes

Jhapatta Maro: Card game on addition

Chudi Phenko: Calculating the value of dots of different colours which are inside the bangle.

Key Takeaways: Teachers came to know about new tools and strategies to engage students in mathematics and science, making learning more interactive, relatable and enjoyable.

Feedback from Participants:

- **Mr. Tarun Kumar, Primary Teacher:**
  "It was a pleasant experience over here. I have learnt a lot of new things and explanations of how students can do maths and science. Really, maths is visual, and every student can do maths."

- **Mr. Satinder Gulia, Primary Teacher:**
  "आप सभी लोगो की भागीदारी ओर आप सभी मेहनत, लग्न, जोश आदि काफी काबिले तारीफ है। आप लोगो ने बहुत हट कर बच्चो को basic knowledge के बारे में बताने के लिए बहुत कुछ बताया।"

- **Om Prakash meena, Primary Teacher:**
  "The workshop was an eye-opener for me. I never realized how much fun maths and science could be until I experienced the hands-on activities like Mel ka Khel and the cutting symmetry exercises. I am excited to take these innovative methods back to my classroom and make learning more engaging for my students."

- **Neelima , Primary Teacher:**
  "The science sessions were incredibly insightful, especially the experiment with coins and water droplets to explain adhesive properties. It made me realize how simple, everyday objects can be used to teach complex concepts. I will definitely incorporate more real-life examples and experiments in my science classes to spark curiosity among my students."

- **Lukman malik, Primary Teacher:**
  "The session on multiplication using the 'Diamond' method was truly enlightening. I always struggled to make multiplication interesting for my students, but now I have a variety of tools like foam blocks and visual aids to make it more relatable. I feel more confident in teaching maths creatively.

Implementation Strategies:

1. **Incorporate Hands-on Activities:** Teachers plan to use more hands-on activities like *Mel ka Khel* and *Aadhe Badhe* to make maths and science more interactive.

2. **Use of Visual Tools:** Teachers will use visual tools like base 10 blocks and tape diagrams to help students visualize mathematical concepts.
3. **Encourage Critical Thinking:** Teachers will encourage students to ask questions and explore answers through experiments and observations.
4. **Ganit Mela in Classrooms:** Teachers will organize mini-Ganit Melas in their schools to engage students in fun and educational games.

Glimpses of the Capacity Building Program: