DISTRICT RESOURCE GROUP WORKSHOP

Context:

The District Institute of Education and Training (DIET) works on the capacity building of teachers. It provides academic and resource support to the elementary and secondary education systems of the district. It organizes programs to support better learning and teaching. In that context, a two-day District resource group mathematics session from 13 to 14 of September was conducted at DIET Ratura for upper primary teachers. A total of 30 teachers participated in two days.

Objectives:

1. To ensure a deep understanding of fundamental mathematical concepts, including fractions, integers, algebra, and area and address common challenges faced while teaching these concepts.
2. To provide a collaborative environment where teachers could share their experiences, insights, and effective practices in teaching mathematics.

DAY 1

- Introduction and Purpose

The session began with the introduction of a resource person to everyone. Then, the DIET principal and members outlined the workshop's purpose, welcomed everyone for the two-day workshops and motivated them to participate and use the platform as an experience-sharing and problem-solving platform. Then, the facilitator Ravikant Ji started the session by establishing rapport with the participants by knowing their names. Later, he introduced the concepts that would be covered during the workshop: fractions, integers, algebra, and area. Day one was mostly dedicated to fractions and some time was given to integers as well.

- Exploring Fractions & Integers

Facilitators started the discussion with a question i.e., what are the challenges faced while teaching fractions to students? Teacher responses were as follows:

1. Difficulty in making them understand the meaning of fractions.
2. Example Response: "Why fractions? Students struggle to grasp the purpose and relevance of fractions in real-life situations."

3. Students takes the denominator and numerator as a separate number rather than as a fraction.
4. Example Response: "Students often see 3/4 as 'three-four' instead of a single unit."
5. Difficulty in building an understanding of least common multiples.
6. Significance of half w.r.t to different wholes.
7. Example Response: "Students struggle to relate half to different objects."
8. Comparing fractions, simplifying fractions, Improper fractions
9. Adding and multiplying of fractions

Then the facilitator asked the participants to make a list of things that they want their students to learn in Fractions. The list is shown as follows:

1. Concept of Fractions including an understanding of whole, parts, numerator, and denominator.
2. Why learning fractions is important?
3. Types of fractions

Then, by understanding the challenges and needs of the participants, the facilitator used some hands-on activities, ensuring that teachers not only understood the concepts themselves but were also equipped to convey them effectively to their students.

Facilitator distributed white A4 sheets, crayon colours, scale, and thread to the participants. Then, he asked a question again to get an understanding of the teaching practices used in the classroom to teach the concept of fractions. The question asked was How do they introduce fractions to the students? Teachers responded that the students were aware of the term half, so they used examples like half chapati, and half apple, then told them the definition i.e., a part of the whole is called a fraction. Then moved to the symbolic part and told them about the numerator and denominator.

Adding to the discussion, the facilitator emphasised teaching in the order given below.

o Meaning (First focus on building an understanding of the meaning using some hands-on activities, let them explore and make connections rather than directly telling them the meaning)
o Name (Then, introduced the name)
o Meaning + Name (Given the opportunity to use meaning and name together and find connections)
o Meaning + Name+ Symbols (At last introduced the symbols)

Meaning of Fraction (Equal parts of whole) - To teach the fraction first thing that we need to build is the understanding of the Concept of whole, Parts, Parts should be equal and Joining parts makes a whole.

The facilitator introduced the area model, measurement model, set model and division model that can be used to teach fractions to the students. Due to the time and resource availability, only the area and measurement model were explored by the participants.

Using the area model and measurement model, the facilitator told all the participants to take the A4 sheet and make 8 equal parts of that. Then, he told me to use smaller papers as a Whole to learn fractions. He told every participant to fold the smaller paper into six equal parts and colour it with different colours. Then, told them to answer how many parts of the paper are red in colour and how many are blue. Here, he emphasized that we only asked students to say the name like 2 out of 6 are red or 3 out of 6 are blue. This is one of the ways we can engage students to explore the meaning of fractions and guide them, rather than directly tell them the definition. Later, the facilitator gave a task to the participants that is to use all the material given as LTM to teach different types of fractions. Then, together, all of them made a list of LTM used for teaching different types of fractions, ways of teaching, and material used for the same. The CPA approach provided practical exercises and real-life scenarios to make the concept more relatable.

The emphasis remained on what to teach and how to teach effectively using different materials. The approach gradually progressed from simple to complex.

In the second half of the day, some activities to teach addition and subtraction of fraction using the concrete material was explored by the participants.

Then, the facilitator took a break from fractions exploration and moved towards integers and gave 10 white and 10 black buttons to the participants and told them to use white buttons as negative integers and black buttons as positive integers. Then, gave them some problems of integers and their operations to solve.

1. (+3) -(+4)
2. (-2) + (-3)
3. (+4) +(+5)
4. (-6) – (-5)

5. (+5) – (-2)
6. (-5) – (+3)

All the participants were able to easily solve the questions numbered from one to four but got stuck at the fifth one. The facilitator pushed them to think and find out the answer. But only one teacher was able to do so. Seeing that the facilitator gave the same questions as homework to everybody. Day one concluded with a hands-on exercise involving the creation of faces of a square with a volume of 1 cm³. Additional faces were assigned as homework.

DAY 2

The second day started with a quick review of day one, then the facilitator reviewed the topics that needed to be covered that day which were multiplication, division of fractions, integers and the introduction of algebra, area, and volume.

The discussion started with the puzzling question of integers that was given for the homework. A puzzling question (+5) - (-2) became the star, initiated a brainstorming session on simplifying it for the little minds using the concrete material. It is a challenging part for the teachers as they don't use concrete material to teach integers. They were not able to understand why we are adding zero pairs to subtract (-2) from 5. They were saying that these types of activities can create confusion among students to which the facilitator replied that we are here to clear our conceptual confusion first and I believe to clear the confusion of the students, first and foremost a teacher needs to clear his/ her confusion first.

Step 1. The problem (+5) – (-2)

Step 2. Adding zero pair
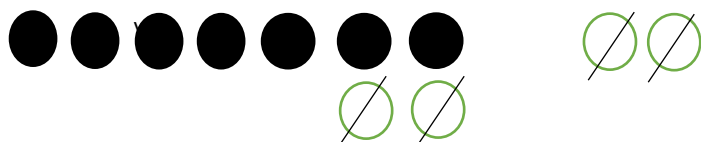
The facilitator explained that we do not have any negative integers, or we can say buttons with us to subtract so we added zero pairs which did not change the problem at all and gave us what we needed. A good discussion happened on the same leaving the participants with some sense of challenge.

The focus then shifted to the fraction's multiplication and division which was not covered on the first day. This was also learned by using the area model. The sessions remained highly engaging, allowing participants ample time to solve various problems ranging from simple to complex.

Additionally, Algebra, area, and volume were introduced. Algebra was introduced through an activity involving matchsticks. Teachers also shared their experiences and provided valuable insights throughout the session. Concepts of the area were thoroughly discussed, including

both standard and non-standard approaches. The faces of squares with a volume of 1 cm³ were.

used to teach the concept of volume through concrete material. The focus was on using 'tailored instructions' that would make these concepts easier and clearer for students to understand in the classroom. The understanding of patterns in mathematics was emphasized repeatedly.

The workshop concluded with remarks from the principal of DIET and the distribution of certificates.

Takeaways

- Participants gained an understanding of mathematical concepts, with a focus on fractions, integers, algebra, area, and volume.
- The hands-on activities and real-world applications challenged and helped them build a practical understanding of the concepts.
- Teachers actively shared experiences, doubts, and solutions.
- Session helped us to build rapport with the UPS teachers and get an idea of their needs and teaching practices.

Next steps

- School visits to these teachers' schools with proper planning and preparation.
- Organizing follow-up sessions on a monthly or quarterly basis.
- Identifying the best-practicing teachers.
- Sharing best practices with other teachers.

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