KENDRIYA VIDYALAYA SANGATHAN

तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन

3-DAY OFFLINE WORKSHOP ON THE ORIENTATION COURSE FOR MASTER TRAINERS ON THE NEW MATHEMATICS TEXTBOOK

29.07.2025 TO 31.07.2025

GANITA PRAKASH
Textbook of Mathematics for Grade 6

GANITA PRAKASH
TEXTBOOK OF MATHEMATICS
GRADE 7 Part-I

GANITA PRAKASH
TEXTBOOK OF MATHEMATICS
GRADE 8 Part-I

ZONAL INSTITUTE OF EDUCATION AND TRAINING MYSURU

COURSE DIRECTOR

Ms. MENAXI JAIN

DEPUTY COMMISSIONER KVS &

DIRECTOR, ZIET MYSURU

ASSOCIATE COURSE DIRECTOR

Mr. AKHIL K

TGT(MATHS), PM SHRI KV NO 2 CALICUT

ERNAKULAM REGION

RESOURCE PERSONS

Mr. B ARI KUMAR

TGT(MATHS), PM SHRI KV No 1 MADURAI

&

Mr. RV SURYA NARAYANA RAJU

TGT(MATHS), PM SHRI KV VIZIANAGARAM

COURSE COORDINATOR

D.SREENIVASULU

TRAINING ASSOCIATE(MATHEMATICS)
ZIET MYSURU

DIRECTOR'S MESSAGE

It gives me immense pleasure to welcome all the dedicated Mathematics educators participating in the *3-Day New Textbook Orientation Workshop for Classes VI to VIII.*

With the implementation of the National Education Policy (NEP) 2020 and the National Curriculum Framework (NCF) 2023, we are witnessing a transformative change in the way Mathematics is taught and experienced in our classrooms. The new textbooks are designed to spark mathematical curiosity, encourage reasoning and exploration, and promote hands-on, experiential learning that builds strong conceptual understanding and core competencies among learners.

This workshop aims to empower you with a clear understanding of the revised curriculum, innovative pedagogical practices, and effective assessment strategies. It provides an opportunity to engage deeply with the content as well as the intent of the new framework—helping every learner experience Mathematics as a meaningful, joyful, and creative pursuit.

I encourage you to make the most of these three days—collaborate, inquire, experiment, and reflect. Together, let us strive to make Mathematics education more engaging, inclusive, and impactful.

Wishing you a fruitful and inspiring workshop experience.

MENAXI JAIN
DIRECTOR
ZIET MYSURU

LIST OF PARTICIPANTS

S.NO	Name of Teacher(Mrs/Miss/Mr)	Designation	Name of KV	Region
ACD	AKHIL K	TGT(Maths)	PM SHRI KV NO 2 CALICUT	Ernakulam
RP	B Ari Kumar	TGT(Maths)	PM SHRI KV No 1 Madurai	Chennai
RP	RV Surya Narayana Raju	TGT(Maths)	PM SHRI KV VIZIANAGARAM	Hyderabad
1	K James	TGT(Maths)	No.1 Golconda	Hyderabad
2	P Sreenivasa Rao	TGT(Maths)	Guntur (S.1)	Hyderabad
3	Naresh Duvvuri	TGT(Maths)	Kakinada	Hyderabad
4	D Venkatacharyulu	TGT(Maths)	Machilipatnam,	Hyderabad
5	V Narayana Rao	TGT(Maths)	NAD Vizag	Hyderabad
6	Kaushalendra Pratap	TGT(Maths)	Sircilla	Hyderabad
7	I Sreeivasa Rao	TGT(Maths)	No.1 Srivijayanagar	Hyderabad
8	Lalitha. K	TGT(Maths)	Tirumalagiri	Hyderabad
9	GV Ramana	TGT(Maths)	Waltair	Hyderabad
10	REMYA GOPI E P	TGT(Maths)	PM SHRI KV KANNUR	Ernakulam
11	KAVITHA GS	TGT(Maths)	PM SHRI KV CRPF PALLIPURAM	Ernakulam
12	ROOPITHA E K	TGT(Maths)	PM SHRI KV THRISSUR	Ernakulam
13	MINIMOL K A	TGT(Maths)	PM SHRI KV NAD ALUVA	Ernakulam
14	MIDHUN BASHEER	TGT(Maths)	PM SHRI KV ERNAKULAM	Ernakulam
15	ANUPAMA CHANDRAN	TGT(Maths)	PM SHRI KV IDUKKI	Ernakulam
16	DEEPTHI K THAMPI	TGT(Maths)	PM SHRI KV RB KOTTAYAM	Ernakulam
17	AAGYA PATHAK	TGT(Maths)	PM SHRI KV AFS AKKULAM	Ernakulam
18	MANJU S NAIR	TGT(Maths)	PM SHRI KV PANGODE	Ernakulam
19	SOWMYA GANESH	TGT(Maths)	PM SHRI KV ANNA NAGAR	Chennai
20	MOHANA KUMARI.K	TGT(Maths)	PM SHRI KV ASHOK NAGAR	Chennai
21	D. Gayathri	TGT(Maths)	PM SHRI KV CLRI CHENNAI	Chennai
22	Sharon S	TGT(Maths)	PM SHRI KV COIMBATORE	Chennai
23	Pawan Singh	TGT(Maths)	PM SHRI KV DINDIGUL	Chennai
24	Jyothi R Nair	TGT(Maths)	KV KALPAKKAM NO.2	Chennai
25	Prabha Devi.V.S	TGT(Maths)	PM SHRI KV MADURAI NO.2	Chennai
26	A.R.Kankshini	TGT(Maths)	KV PONDICHERY NO.1 (Shift - I)	Chennai

27	Shikha Pandey	TGT(Maths)	KV PONDICHERY NO.1 (Shift - II)	CHENNAI
28	DEEPANSHU	TGT(Maths)	PM SHRI KV THANJAVUR (AFS)	CHENNAI
29	Tejasvi pandole	TGT(Maths)	KV AFS NO.I JALAHALLI	Bengaluru
30	PUSHPA KUMARI	TGT(Maths)	KV NAL BANGALORE	Bengaluru
31	Asa Franklin	TGT(Maths)	KV MALLESHWARAM (Shift -1)	Bengaluru
32	SukhpreetKaur	TGT(Maths)	KV MG RLY. BANGALORE	Bengaluru
33	Johny Daswani	TGT(Maths)	KV NO.I HUBLI	Bengaluru
34	P.S. KAVITHA	TGT(Maths)	KV DRDO	Bengaluru
35	ARCHANA CHANDRA SEKHAR	TGT(Maths)	KV ASC CENTRE	Bengaluru
36	SHIVANI UNIYAL	TGT(Maths)	KV MYSURU	Bengaluru
37	SATYA TIWARI	TGT(Maths)	KV MEG&CENTRE	Bengaluru
38	K. DEEPA	TGT(Maths)	KV HEBBAL	Bengaluru

GROUP - 1

S.NO	Name of Teacher	Designation	Name of KV	Region
1	GV Ramana	TGT(Maths)	Waltair	Hyderabad
2	Mrs.MINIMOL K A	TGT(Maths)	PM SHRI KV NAD ALUVA	Ernakulam
3	MRS. AAGYA PATHAK	TGT(Maths)	PM SHRI KV AFS AKKULAM	Ernakulam
4	Mrs. D. Gayathri	TGT(Maths)	PM SHRI KV CLRI CHENNAI	CHENNAI
5	Johny Daswani	TGT(Maths)	KV NO.I HUBLI	Bengaluru
6	MIDHUN BASHEER	TGT(Maths)	PM SHRI KV ERNAKULAM	Ernakulam
7	Ms. Shikha Pandey	TGT(Maths)	KV PONDICHERY NO.1 (Shift - II)	CHENNAI
8	Mrs.ROOPITHA E K	TGT(Maths)	PM SHRI KV THRISSUR	Ernakulam
9	PUSHPA KUMARI	TGT(Maths)	KV NAL BANGALORE	Bengaluru

GROUP - 2

1	Mrs.Prabha Devi	TGT(Maths)	PM SHRI KV MADURAI NO.2	CHENNAI
2	Tejasvi pandole	TGT(Maths)	KV AFS NO.I JALAHALLI	Bengaluru
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4	MRS.MOHANA KUMARI	TGT(Maths)	PM SHRI KV ASHOK NAGAR	CHENNAI
5	Kaushalendra Pratap	TGT(Maths)	Sircilla	Hyderabad
6	Smt. REMYA GOPI E P	TGT(Maths)	PM SHRI KV KANNUR	Ernakulam
7	Mrs.MANJU S NAIR	TGT(Maths)	PM SHRI KV PANGODE	Ernakulam

8	Mrs. Sharon S	TGT(Maths)	PM SHRI KV COIMBATORE	CHENNAI
9	Smt.A.R.Kanshini	TGT(Maths)	KV PONDICHERY NO.1 (Shift - I)	CHENNAI
10	Mrs.ARCHANA CHANDRA SEKHAR	TGT(Maths)	KV ASC CENTRE	Bengaluru

GROUP - 3

1	Mrs. P.S. KAVITHA	TGT(Maths)	KV DRDO	Bengaluru
2	Naresh Duvvuri	TGT(Maths)	Kakinada	Hyderabad
3	I Sreeivasa Rao	TGT(Maths)	No.1 Srivijayanagar	Hyderabad
4	Mrs. KAVITHA GS	TGT(Maths)	PM SHRI KV CRPF PALLIPURAM	Ernakulam
5	ANUPAMA CHANDRAN	TGT(Maths)	PM SHRI KV IDUKKI	Ernakulam
6	Mrs. SOWMYA GANESH	TGT(Maths)	PM SHRI KV ANNA NAGAR	CHENNAI
7	Pawan Singh	TGT(Maths)	PM SHRI KV DINDIGUL	CHENNAI
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9	Mrs. SHIVANI UNIYAL	TGT(Maths)	KV MYSURU	Bengaluru

GROUP - 4

1	D Venkatacharyulu	TGT(Maths)	Machilipatnam,	Hyderabad
2	Lalitha	TGT(Maths)	Tirumalagiri	Hyderabad
3	DEEPTHI K THAMPI	TGT(Maths)	PM SHRI KV RB KOTTAYAM	Ernakulam
4	Mrs.Jyothi R Nair	TGT(Maths)	KV KALPAKKAM NO.2	CHENNAI
5	Sh.DEEPANSHU	TGT(Maths)	PM SHRI KV THANJAVUR (AFS)	CHENNAI
6	SukhpreetKaur	TGT(Maths)	KV MG RLY. BANGALORE	Bengaluru
7	Mrs. SATYA TIWARI	TGT(Maths)	KV MEG&CENTRE	Bengaluru
8	K James	TGT(Maths)	No.1 Golconda	Hyderabad
9	V Narayana Rao	TGT(Maths)	NAD Vizag	Hyderabad
10	Ms. K. DEEPA	TGT(Maths)	KV HEBBAL	Bengaluru

TIME TABLE

DATE	9.00 -9.30 am	9.30 am - 11.15am		11.30am -1.00 pm		2.00 pm-3.30 pm		3.45 pm -5.30 pm
29.07.2025	Inauguration	Structure and Design of New Mathematics Text Book in context with NEP 2020 & NCF-SE - by Mr. Akhil(ACD)	T E A B R E A K	Effective Strategies for Teaching Arithmetic Expressions & Expressions using Letter Numbers - By Ari Kumar(RP) Demo lesson by Participants	L U N C H	Teaching of Numbers around us & Number Play - By RVSN Raju(RP)	T E A B R E A K	Indian Traditional Knowledge system in Mathematics - By D.Sreenivasulu
30.07.2025	Assembly	Ancient Indian Mathematicians- By D.Sreenivasulu Demo lesson by Participants		Teaching of Decimals - By Mrs.Sharadha		Parallel and Intersecting lines and a Tale of Three intersecting lines- By Mrs.Sharadha		Experiential Learning in Mathematics - By Mrs.Kavitha P S
31.07.2025	Assembly	Teaching of Fractions - Mr. Madhu B, Assistant Professor, RIE, Mysuru		ICT enabled Assessment & Digital Integration: Using QR Codes, e-Content & DIKSHA Portal - By Dinesh Kumar		A peek beyond the point: Concepts and Classroom Strategies - by Mr. Akhil(ACD)		Closing Session

DAY-WISE REPORTS

DAY 1: 29.07.2025

The first day of the training programme began with great enthusiasm and a spirit of learning. The morning session commenced with a solemn prayer, setting a serene and focused atmosphere for the day's activities.

This was followed by a welcome address by Mr. D. Sreenivasulu, Training Associate (Mathematics), who extended a warm welcome to all dignitaries and participants. He cordially welcomed Ms. Menaxi Jain, Director, ZIET Mysuru & Deputy Commissioner, KVS, Mr. Akhil K., Associate Course Director, the resource persons Shri Ari Kumar and Shri R.V.S.N. Raju, the ZIET faculty members, and all the participants of the programme.

In his address, Mr. Sreenivasulu highlighted the objectives of the training, emphasizing the importance of continuous professional growth for teachers in the context of the National Education Policy (NEP) 2020 and the forthcoming National Curriculum Framework (NCF) 2025. He underscored the need to integrate technology, creativity, and contextual learning into classroom practice to make mathematics more meaningful and enjoyable for students. His inspiring words set the tone for a productive and insightful day ahead.

The first academic session was conducted by Mr. Akhil K., Associate Course Director, who delivered an enlightening presentation on the new theme-based, constructivist, and learning-integrated NCERT textbooks. His session provided a detailed understanding of the design, structure, and pedagogical vision underlying the newly developed materials.

He explained how the new textbooks emphasize Indianness in content and approach, integrating cultural values, local contexts, and real-life applications to make learning more relevant and engaging. Mr. Akhil also discussed how the revised curriculum aligns with the goals of NEP 2020 and NCF 2025, promoting competency-based, holistic, and lifelong education for all learners.

Participants appreciated his clarity in explaining the shift from rote learning to experiential learning, the focus on inquiry-based activities, and the role of teachers as facilitators of knowledge construction. The session helped teachers understand how to translate the textbook philosophy into effective classroom practice.

The second session of the forenoon was conducted by Shri Ari Kumar, PGT (Mathematics), KV Madurai, who presented an engaging demonstration lesson on "Arithmetic Expressions." His class was dynamic and well-structured, showcasing how mathematical concepts can be taught through activities and guided discovery.

The session emphasized connecting arithmetic operations to real-life situations, enabling learners to visualize mathematical patterns and relationships. Participants observed how an interactive approach promotes conceptual clarity and student engagement.

Following this, demo lessons by participants were organized at KV Mysuru, where teachers presented innovative teaching strategies and creative use of classroom resources. These demonstration lessons provided a platform for sharing best practices, peer learning, and reflection on effective pedagogy.

The afternoon session began with an activity-based lesson on "Expressions Using Letters" conducted by Shri Ari Kumar. The session highlighted the importance of hands-on activities and student participation in understanding algebraic concepts. Through engaging tasks and discussions, participants experienced how abstract mathematical ideas can be simplified for middle school learners.

This was followed by a lively and interactive session on "Types of Questions" conducted by Shri R.V.S.N. Raju, Resource Person. He discussed various forms of questions—objective, descriptive, analytical, and application-based—aligned with competency-based assessment practices prescribed by CBSE. The discussion focused on how well-designed questions can assess conceptual understanding, reasoning ability, and problem-solving skills.

Participants actively interacted with the resource person, sharing examples and ideas from their classroom experience. The session was both informative and thought-provoking, emphasizing the role of assessment as an integral part of the learning process.

The final session of the day was conducted by Shri D. Sreenivasulu, Course coordinator, who gave an inspiring presentation on "Indian Mathematicians." He briefly narrated the contributions of great Indian scholars such as Aryabhata, Bhaskara, Brahmagupta, and Ramanujan, emphasizing India's rich mathematical heritage.

He encouraged participants to share these insights with their students to foster a sense of pride and connection with India's intellectual traditions. The session beautifully blended history with pedagogy, highlighting how contextualizing mathematics in its cultural roots can enhance students' appreciation of the subject.

DAY 2: 30.07.2025

The second day of the training programme began on an inspiring note. The morning session, after the prayer, started with a thought-provoking session by the Course coordinator, Mr. D. Sreenivasulu, on Vedic Mathematics. He explained the rich mathematical heritage of ancient India and elaborated on the contributions of great mathematicians during the Vedic period.

His discussion on Aryabhata's age and the calculation of the Kaliyuga timeline captured everyone's attention. The session beautifully linked historical insights with mathematical reasoning, making it both intriguing and intellectually stimulating. He highlighted how these ancient techniques reflect India's deep-rooted mathematical culture and how teachers can draw inspiration from them to make classroom learning more engaging and meaningful.

Before the tea break, demo lessons by participants were conducted, providing an opportunity for teachers to showcase innovative teaching practices. These demonstrations fostered peer learning and encouraged reflective discussions on improving classroom effectiveness. The morning concluded with a group photo session, capturing the collective spirit of collaboration and learning.

After the break, the participants assembled at ZIET Mysuru for two highly enriching sessions by Smt. H. S. Sharada, TGT (Mathematics), Government High School, H.D. Kote, Karnataka. Being an active member of the Textbook Development Committee, she offered valuable first-hand insights into the new NCERT textbook pattern and the pedagogical thought process that guided its development.

In the forenoon session, Smt. Sharada explained the underlying philosophy of the new textbooks—how they are structured around themes, integration, and experiential learning. She emphasized that the focus of the new framework is not on teaching more content but on enabling deeper understanding and learner engagement. Her remark, *"More teaching does not necessarily mean more learning,"* resonated deeply with the participants.

Her post-lunch session took the participants through interconnected topics of Classes VI and VII, illustrating how concepts are designed to build upon each other seamlessly. She discussed in detail the variety of questions included in the textbooks—those meant for concept building, critical thinking, multiple solutions, and real-life applications.

Smt. Sharada emphasized that classroom transactions should be lively, interactive, and inquiry-based, encouraging students to think, question, and reason. Her practical insights, drawn from direct involvement in curriculum design, made the sessions exceptionally valuable and inspiring. Participants appreciated her clarity, humility, and depth of understanding. The day's discussions reinforced the importance of adopting a constructivist approach and creating learning environments that empower students to discover concepts independently.

The final session of the day was led by Smt. Kavitha P. S., TGT (Mathematics), one of the participants. She conducted an engaging session on Experiential Learning, focusing on its role in transforming classroom practices. Through examples and discussions, she demonstrated how mathematics can be taught through real-life contexts, hands-on activities, and exploratory tasks that help learners connect abstract ideas to their surroundings.

Her session was followed by a group discussion on activities for Class VI, where participants collaboratively designed and shared classroom tasks aligned with the experiential learning approach. This peer interaction fostered creativity and provided multiple ideas that teachers could readily implement in their classrooms.

DAY 3: 31.07.2025

The final day of the 3-Day New Textbook Orientation Course at ZIET Mysuru began on an energetic and cheerful note. The morning assembly, conducted by the participants of *Group 2*, created a positive and reflective atmosphere for the day's proceedings. The participants led the assembly with enthusiasm, incorporating thoughtful reflections, a prayer, and an inspiring message that set the tone for the day's learning.

The first academic session of the morning was led by Dr. Madhu B, *Assistant Professor, RIE Mysuru*, and a *member of the Textbook Development Team*. His session was centered on the methodology of transacting the new textbook and provided a comprehensive understanding of the pedagogical vision behind its design.

Dr. Madhu elaborated on how the new textbooks have been developed in alignment with the National Curriculum Framework for School Education (NCF-SE) 2023. He explained that the revised structure focuses not only on content delivery but also on nurturing competency-based and experiential learning. The session emphasized how the Indian Knowledge System (IKS) has been integrated into the curriculum to connect mathematical ideas with India's rich cultural and intellectual traditions.

Using examples such as the introduction of *fractions* through culturally relevant contexts, Dr. Madhu highlighted that the goal is not merely to *teach the chapter* but to *engage learners through meaningful exploration*. He discussed the role of teachers in facilitating discovery-based learning, where students actively construct knowledge through guided activities and reflections.

Participants found the session extremely valuable, as it deepened their understanding of how to effectively utilize the new textbook as a *pedagogical tool* rather than simply a source of information. The insights shared by Dr. Madhu provided clear direction for transacting lessons in classrooms in a manner consistent with the NCF-SE vision.

Following this insightful session, participants enjoyed a short tea break, providing time for informal discussion and reflection on the morning's key takeaways.

After the break, the next session was conducted by Shri Dinesh Kumar, *Training Associate (Physics), ZIET Mysuru*. His session focused on the use of digital resources in teaching and learning, which proved to be highly informative and practical.

He introduced participants to a wide range of online educational platforms and repositories such as e-Pathshala, DIKSHA, NCERT online resources, and Amrita Virtual Labs. Through live demonstrations, he explained how these platforms can supplement classroom teaching, providing teachers with access to interactive content, videos, simulations, and assessments.

The participants explored how integrating these digital tools can enhance engagement, facilitate conceptual understanding, and promote blended learning approaches. The session highlighted the importance of teachers adopting digital competency as an essential skill in the 21st-century classroom.

After the lunch break, the afternoon session continued with a hands-on exploration of digital quiz tools such as Quizizz, Kahoot, and Plickers. Shri Dinesh Kumar demonstrated how these platforms can be used to make assessments more interactive, immediate, and student-centered.

A live demo of Plickers was conducted, followed by a hands-on activity where participants created their own quizzes and practiced administering them using the tool. The experience allowed teachers to understand how easily Plickers could be integrated into their classrooms, especially in environments where digital devices for every student may not be available.

Participants appreciated this practical exposure, as it enhanced their confidence in using digital tools for formative assessment and student engagement. The session emphasized how technology can make assessment not only efficient but also enjoyable and motivating for students.

Assessment and Valedictory Session

Before the closing ceremony, an assessment test was conducted using Google Forms to evaluate participants' understanding of the course content and digital tools covered during the three days. The online test reflected the use of technology-integrated assessment methods that had been discussed throughout the programme.

The training programme concluded with a Valedictory Ceremony, marking the successful completion of the 3-Day New Textbook Orientation Course. During the ceremony, participants shared their reflections and feedback, expressing their appreciation for the enriching sessions, the resource persons' expertise, and the collaborative learning environment fostered by ZIET Mysuru. Certificates were distributed, and participants expressed gratitude to the Director, ZIET Mysuru, the Course Director, and the entire organizing team for their meticulous planning and support.

SESSIONS

STRUCTURE AND DESIGN OF NEW MATHEMATICS TEXT BOOK IN CONTEXT WITH NEP 2020 & NCF-SE

MR. AKHIL
TGT(MATHS)
PM SHRI KV NO 2 CALICUT
ERNAKULAM REGION

The session on the Structure and Design of the New Mathematics Textbook provided a comprehensive understanding of the philosophy, framework, and pedagogical intent behind the newly developed textbook *Ganita Prakash*, designed in alignment with the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCF-SE) 2023.

The new textbook emphasizes learning through play, ensuring that students understand mathematical concepts in a joyful, engaging, and meaningful manner. Its design promotes a constructivist approach, enabling learners to explore principles and algorithms through structured, experiential learning sequences.

The key features of this textbook include the incorporation of activities, puzzles, and games for developing conceptual understanding without direct instruction. Students naturally absorb knowledge through exploration and problem-solving, while teachers act as facilitators who guide and nurture curiosity. The approach encourages teachers to enjoy the process of teaching and pass on the same enthusiasm to students.

Presentation Highlights

I. Textbook Structure

The textbook consists of 15 chapters divided into two volumes, with two additional transition chapters for Grade 6 (Chapters 1 and 2). Each volume contains around 200 pages. The chapters integrate Number System, Geometry, and Statistics, ensuring a balanced representation of key mathematical domains.

The placement of chapters follows a pedagogical sequence that builds understanding progressively. The chapter titles are designed to be engaging and thought-provoking, sparking curiosity among learners. Each chapter begins with a real-life situation or a challenging question, gradually leading to conceptual understanding.

For example, in the chapter *"Expressions Using Letters and Numbers"*, concepts evolve from familiar contexts to abstract mathematical ideas. Special attention is drawn to significant questions

using question marks (?) to prompt class discussion and engagement. Exercises are renamed as "Figure It Out," "Math Talk," or "Try This," reflecting an interactive approach.

II. Key Aspects and Features

1. Salient Features

- Balanced emphasis on:

    o *Conceptual understanding and meaning-making*: e.g., rounding off explained through relatable situations rather than fixed rules.

    o *Thinking and reasoning*: e.g., simplifying 160×5 as $(160 \times 10) \div 2$.

    o *Procedural fluency*: e.g., finding the nth term for multiples or odd numbers.

    o *Mathematical literacy*: encouraging students to read, interpret, and communicate mathematics effectively.

Other highlights include:

- *Quality over quantity* – fewer topics taught in depth.

- *Exposure to multiple contexts* for each concept.

- *Integration of historical development and Indian Knowledge Systems (IKS).*

- *Competency-based and application-oriented questions.*

2. Style and Flow of Chapters

Each chapter follows a structured pedagogical flow:

1. Question/Challenge – introduces a real-life or thought-provoking question.

2. Explore, Think, Discuss – encourages learners to brainstorm and share reasoning.

3. Concept Development – guides towards understanding underlying principles.

4. Practice – consolidates learning through activities and exercises.

3. Question Design

Questions are categorized as:

- Diagnostic Questions – to assess prior knowledge.

- Concept-Building Questions – for exploration and understanding.

- Reasoning and Thinking Questions – to deepen insight.

Question Types include:

- Multiple-answer and open-ended questions.

- Fully or partially worked examples.

- Numerical and word problems.

- Puzzles and games.

- DIY (Do It Yourself) activities.

- Peer/class discussions.

4. Focus on Mathematical Processes

The textbook emphasizes key mathematical processes such as reasoning, communication, representation, and connections, encouraging learners to develop habits of logical and analytical thinking.

5. Use of Comics and Computational Thinking

Comics are integrated to make abstract ideas more relatable and engaging. Elements of computational thinking—like pattern recognition and logical sequencing—are subtly woven into learning tasks.

6. Visual Exposure and Addressing Misconceptions

Visual representations, diagrams, and models help bridge the gap between concrete and abstract thinking. Common misconceptions are identified and addressed explicitly through guided questioning.

7. Cross-Subject Integration

The new textbook integrates concepts across subjects, linking mathematics with environmental studies, art, and language, thereby promoting holistic learning.

A noteworthy change is that answers are not provided at the end of the textbook, encouraging discussion, exploration, and critical thinking rather than rote memorization.

Conclusion

The new *Ganita Prakash* textbook marks a paradigm shift in mathematics education — from rote learning to active, competency-based learning. It invites both teachers and students to participate in a journey of joyful discovery, reflection, and lifelong learning, truly embodying the spirit of NEP 2020 and NCF-SE 2023.

EFFECTIVE STRATEGIES FOR TEACHING ARITHMETIC EXPRESSIONS & EXPRESSIONS USING LETTER NUMBERS

Mr. ARI KUMAR
TGT(MATHS)
PM SHRI KV NO 1 MADURAI
CHENNAI REGION

Session Overview

As part of the *Orientation Course for Master Trainers on the New Mathematics Textbook for TGT (Mathematics)*, a highly insightful and interactive session was conducted on the topic "Effective Strategies for Teaching Arithmetic Expressions and Expressions Using Letters and Numbers." The session focused on understanding the pedagogical shifts, activity-based approaches, and ICT integration methods suggested in the new NCERT Mathematics textbooks (Classes VI–VIII) under the National Curriculum Framework (NCF 2023).

The resource person emphasized that teaching expressions is not merely about symbolic manipulation but about helping students build connections between arithmetic and algebraic thinking. The session encouraged teachers to adopt conceptual, experiential, and technology-supported approaches to develop mathematical reasoning and generalization skills among learners.

Understanding Arithmetic Expressions in the New NCERT Textbooks

The new NCERT Mathematics textbooks are structured around **competency-based learning**, focusing on conceptual clarity, reasoning, and real-life application. Arithmetic expressions and expressions using letters and numbers are introduced progressively across classes VI to VIII to develop *pre-algebraic* and *algebraic* understanding systematically.

- **Class VI:**
  Students begin to observe patterns, understand the use of letters to represent numbers, and form simple arithmetic expressions from verbal statements.
  Example: If one pencil costs ₹x, then the cost of 5 pencils = 5x.

- **Class VII:**
  Learners explore addition, subtraction, and simplification of expressions.

They understand coefficients, like and unlike terms, and the structure of algebraic expressions through examples, tables, and visual patterns.

- **Class VIII:**
  Students advance to operations on algebraic expressions, multiplication, factorization, and application in geometry and daily life situations.

The session underlined that these topics must be taught not as isolated procedures but as a continuum of mathematical reasoning, where each level strengthens the foundation for algebraic understanding.

Pedagogical Objectives

1. To connect arithmetic operations with symbolic expressions and generalization.

2. To help students recognize and express patterns using letters and numbers.

3. To develop reasoning, logical thinking, and problem-solving skills.

4. To use ICT tools and manipulatives to visualize abstract concepts.

5. To promote discussion, exploration, and collaborative learning.

The resource person reminded that *"Algebra begins with curiosity"*—students must be encouraged to explore how numbers behave and represent these relationships using symbols.

Effective Teaching Strategies

1. Building Conceptual Bridge from Arithmetic to Algebra

Students often find the transition from numbers to symbols challenging. Teachers can help them make this shift by:

- Starting with pattern-based activities (e.g., number patterns, geometric patterns).

- Using repeated addition examples to derive expressions like *3 × (x + 2)*.

- Encouraging verbal expression of rules before symbolic representation.

For instance, teachers can use ICT simulations to display growing patterns (triangles, squares, staircases) and guide students to generalize the *nth term*. This helps them understand how variables represent changing quantities.

2. Contextual and Real-Life Applications

Expressions become meaningful when rooted in real-world contexts. Examples such as:

- "If one chocolate costs ₹x, what will be the cost of 10 chocolates?"

- "If Rina is 3 years older than her brother, how can we express her age?" Such examples link arithmetic operations to algebraic expressions, enabling learners to *see mathematics in their surroundings*.

3. Use of Manipulatives and Visual Models

The session highlighted the Concrete–Pictorial–Abstract (CPA) approach:

- **Concrete:** Using *algebra tiles*, counters, and strips to represent variables and constants.

- **Pictorial:** Drawing diagrams or using ICT tools to show combinations of terms.

- **Abstract:** Representing and simplifying expressions symbolically.

For example, algebra tiles can be used to demonstrate addition and subtraction of like and unlike terms, helping students visualize what "$2x + 3x = 5x$" means.

4. Integration of ICT Tools

The use of digital resources significantly enhances engagement and conceptual clarity. Suggested tools include:

- **GeoGebra and Desmos:** To visualize and manipulate algebraic expressions dynamically.

- **PhET Simulations:** To demonstrate variable relationships and balancing equations.

- **Kahoot! / Quizizz:** For interactive quizzes and instant feedback.

- **Digital whiteboards:** For collaborative exploration and simplification exercises.

These tools promote active learning, instant visualization, and collaborative problem-solving among students.

Progressive Approach from Classes VI to VIII

Class	Focus Area	Suggested Teaching Strategy
VI	Introduction to variables, simple expressions	Use real-life examples, pattern activities, and ICT-based games
VII	Simplification and combination of expressions	Introduce algebra tiles, like/unlike terms through color coding
VIII	Operations on expressions, factorization	Use GeoGebra simulations and project-based learning

This progression ensures that learning builds conceptually and that students view algebra as a natural extension of arithmetic.

Addressing Common Learning Gaps

The resource person drew attention to several misconceptions students often have:

- Confusing *letters as fixed unknowns* rather than *variables that change*.

- Combining unlike terms incorrectly.

- Overreliance on rote rules without conceptual understanding.

Remedial strategies include:

- Color coding terms (like vs. unlike).

- Peer explanation and collaborative exercises.

- Visual demonstrations before symbolic manipulation.

- Concept mapping and reflection tasks through digital journals.

Assessment and Reflection

Assessment should not be limited to procedural accuracy but should evaluate reasoning and understanding. Suggested assessment strategies include:

- **Diagnostic Quizzes** using Google Forms or interactive platforms.

- **Math Journals:** Students explain in their own words what expressions mean.

- **Peer Assessment:** Collaborative problem-solving and feedback.

- **Performance Tasks:** Applying algebraic expressions in real-life contexts such as calculating costs, perimeters, or age problems.

ICT-based assessments allow for immediate feedback, motivating students to self-correct and reflect on their learning.

Integration with NEP 2020 and NCF 2023 Vision

The session connected the teaching of expressions to the NEP 2020 and NCF 2023 vision of transforming classrooms into concept-based, competency-driven learning spaces.
Teachers were encouraged to shift from rote rule-based algebra to exploratory and reasoning-based learning, aligning with the NEP's emphasis on:

- Foundational numeracy,

- Conceptual understanding,

- Integration of technology,

- Holistic and joyful learning.

The resource person also stressed the importance of developing *mathematical language and communication*, enabling students to express reasoning both verbally and symbolically.

Key Takeaways

1. Begin algebraic learning through patterns, exploration, and real-life contexts.

2. Move from concrete to abstract understanding using manipulatives and ICT tools.

3. Encourage reasoning, generalization, and justification of rules.

4. Integrate 21st-century skills—critical thinking, collaboration, creativity, and communication—into mathematical teaching.

5. Use formative assessments to guide learning and provide feedback.

Conclusion

The session on "Effective Strategies for Teaching Arithmetic Expressions and Expressions Using Letters and Numbers" offered valuable insights for Mathematics educators on implementing the new NCERT textbooks effectively. It reinforced the idea that algebra is not merely computation with symbols but a language for expressing mathematical relationships.

By adopting inquiry-based learning, ICT tools, and contextualized pedagogy, teachers can make abstract concepts accessible and enjoyable for students. The session concluded with the message that effective mathematics teaching is about enabling students to think, reason, and create, preparing them for future learning and real-life problem-solving.

TEACHING OF NUMBERS AROUND US & NUMBER PLAY

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PM SHRI KV VIZIANAGARAM
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Session Overview

As part of the *Orientation Course for Master Trainers on the New Mathematics Textbook for TGT (Mathematics)*, an engaging and thought-provoking session was conducted on "Teaching of Numbers Around Us and Number Play."

The session aimed to help teachers understand the new pedagogical approaches, competency-based outcomes, and creative teaching strategies proposed in the revised NCERT Mathematics textbooks for Classes VI to VIII under the National Curriculum Framework (NCF 2023).

The resource person emphasized that *numbers are not confined to textbooks*—they are an integral part of our daily life and environment. The theme *"Numbers Around Us"* and *"Number Play"* encourages teachers to connect mathematics with real-world experiences, nurture curiosity, and promote joyful learning through activities, patterns, and explorations.

Understanding the Theme in the New NCERT Textbooks

The new NCERT textbooks for Classes VI–VIII have been designed to promote mathematical reasoning, exploration, and creativity rather than rote memorization. The themes *"Numbers Around Us"* and *"Number Play"* appear prominently in the upper primary grades to bridge the gap between arithmetic and number sense, enabling students to perceive numbers as tools for reasoning, estimation, and discovery.

- **In Class VI:** Learners explore whole numbers, factors, multiples, prime numbers, and patterns in the number system. Activities help them understand the logic behind divisibility, operations, and relationships between numbers.

- **In Class VII:** The focus shifts toward integers, fractions, and rational numbers—helping learners recognize how numbers extend to represent new quantities (positive, negative, fractional).

- **In Class VIII:** Students study exponents, powers, squares, cubes, and number patterns, reinforcing abstract reasoning through playful and investigative methods.

This progression ensures that students develop not only computational accuracy but also numerical reasoning, estimation skills, and appreciation for the beauty of numbers.

Objectives of Teaching Numbers Around Us and Number Play

1. To help learners observe and recognize numbers in their environment.

2. To develop numerical reasoning, pattern recognition, and estimation skills.

3. To promote curiosity and creativity through play, puzzles, and exploration.

4. To integrate real-life contexts with mathematical learning.

5. To use ICT tools, games, and collaborative activities for joyful engagement.

The session highlighted that effective number teaching must go beyond mechanical operations to foster conceptual understanding, number sense, and flexibility in thinking.

Effective Teaching Strategies

1. Connecting Mathematics to Real-Life Contexts

Students should see that numbers are everywhere — in clocks, calendars, currency, temperature, measurements, and digital devices.
Teachers can begin lessons with situational contexts, such as:

- Reading bus numbers, counting steps, or measuring distances.

- Understanding household budgets, grocery bills, or sports scores.

- Observing number patterns in vehicle number plates, telephone numbers, and digital codes.

Activity Example:
Ask students to find and list different types of numbers (whole, even, odd, prime, etc.) that appear around them in a single day. Discuss patterns and meanings behind them.

Such experiential learning develops observation, reasoning, and appreciation for mathematics in the real world.

2. Activity-Based and Playful Learning

The *"Number Play"* component in the new textbooks encourages the use of mathematical games, puzzles, and magic tricks to teach numerical relationships.

Examples include:

- **Number riddles:** Guess the number based on clues involving operations.

- **Magic squares:** Discover patterns that lead to equal sums in rows and columns.

- **Number chains:** Create a sequence where each term follows a rule.

- **Digital games:** Use online platforms (e.g., *Toy Theater*, *Math Playground*) for interactive number puzzles.

Such play-based learning makes mathematics enjoyable and enhances logical thinking. It also aligns with the NEP 2020 emphasis on joyful and discovery-based learning.

3. Pattern Exploration and Mathematical Investigation

Patterns are the essence of mathematics.
Teachers can use **patterns in nature**, art, music, and architecture** to spark curiosity among learners.

Examples:

- Number sequences like 2, 4, 8, 16… (powers of 2)

- Multiplication patterns (e.g., $9 \times 1 = 9$, $9 \times 2 = 18$, pattern in digits)

- Symmetry and patterns in tiling or Rangoli designs

Using ICT tools like GeoGebra, Desmos, or simple spreadsheet software (Excel, Google Sheets), students can generate and visualize number patterns dynamically. This develops computational thinking and the ability to predict, test, and generalize rules—core components of higher mathematical reasoning.

4. Use of ICT and Digital Resources

Integration of Information and Communication Technology (ICT) brings abstract number concepts to life. The resource person demonstrated how digital tools can be used to make learning interactive and visual.

Recommended approaches include:

- **Visual number lines** and animations to explain integers and operations.

- **Simulations and games** to model operations on fractions or rational numbers.

- **Online quizzes and polls** for quick assessments (using *Kahoot*, *Quizizz*, or *Nearpod*).

- **Digital storytelling** – creating short videos or slides showing "numbers in daily life."

These tools foster collaborative learning, instant feedback, and self-paced exploration, catering to diverse learning styles.

5. Differentiated and Inclusive Learning

The new NCERT textbooks encourage teachers to recognize diverse learning needs. Strategies suggested include:

- Using manipulatives and visual aids for slow learners.

- Offering extension puzzles and logic problems for advanced learners.

- Incorporating peer learning and group activities to promote inclusion.

- Encouraging reflection—students explain *why* a number pattern works, not just *what* it is.

Through differentiated approaches, all learners develop confidence in handling numbers and expressing mathematical ideas.

Examples from the New Textbooks

The session highlighted activities drawn from the new NCERT books:

- **Class VI:** "Playing with Numbers" – finding patterns in multiplication tables, prime factorization, and divisibility.

- **Class VII:** "Number Games" – discovering the role of negative numbers in real contexts (e.g., temperatures, bank transactions).

- **Class VIII:** "Number Puzzles" – exploring exponents, powers, and numerical patterns through experimentation.

Each activity links real-world situations with playful inquiry, aligning with the competency-based learning framework.

Assessment and Reflection

Assessment in the new approach is integrated and formative. Teachers are encouraged to assess not only correctness but also reasoning, strategy, and creativity.

Suggested assessment methods include:

- Observation checklists during games and activities.

- Peer assessment for group tasks and discussions.

- Math journals or portfolios where students document patterns, discoveries, and reflections.

- ICT-based tests with interactive quizzes for instant feedback.

This holistic assessment approach ensures that learning is continuous, reflective, and inclusive.

Key Takeaways

1. Numbers are everywhere – teaching must connect classroom learning with real-life experiences.

2. Learning through play, exploration, and patterns enhances conceptual understanding.

3. ICT tools transform number learning into visual, interactive, and enjoyable experiences.

4. Encourage inquiry and reasoning – let students discover relationships rather than memorize rules.

5. Assess students holistically – focusing on process, creativity, and application.

The resource person stressed that effective number teaching should aim to *develop a sense of wonder about mathematics*, where every learner finds joy in discovering numerical beauty.

Conclusion

The session on "Teaching of Numbers Around Us and Number Play" was an enriching and insightful experience for all participants. It reflected the paradigm shift in mathematics education promoted by the NCERT's new textbooks—from rote computation to experiential, integrated, and competency-based learning.

The resource person concluded that teaching numbers should focus on developing reasoning, curiosity, and creativity, not merely procedural accuracy. When learners are encouraged to observe numbers in their surroundings, play with patterns, and explore relationships through ICT and activities, mathematics becomes meaningful, joyful, and life-connected.

Such an approach truly aligns with the vision of NEP 2020 and NCF 2023, preparing learners to think critically, appreciate mathematics in daily life, and grow as confident problem-solvers in the 21st century.

PARALLEL AND INTERSECTING LINES AND A TALE OF THREE INTERSECTING LINES

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ASST. TEACHER
MC THALALU, HD KOTE TALUK,
MYSORE

Session Overview

As part of the *Orientation Course for Master Trainers on the New Mathematics Textbook for TGT (Mathematics)*, a comprehensive and engaging session was conducted on the topic "Parallel and Intersecting Lines and A Tale of Three Intersecting Lines."
The session aimed to introduce the conceptual and pedagogical approaches of the *new NCERT Mathematics textbooks (Classes VI–VIII)* under the National Curriculum Framework (NCF 2023).

The resource person emphasized that geometry is not just about abstract definitions or diagrammatic exercises but a subject that helps students observe, reason, and interpret the spatial world around them. The topic of parallel and intersecting lines, along with the "Tale of Three Intersecting Lines", provides the foundation for higher-level geometric reasoning and analytical thinking.

Conceptual Focus in the New NCERT Textbooks

The new NCERT textbooks promote activity-based learning, integrating real-life contexts, illustrations, and ICT tools to make geometry more meaningful and experiential.

In Class VI:

Students are introduced to basic geometric ideas — points, line segments, lines, rays, and their relationships. They learn to identify parallel and intersecting lines through everyday observations such as railway tracks, window frames, and roads meeting at junctions. Activities encourage them to understand that parallel lines never meet, whereas intersecting lines meet at one point.

In Class VII:

Learners explore angle relationships formed when a transversal cuts parallel line — corresponding angles, alternate interior angles, and co-interior angles. Through measurement and reasoning, they discover the consistency of angle properties.

In Class VIII:

The focus deepens with "A Tale of Three Intersecting Lines", where learners explore concurrency, relationships among intersecting lines, and angle properties using observation, reasoning, and algebraic verification.

This gradual progression from observation to reasoning reflects the spiral structure of the new textbooks, ensuring conceptual continuity and depth.

Objectives of the Topic

1. To help learners identify and describe parallel and intersecting lines in real life.

2. To promote reasoning and spatial visualization through exploration and measurement.

3. To link geometric concepts with practical, everyday contexts.

4. To use ICT and models to visualize relationships among lines.

5. To foster curiosity, logical reasoning, and problem-solving through discovery.

The resource person reiterated that geometry must *develop reasoning, not just replication of shapes* — students should experience geometry as a process of exploration and thinking.

Teaching Parallel and Intersecting Lines

1. Real-Life Observation and Connection

The lesson begins by encouraging students to look around:

- **Parallel Lines:** Railway tracks, the edges of notebook paper, stripes on a uniform, grill patterns.

- **Intersecting Lines:** The letter X, road crossings, scissors blades, or corners of tables.

Students are invited to share observations, creating a sense of ownership and curiosity. The teacher then formalizes the concept through guided questioning.

2. Hands-on Activities

The new textbooks integrate simple classroom activities to explore the topic:

- Using rulers and protractors to draw and extend lines.

- Demonstrating intersection using sticks, strings, or straws on chart paper.

- Constructing models of parallel and intersecting lines using matchsticks or geoboards.

- Discussing *"Can two lines never meet? Can they meet more than once?"* to build reasoning.

These tasks transform definitions into discoveries, promoting experiential understanding.

3. Integrating ICT Tools

ICT-supported teaching was strongly emphasized in the session. The resource person demonstrated tools like GeoGebra and PhET Interactive Geometry Simulations to dynamically show how:

- Two lines can remain parallel regardless of extension.

- A transversal creates pairs of equal and supplementary angles.

- The position and intersection points of three lines can be explored interactively.

Such visualization supports students in constructing geometric meaning beyond textbook diagrams.

Exploring "A Tale of Three Intersecting Lines"

1. Concept and Story Approach

The Class VIII textbook presents this topic through a narrative format, blending storytelling and exploration. "A Tale of Three Intersecting Lines" introduces students to the idea of concurrency — when three or more lines meet at a single point.

Through story-driven exploration, learners engage in activities that make geometry relatable and enjoyable, encouraging them to draw conclusions based on reasoning rather than rote rules.

2. Classroom Applications

Students can experiment by:

- Drawing three different lines and observing how they intersect.

- Identifying when all three lines pass through a single point (concurrent lines).

- Measuring and comparing angles formed at the intersections.

- Discussing scenarios where lines form triangles when intersecting in pairs.

Teachers can guide them to understand that concurrent lines appear frequently in geometric figures (medians, altitudes, or angle bisectors of a triangle).

3. Real-Life Relevance

The resource person linked the topic to structures like railway crossings, towers, bridges, and road junctions. These examples help students appreciate how geometry is used in design, construction, and visual art — making the learning experience tangible and integrated with daily life.

Pedagogical Strategies Highlighted in the Session

1. **Concrete–Pictorial–Abstract (CPA) Progression:**
   Start with tangible models → move to pictorial representations → finally reach abstract reasoning.

2. **Exploration-Based Learning:**
   Encourage students to predict, experiment, and discover geometric relationships through inquiry.

3. **Collaborative and Discussion-Based Learning:**
   Promote group work and peer explanations to build communication and reasoning skills.

4. **Use of ICT for Dynamic Visualization:**
   Digital tools make the invisible visible and the abstract understandable.

5. **Interdisciplinary Approach:**
   Connect geometry with art, design, and architecture — integrating aesthetic appreciation with mathematical precision.

Assessment and Reflection

The session emphasized continuous, process-based assessment rather than one-time evaluation. Suggested methods include:

- **Observation checklists** during practical activities.

- **Drawing and labeling exercises** showing line relationships.

- **Exploratory tasks** like "find examples of concurrent lines in your surroundings."

- **Math journals** where students record discoveries and reflections.

- **ICT-based quizzes** using tools such as *Kahoot*, *Nearpod*, or *Google Forms* for instant feedback.

These assessments focus on *understanding, reasoning, and creativity* rather than memorized answers.

Integration with NEP 2020 and NCF 2023

The topic aligns closely with the **NEP 2020** and **NCF 2023** vision of experiential and competency-based learning.
Students are expected to:

- Observe, explore, and reason geometrically.

- Develop visualization and spatial reasoning skills.

- Apply mathematical concepts to real-life and interdisciplinary contexts.

The emphasis is on making geometry learner-centered, inquiry-based, and joyful, reflecting the shift from *"learning about mathematics"* to *"learning through mathematics."*

Key Takeaways

1. Geometry teaching should move from memorization to meaningful exploration.

2. Real-world examples make abstract concepts accessible and engaging.

3. ICT tools and digital geometry labs enhance interactive understanding.

4. Storytelling and discovery methods create curiosity and long-term retention.

5. Continuous reflection and assessment promote deep, conceptual learning.

Conclusion

The session on "Parallel and Intersecting Lines and A Tale of Three Intersecting Lines" provided a refreshing and practical perspective on teaching geometry in middle school. It demonstrated how the new NCERT textbooks integrate real-life context, narrative pedagogy, and technology to make geometry experiential and enjoyable.

The resource person concluded that when students observe, construct, and reason rather than memorize, they begin to see geometry as a living subject—one that explains the order, beauty, and symmetry of the world around them.

This approach truly embodies the spirit of NEP 2020 and NCF 2023, preparing learners to think critically, reason logically, and appreciate the aesthetic harmony of mathematics in everyday life.

INDIAN TRADITIONAL KNOWLEDGE SYSTEM IN MATHEMATICS

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ZIET MYSURU

Introduction

The three-day Orientation Course for Master Trainers (TGT Mathematics) on the new NCERT Mathematics textbooks for Classes VI to VIII aimed to familiarize participants with the philosophy, structure, and pedagogy of the revised *Ganita Prakash* textbooks developed in alignment with the National Education Policy (NEP) 2020 and the National Curriculum Framework (NCF) 2023.

A special session on "Indian Traditional Knowledge System in Mathematics" was conducted to highlight India's rich mathematical heritage and its integration in the new textbooks. The session sought to deepen participants' understanding of the contributions of ancient Indian scholars to mathematical thought and their relevance to present-day teaching and learning practices.

Objectives of the Session

The session had the following specific objectives:

- To acquaint teachers with the historical evolution and indigenous roots of mathematical knowledge in India.
- To connect traditional mathematical concepts with modern-day curriculum outcomes and classroom pedagogy.
- To encourage teachers to adopt culturally contextualized examples while teaching various mathematical concepts.
- To explore ways of integrating the Indian Knowledge System (IKS) within the new NCERT textbooks, aligning with the goals of holistic and competency-based education envisioned in NEP 2020.

Content Highlights

The resource person began the session by emphasizing the continuity and depth of India's mathematical tradition, tracing it from the Vedic period to later scholars such as Āryabhaṭa, Bhāskara, Brahmagupta, and Pingala. The presentation covered:

- Vedic Mathematics: Mental computation techniques, sutras, and their classroom applications for developing numerical agility and logical reasoning.
- Geometry in Ancient India: Measurement of altars (Sulbasutras), geometrical patterns, and symmetry in temple architecture and art forms.
- Concept of Zero and Decimal System: Contributions of Indian mathematicians in developing the place-value system and its profound global influence.
- Mathematics in Daily Life: Use of mathematical reasoning in Indian art, design, astronomy, music, and traditional crafts.

- IKS Integration in New Textbooks: Discussion on how activities, illustrations, and contextual examples in the new *Ganita Prakash* textbooks reflect indigenous knowledge traditions.

Interactive demonstrations were presented using selected textbook activities that showcase the link between cultural practices and mathematical ideas, such as kolams, mandalas, and traditional measuring units.

Pedagogical Insights

The session emphasized the need to shift from teaching Mathematics as a set of abstract formulas to a living discipline rooted in experience and culture. Teachers were encouraged to:
- Integrate stories, patterns, and indigenous examples to make abstract concepts relatable.
- Promote inquiry-based and experiential learning approaches inspired by traditional practices.
- Connect mathematical reasoning with art, design, and environmental contexts to promote interdisciplinary learning.
- Develop sensitivity towards local knowledge systems and encourage students to explore mathematical ideas embedded in their surroundings.

The resource person demonstrated sample lesson plans and activity modules that align the Indian Traditional Knowledge System with competency-based teaching and learning outcomes.

Participant Reflections

Participants actively engaged in discussions and shared local examples from their own cultural contexts that could be incorporated into classroom practice. They expressed appreciation for the inclusion of IKS in the new textbooks, noting that it:
- Makes learning more contextual and engaging.
- Helps students appreciate India's contributions to world knowledge.
- Bridges the gap between tradition and modernity in the teaching of Mathematics.

Several teachers shared classroom strategies for adapting IKS-based activities, such as creating geometry lessons inspired by rangoli patterns, exploring measurement through indigenous crafts, and introducing mental arithmetic using Vedic techniques.

The session on *Indian Traditional Knowledge System in Mathematics* provided valuable insights into India's mathematical legacy and its pedagogical potential. It reaffirmed that Mathematics is not merely a universal language of logic but also a reflection of a civilization's cultural and intellectual achievements.

By integrating IKS into classroom teaching, educators can cultivate curiosity, creativity, and national pride among learners—aligning with the vision of NEP 2020 to promote rootedness and pride in India, along with global competency.

The workshop concluded with a collective resolve among participants to infuse Indian perspectives, creativity, and experiential learning into mathematics education, thereby making it joyful, meaningful, and holistic.

ANCIENT INDIAN MATHEMATICIANS

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ZIET, MYSURU

Introduction

As part of the Orientation Course for Master Trainers (TGT Mathematics) on the new NCERT Mathematics textbooks for Classes VI to VIII, a session on "Indian Mathematicians" was conducted by Mr. D. Sreenivasulu, Training Associate (Mathematics), ZIET Mysuru.

The session aimed to create awareness among teachers about the remarkable contributions of ancient and medieval Indian mathematicians, whose pioneering ideas laid the foundation for modern mathematical concepts. The discussion highlighted the integration of this rich mathematical heritage into the new *Ganita Prakash* textbooks, aligned with the vision of NEP 2020 and NCF 2023, which emphasize the inclusion of Indian Knowledge Systems (IKS) in school education.

Objectives of the Session

The key objectives of the session were to:

- Familiarize teachers with the historical timeline and major contributions of ancient Indian mathematicians.

- Appreciate the scientific rigor and logical reasoning found in India's mathematical tradition.

- Explore ways to integrate examples from Indian mathematicians into classroom teaching.

- Strengthen the spirit of national pride and rootedness in knowledge while fostering curiosity and innovation among students.

Content Highlights

The presentation covered the contributions of several eminent Indian mathematicians spanning from the Vedic period to the medieval period, illustrating India's continuous mathematical advancement.

Baudhayana (800–740 BCE)

- Recognized for one of the earliest recorded statements of the **Pythagorean Theorem**, predating Pythagoras.

- His *Śulba Sūtra* describes methods for constructing altars of equal areas using geometric transformations.

- Demonstrated advanced understanding of geometry and approximate methods for squaring the circle.

Āpastamba (600–400 BCE)

- Extended and refined Baudhayana's work, presenting systematic geometric constructions.

- Provided an accurate **approximation for √2** and rational fraction methods.

- His approach to geometry showed early forms of axiomatic thinking and logical reasoning.

Pingala (circa 300 BCE)

- Authored *Chandahsastra*, linking poetry and mathematics through combinatorics.

- Introduced the binary number system, centuries before it appeared in the West.

- His work also contained the seeds of the Fibonacci sequence and early forms of Pascal's triangle.

Āryabhaṭa (476–550 CE)

- One of the greatest mathematicians and astronomers of ancient India.

- His *Āryabhaṭīya* introduced the concept of zero (śūnya) and the place-value system.

- Accurately calculated the value of π (pi ≈ 3.1416) and explained the rotation of Earth on its axis.

- His contributions influenced both Indian and Islamic mathematical traditions through later translations.

Brahmagupta (598–668 CE)

- Extended Aryabhata's work and provided rules for arithmetic operations involving zero and negative numbers.

- Introduced methods for solving quadratic equations and worked on geometry and algebra.

- His book *Brāhmasphuṭasiddhānta* became a cornerstone for later scholars in India and abroad.

Bhāskara I (600–680 CE)

- One of the earliest commentators on *Āryabhaṭīya*.

- Provided accurate trigonometric approximations and explained the sine function with remarkable precision.

Mahāvīra (800–870 CE)

- Authored *Gaṇita Sāra Saṅgraha*, a comprehensive work on arithmetic and algebra.

- Explained the concept of zero as a number and contributed to the systematization of mathematical operations.

Śrīdhara (870–930 CE)

- Wrote *Pāṭīgaṇita* and *Triśatikā*, which dealt with arithmetic, mensuration, and geometry.

- His work simplified computation for practical use in trade and construction.

Bhāskara II (Bhāskarāchārya) (1114–1185 CE)

- The author of *Siddhānta Śiromaṇi*, divided into four parts — *Līlāvatī* (Arithmetic), *Bījagaṇita* (Algebra), *Golādhyāya* (Spherical Astronomy), and *Grahagaṇita* (Mathematics of the Planets).

- *Līlāvatī* remains one of the most celebrated mathematical texts for its clarity and poetic presentation of mathematical problems.

- Developed methods for solving indeterminate equations and discussed concepts related to calculus centuries before Newton and Leibniz.

Mādhava of Sangamagrama (1238–1317 CE)

- Considered the founder of the Kerala School of Mathematics and Astronomy.

- Discovered infinite series for π, sine, cosine, and tangent—concepts that anticipate modern calculus.

Nīlakaṇṭha Somayāji (1444–1544 CE)

- Advanced trigonometric and astronomical calculations based on Mādhava's work.

- His treatise *Tantrasangraha* includes improved planetary models and precise mathematical reasoning.

Pedagogical Insights

The session emphasized the integration of India's mathematical heritage into the teaching-learning process to make Mathematics contextual, inspiring, and interdisciplinary. Teachers were encouraged to:

- Relate mathematical concepts in textbooks to the discoveries of Indian scholars.

- Use storytelling, puzzles, and historical anecdotes to make lessons engaging.

- Highlight the continuity of mathematical thought—from ancient sutras to modern algorithms.

- Foster inquiry and appreciation for indigenous contributions as part of competency-based learning.

The facilitator demonstrated how certain textbook topics—such as fractions, geometry, and algebra—can be linked to the works of Aryabhata, Bhaskara, and other mathematicians for better conceptual clarity.

Participant Reflections

Participants expressed great interest in learning about India's long and unbroken mathematical tradition. They acknowledged that such knowledge not only enriches classroom teaching but also helps students connect learning with national heritage.
Many participants appreciated that the new NCERT textbooks subtly incorporate the contributions of Indian mathematicians, aligning with the Indian Knowledge System (IKS) focus in NEP 2020.

Several teachers shared ideas for integrating IKS elements into lessons—for example, demonstrating the Pythagorean theorem through Baudhayana's altar constructions, or introducing binary coding through Pingala's poetic meter patterns.

The session on Indian Mathematicians provided deep insight into India's intellectual legacy and its lasting impact on world mathematics. It reinforced the idea that mathematical thought in India evolved through observation, logic, and application to real-world problems.

By recognizing and integrating the contributions of Indian mathematicians into school teaching, educators can cultivate curiosity, creativity, and cultural awareness among learners—key goals of NEP 2020.

The session concluded with the collective understanding that teaching Mathematics in the Indian context should celebrate both global and indigenous perspectives, thereby nurturing rooted, competent, and innovative learners.

EXPERIENTIAL LEARNING IN MATHEMATICS

Mrs. KAVITHA P S
KV DRDO
BENGALURU

Introduction

The session aimed to familiarize teachers with the principles of experiential learning and to demonstrate how new mathematics textbooks are designed to make learning active, reflective, and competency-based in alignment with the National Education Policy (NEP 2020) and the National Curriculum Framework (NCF 2023).

The presentation began with a reflective statement:

"Just because it's hands-on doesn't mean it's minds-on."

This thought invited teachers to look beyond activity-based instruction and understand that real learning happens when students engage cognitively and reflectively with mathematical concepts.

Highlights of the Session

1. Understanding Experiential Learning

The resource person introduced the idea of experiential learning as learning through doing and reflecting. It was explained that experiential learning goes beyond physical activity; it connects observation, reflection, and application to create meaningful understanding.

Participants discussed a few misconceptions about experiential learning and realized that meaningful engagement occurs when students think deeply about their experiences.

To clarify this process, Kolb's Experiential Learning Model was presented. The model consists of four cyclic stages:

- **Concrete Experience** – engaging in an activity to gain experience.

- **Reflective Observation** – thinking about what happened during the activity.

- **Abstract Conceptualization** – drawing inferences and forming mathematical concepts.

- **Active Experimentation** – applying the new learning to solve problems or test new ideas.

This model was related to mathematics classrooms, where students explore, observe, reason, and apply ideas to build conceptual clarity.

2. Demonstration of Experiential Activities in Mathematics

The second part of the session was devoted to exploring hands-on mathematical activities from the new textbooks, designed to promote experiential learning.

(a) Activity – "Who I Am?" (Coordinate Geometry)

In this engaging task, participants plotted a series of given coordinates on a Cartesian plane and joined them sequentially to discover a hidden figure.
The coordinates, such as
$$(0,5), (2,7), (2,8), (3,7), (3,8), (4,7), (4,5), (8,5), (9,4), (10,2), \dots$$
revealed a meaningful shape when connected.

This activity combined art with geometry, encouraging logical reasoning, pattern identification, and spatial visualization. Teachers recognized how such activities could make geometry interactive and enjoyable, transforming abstract concepts into visual experiences.

A second version of "Who I Am?" used negative coordinates, prompting learners to extend their understanding of all four quadrants in the coordinate plane. The activity demonstrated how mathematical curiosity could be built through discovery-based learning.

(b) Activity – Exploring Area and Perimeter through Tangrams (Class VI)

The next activity introduced Tangrams—a dissection puzzle consisting of seven geometric pieces: two large triangles, one medium triangle, two small triangles, one square, and one parallelogram.
Teachers created tangram sets by drawing, cutting, and arranging the shapes. The facilitator guided them to explore geometric relationships and verify properties of the shapes through measurement and observation.

Participants engaged in the following tasks:

- Assigning fractional values, percentages, and decimals to each tangram piece relative to the whole.

- Discussing addition, subtraction, and equivalence of fractions using the pieces.

- Comparing the areas of different shapes (e.g., $D = 2C$, $C + E = D$, $C + E = F = G$).

- Identifying relationships among shapes such as $A = 2G = 4C$.

They discovered that when all seven pieces were rearranged to form different figures such as squares, rectangles, rhombuses, or trapeziums, the total area remained constant (since all seven pieces were used), but the perimeters varied.

This observation initiated rich discussion on how area depends on the total surface covered while perimeter depends on shape arrangement. Participants reflected on how such activities develop deeper understanding of geometry, fractions, ratios, and spatial reasoning.

3. Reflection and Discussion

After completing both activities, participants reflected on how experiential learning encourages mathematical thinking beyond rote computation.
They noted that:

- Learners construct understanding through exploration and reasoning.

- Activities like coordinate plotting and tangrams foster conceptual clarity, collaboration, and creative problem-solving.

- Mathematics becomes meaningful when learners connect ideas with real-world experiences and visual contexts.

The session concluded with the idea that experiential learning must be intentionally embedded in lesson design—not as an add-on, but as an integral part of the teaching–learning process.

Conclusion

The 90-minute session on *Experiential Learning in Mathematics* effectively demonstrated how experiential approaches can make mathematical learning more joyful, reflective, and conceptually strong.

Through examples from coordinate geometry and tangram-based geometry, teachers experienced the process of learning by doing, observing, and reasoning. The session reinforced that the new Mathematics textbooks for Classes VI to VIII are built on the principles of activity-based, inquiry-driven, and competency-oriented learning, as envisioned by NEP 2020 and NCF 2023.

Teachers appreciated the simplicity and power of these activities and expressed confidence in implementing similar experiential strategies in their classrooms. The session successfully conveyed that experiential learning transforms Mathematics from a subject of procedures to a subject of exploration, reasoning, and discovery.

Teaching of Fractions

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Introduction

As part of the *Orientation Workshop for Master Trainers on New NCERT Textbooks for Classes VI to VIII (Mathematics)*, a session on "Teaching of Fractions" was conducted by Mr. Madhu B, Assistant Professor, Regional Institute of Education (RIE), Mysuru, and one of the subject contributors to the newly developed NCERT textbooks.

The session aimed to help teachers understand the conceptual progression of fractions from Classes VI to VIII and to explore the pedagogical approaches embedded in the new textbooks designed in accordance with the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCF-SE 2023).

Fractions, being one of the foundational yet abstract concepts in school mathematics, often present conceptual difficulties to learners. The new NCERT textbooks have been developed to address these challenges through a competency-based, experiential, and spiral approach that emphasizes conceptual understanding, visualization, and application over rote procedures.

Progression of Fraction Concepts & Key Textbook Features

Class VI – Building Meaning and Representation

- The new textbook (Chapter 7: Fractions) introduces fractions through part-whole contexts, for example slices of roti shared among children.
- Students work with unit fractions, proper fractions, improper fractions and mixed numbers. They learn to represent fractions using shapes (area models), number-lines and equal partitions.
- The textbook embeds tasks where learners explore equivalent fractions, simplify to lowest terms, compare fractions using visual and number-line models.
- Emphasis is given to learners constructing meaning: e.g., dividing a paper, shading parts, asking how many parts one child gets. This helps internalise that a fraction is a single quantity (not two separate numbers).
- From discussion: "Start with real sharing situations → visual models → number-line → symbolic form" — a scaffolding sequence that helps avoid procedural traps.

Class VII – Operations and Deepening Understanding

- In the new textbook, operations (addition, subtraction, multiplication, division of fractions) are treated in a reasoning-based manner rather than rote rule copying. For

example, multiplication is introduced as "a fraction of a fraction" using area models or repeated parts.

- Learners revisit equivalent fractions and simplify before performing operations; they visualise what adding unlike fractions means (through common denominators or partitioning) rather than just applying formulae.
- The textbook uses meaningful word-problems (contexts of sharing, measurement, allocating quantities) so that learners see fractions in action—not just as abstract numbers.
- Trainers at the session discussed designing classroom tasks where learners first explore (hands-on), then reflect (why the procedure works), then generalise (symbolic representation) aligned with experiential learning.

Class VIII – Connecting Fractions with Broader Mathematical Ideas

- Fractions now serve as a bridge to ratios, proportions, decimals, percentages and rational numbers. The textbook emphasises connections rather than treating these topics in isolation.
- Problem-solving tasks in the textbook require learners to apply fraction skills in new settings: e.g., mixing quantities, interpreting data, solving real-life problems involving fractional quantities.
- Assessment tasks also include reasoning, representation and modelling, thereby aligning with the competency-based approach of NEP 2020.
- In the session the trainers examined sample classroom tasks from the textbook and discussed how to scaffold for diverse learners (differentiation, peer work, visual supports).

Pedagogical Design & Experiential Features in the Textbooks

- **Experiential tasks**: Activities where students manipulate materials (paper folding, shading, using fraction strips), observe patterns, reason and represent. This aligns with the cycle: concrete experience → reflection → abstraction → experimentation.

- **Spiral progression**: Fraction concepts recur across classes but in increasingly abstract and applied contexts—ensuring reinforcement and continuity.

- **Visual and symbolic link**: The textbooks consistently move from models (area, number-line) to symbolic form, helping learners ground their understanding in something they can see or do.

- **Real-life contexts and word problems**: Fraction learning is contextualised in everyday situations to enhance meaning and motivation.

- **Competency focus**: Rather than just computational accuracy, the textbooks include tasks where learners *explain*, *justify*, *represent* fraction ideas—developing reasoning and communication.

- **Differentiation and inclusion**: There are tasks for slower learners (visual models) and extension tasks for advanced learners (complex contexts, connections).

- **Assessment aligned with pedagogy**: The textbooks include formative tasks, reflective questions and not just end-of-chapter drills. Trainers explored how to frame classroom assessment in line with this design.

Classroom Implications & Reflection

During the session, participants reflected on how they will translate these textbook features into their classrooms:

- They recognised that teaching fractions must begin with meaning, not procedures. Many admitted they had moved quickly to algorithms.

- The trainers committed to designing lessons where students first *explore* (folding paper, shading shapes), then *reason* (why $2/5 + 1/3 \neq 3/8$) and then *practice* (symbolic work).

- They also discussed how to scaffold for learners who struggle: using fraction strips, number-lines, peer discussion, and open tasks.

- Assessment design emerged as a key focus: observing how students represent fractions (drawing models, using number-lines), asking them to justify equivalence, instead of just calculating answers.

- The session concluded with an action plan to incorporate three activities from the textbook into upcoming lessons, monitor student reasoning and share reflections with peers.

Conclusion

The session "Teaching of Fractions" by Madhu B successfully bridged the theoretical progression of fraction concepts (Classes VI–VIII) with the pedagogical design of the new NCERT textbooks and practical classroom strategies. Participants gained a clearer understanding of how fractions are developed through scaffolded, experiential, competency-based learning rather than through isolated algorithms. They left with both conceptual clarity and practical ideas for classroom implementation.

The new textbooks position fractions as not just numbers to be manipulated, but ideas to be reasoned about, represented and applied. As master trainers, participants are now better equipped to cascade this approach and support teachers in making fraction learning meaningful, inclusive and engaging.

ICT ENABLED ASSESSMENT & DIGITAL INTEGRATION: USING QR CODES, E-CONTENT & DIKSHA PORTAL

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Introduction

As part of the *3-Day Orientation Workshop for Master Trainers on New NCERT Textbooks for Classes VI–VIII (Mathematics)*, a 90-minute session on ICT Enabled Assessment and Digital Integration was conducted to familiarize participants with the digital features, e-resources, and assessment tools embedded in the new NCERT textbooks.

The session focused on three main components — QR Codes, e-Content, and the DIKSHA Portal — demonstrating how digital integration supports *experiential, competency-based, and self-paced learning* in accordance with the National Education Policy (NEP 2020) and National Curriculum Framework for School Education (NCF-SE 2023).

With the digital transformation of classrooms and growing emphasis on technology-enhanced learning, this session aimed to empower mathematics educators to effectively utilize digital tools for assessment, enrichment, and continuous professional development.

1. Digital Integration in the New NCERT Textbooks

The new NCERT textbooks for Classes VI–VIII mark a significant step toward blended learning, where printed content is integrated with digital learning resources. Each chapter is interlinked with QR Codes, which provide instant access to supplementary materials such as videos, interactive simulations, digital worksheets, practice assessments, and teacher support materials hosted on the DIKSHA Portal.

The resource person explained that these digital inclusions are not add-ons but essential components that help achieve the learning outcomes and competency-based objectives envisioned in NEP 2020. The key aims of this integration include:

- Enhancing conceptual understanding through visual and interactive e-content.
- Promoting self-paced learning where students can revisit concepts as needed.
- Supporting teachers with readymade digital tools for lesson planning and assessment.
- Bridging learning gaps through formative feedback mechanisms.

Participants were introduced to the user-friendly design of the new textbooks, where each chapter includes a small QR code symbol (Energised Textbook) that learners can scan using mobile devices or the DIKSHA mobile app to access relevant digital material.

2. Exploring the DIKSHA Portal

The DIKSHA (Digital Infrastructure for Knowledge Sharing) Portal, developed by the Ministry of Education, Government of India, serves as the central platform for hosting NCERT's e-content. The resource person demonstrated how both teachers and students can access the portal through mobile devices or desktop computers using the website https://diksha.gov.in or the DIKSHA app.

Participants explored the structure and navigation of the portal, which includes:

- Digital Textbooks for all NCERT subjects and classes.
- Interactive Content aligned to specific QR codes from textbooks.
- Quizzes and Assessments for formative evaluation.
- Teacher Professional Development Courses.
- Analytics Tools to track student learning progress.

The demonstration included scanning sample QR codes from the new mathematics textbook (for example, from the chapters on Fractions, Mensuration, and Data Handling) to access related video explanations, practice quizzes, and activities.

Teachers appreciated the accessibility and variety of resources, noting that DIKSHA supports multilingual content, ensuring inclusivity and equitable access for learners across regions.

3. ICT-Enabled Assessment Practices

A key focus of the session was on ICT-enabled assessment—using digital tools to design, deliver, and analyse student learning. The facilitator discussed the transition from traditional pen-paper evaluation to continuous, competency-based assessment supported by technology. Examples demonstrated during the session included:

- Digital quizzes and formative assessments available through QR links and DIKSHA modules.
- Google Forms and Quizizz for quick classroom checks and self-assessment.
- Auto-graded tasks linked to textbook exercises that provide immediate feedback to learners.
- Interactive worksheets and online manipulatives (GeoGebra, PhET) for conceptual testing.
- Performance dashboards on DIKSHA that help teachers monitor learner engagement and success rates.

Participants were guided on designing assessments that test understanding, application, and reasoning rather than rote memorization. They discussed how ICT tools can be integrated into lesson plans to make assessment *formative, flexible, and feedback-oriented*.

4. Using QR Codes in Teaching-Learning and Assessment

The facilitator explained the role of Quick Response (QR) Codes in the new NCERT Mathematics textbooks as *gateways to digital enrichment*. Each QR code is uniquely mapped to the corresponding chapter and resource on DIKSHA.

Teachers can:

- Scan the QR code using the DIKSHA app or mobile camera to access curated multimedia content.
- Project videos or interactive demonstrations in classrooms for group learning.
- Use QR-linked resources for revision, reinforcement, and homework assignments.
- Engage students in self-assessment using embedded quizzes.
- Develop context-based worksheets linked to QR-enabled videos.

This feature bridges printed content with digital interactivity, encouraging learners to explore concepts like geometry, data representation, and number systems visually and experimentally.

5. Reflection and Discussion

During the interactive discussion, participants reflected on how digital tools can make mathematics teaching more engaging, accessible, and data-driven. They agreed that integrating ICT tools into assessment allows teachers to:

- Provide instant feedback to learners.
- Maintain individual learning records digitally.
- Personalize instruction based on student performance.
- Develop students' digital literacy and self-learning skills.

The participants also discussed challenges such as internet connectivity, device availability, and digital readiness. The facilitator addressed these by suggesting strategies like offline DIKSHA access, school-level resource sharing, and teacher collaboration for content curation.

6. Alignment with NEP 2020 and NCF-SE 2023

The session reiterated that the use of digital platforms like DIKSHA and QR-linked e-content directly supports the NEP 2020 vision of Technology-Integration in Education, which emphasizes:

- Creation of a National Digital Education Architecture (NDEAR).
- Use of digital tools for formative assessment and professional learning.
- Ensuring equitable access to quality learning resources.
- Building teacher capacity for ICT-enabled pedagogy.

The NCF-SE 2023 also stresses integration of ICT and assessment to promote higher-order thinking and personalized learning. The new mathematics textbooks exemplify this approach through technology-supported experiential tasks.

Conclusion

The session on *"ICT Enabled Assessment & Digital Integration: Using QR Codes, e-Content & DIKSHA Portal"* provided valuable insights into how digital tools can enrich classroom teaching and assessment in Mathematics.

Participants learned to navigate the DIKSHA platform, scan and use QR-linked resources, and design ICT-based assessments aligned with competency-based learning outcomes. They appreciated how the new NCERT textbooks empower both teachers and learners to engage with Mathematics in more interactive, reflective, and personalized ways.

By blending digital and experiential learning, the new textbooks bring the classroom closer to NEP 2020's vision of a technology-driven, inclusive, and joyful learning environment. The session inspired teachers to embrace digital integration not as an additional burden but as a meaningful opportunity to enhance mathematical understanding and assessment.

A PEEK BEYOND THE POINT: CONCEPTS AND CLASSROOM STRATEGIES

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Introduction

The session on *"A Peek Beyond the Point"* introduced participants to Chapter 3 of the *new Class VI Mathematics textbook* developed by NCERT under the National Curriculum Framework 2023. The session aimed to familiarize teachers with the conceptual flow, pedagogical design, classroom activities, and assessment features of this chapter, which focuses on the concept of decimals and their applications in real life.

The chapter has been designed in accordance with the principles of experiential and competency-based learning outlined in the National Education Policy 2020. It encourages learners to explore the *need for numbers smaller than whole numbers* through meaningful contexts such as measurement, money, and data interpretation. The resource person emphasized that decimals are not introduced as an abstract topic but as an extension of the place value system that learners are already familiar with.

Conceptual Flow of the Chapter

The session began by outlining how the chapter progressively develops the concept of decimals through real-life situations, hands-on activities, and guided reasoning.

a) Introduction to Decimals

Students are first introduced to the *need for smaller units* to represent quantities more precisely. The teacher uses examples such as measuring a pencil's length between 4 cm and 5 cm on a ruler to show why we require numbers between whole numbers. This naturally leads to the idea of the decimal point, which separates the *whole part* and the *fractional part* of a number.

b) Place Value in Decimals

The place value system is extended to include tenths, hundredths, and thousandths. Learners explore representations like

$3.45 = 3 + 0.4 + 0.05$

to understand expanded form and word form ("three and forty-five hundredths").

Visual and manipulative tools like decimal blocks and number line mats are used to help learners locate decimals on a number line and to visualize part-whole relationships.

c) Reading, Writing, and Comparing Decimals

The chapter guides students to read decimals fluently, write them in expanded form, and compare or order them using place value. Activities include arranging given decimals in ascending or descending order and recognizing equivalent decimal values.

d) Operations with Decimals

Through contextualized examples, learners discover the procedures for addition and subtraction of decimals. The key rule of aligning decimal points before performing operations is reinforced through interactive tasks and problem-solving situations.

e) Applications of Decimals

Decimals are applied to practical domains such as length, weight, and money. Students convert:

- millimeters to centimeters and meters,
- grams to kilograms, and
- paise to rupees.
  They also represent decimals on a number line to connect visual reasoning with numerical computation.

The session emphasized that the spiral progression from concrete to abstract ensures that students build both *meaning* and *fluency*.

Addressing Misconceptions

The resource person highlighted common misconceptions that learners face while interpreting decimals. Two key examples from the textbook were discussed:

- Decimals in Time: Students often misread 4.5 hours as 4 hours and 5 minutes instead of 4 hours and 30 minutes. Teachers must clarify that decimals operate in base 10, whereas time works in base 60.
- Decimals in Cricket Overs: Learners sometimes interpret 5.5 overs as 5 overs and 5 balls instead of 5 overs and 3 balls. Such contextual misconceptions can be addressed through meaningful discussion and demonstration.

These examples stress the importance of conceptual clarity over procedural memorization, showing how context can both support and confuse learners if not handled carefully.

Learning Materials and Innovative Pedagogical Tools

The session showcased creative Teaching Learning Materials (TLMs) aligned with the chapter objectives:

- Decimal Blocks to represent tenths and hundredths.
- Number Line Mats for visualization and comparison.
- Cartoons and Illustrations to capture students' interest and provide relatable examples.

A notable highlight was the "Jungle Adventure: Decimal Snakes & Ladders" game, a classroom innovation that blends learning with play.

The Decimal Snakes & Ladders Game

- Objective: Reinforce addition and subtraction of decimals in a fun, competitive format.
- How to Play: Players roll a die and move along a board numbered 1 to 100.
- Vines (Ladders): When landing at a vine, players must solve an *addition* problem correctly to climb up.
- Waterfalls (Snakes): Landing on a waterfall requires solving a *subtraction* problem; incorrect answers make players slide down.

Example Problems:

- Vine at 4 → 25: 18 + 8.8 = 26.8
- Waterfall at 9 → 2: 18 − 8.8 = 9.2

Through such interactive games, learners consolidate arithmetic operations with decimals, develop accuracy, and enjoy peer collaboration.

Assessment and Practice Tasks

The session reviewed the variety of assessment formats included in the textbook:

- Objective and Reasoning Questions: e.g., identifying place values, converting decimals to fractions, choosing the largest decimal, and writing expanded forms.
- Word Problems and Case Studies:
    - *Online Shopping Cart:* Priya buys a book, pen, and bag with decimals in prices and calculates the final payable amount after discount.
    - *Science Experiment:* A student measures temperature rise and drop using decimal differences.
- Open-Ended Questions:
  Learners think creatively about the role of the decimal point, "zooming in" on number lines, and comparing decimals to fractions in real-life contexts.
- Activity-Based Questions:
  Designing a board game, finding real-world decimals in daily life ("decimal hunt"), and explaining why decimals are used in specific contexts like currency or measurements.

Such assessment items promote reasoning, application, and creativity, aligning with the competency-based assessment framework under NCF-SE 2023.

Pedagogical Insights and Reflections

Participants reflected on how this chapter models the experiential learning approach envisioned by NEP 2020. The activities demonstrate that when students *see, touch, and relate* mathematical ideas to their surroundings, their understanding becomes durable and joyful.

Teachers appreciated the chapter's integration of real-life examples, interactive tasks, and open-ended reflection prompts, which help in differentiating instruction for varied learning levels. The discussion also underscored the teacher's role in guiding learners to interpret decimals accurately in context and in connecting decimals with fractions and measurement.

Conclusion

The session *"A Peek Beyond the Point"* successfully illustrated how the new NCERT Mathematics textbook transforms the teaching of decimals into an engaging, contextual, and conceptually rich experience.

Through activities, games, misconceptions, and open-ended inquiry, the chapter develops not only procedural skills but also *numeracy, reasoning, and curiosity*. It aligns fully with the competency-based and experiential framework of NEP 2020 and NCF-SE 2023.

Participants concluded that the chapter offers an exemplary model of active learning design, where learners explore, reason, and apply mathematics to real life—truly peeking beyond the point to understand the infinite possibilities within numbers.

PHOTOS