

**REPORT OF THE CERTIFICATE COURSE IN MATHEMATICS**  
**TEACHING**  
**TEACHING RATIOS, FRACTIONS AND PROPORTIONS**  
**SXIE-HBCSE**  
**2020-2021**

The course was designed by both institutions in a collaborative way. The course objectives, course content and course requirements are mentioned in the course brochure.

The overwhelming response for the course has motivated us to conduct the course in 2 phases. The manner of conducting the course was in an interactive manner that participants enjoyed and the meaningful interactions led to interactive questions and stimulated a learning environment all the days of the course.

**Number of Participants in the Phase 1 : 31 participants**

**Number of Participants in the Phase 2 : 25 participants**

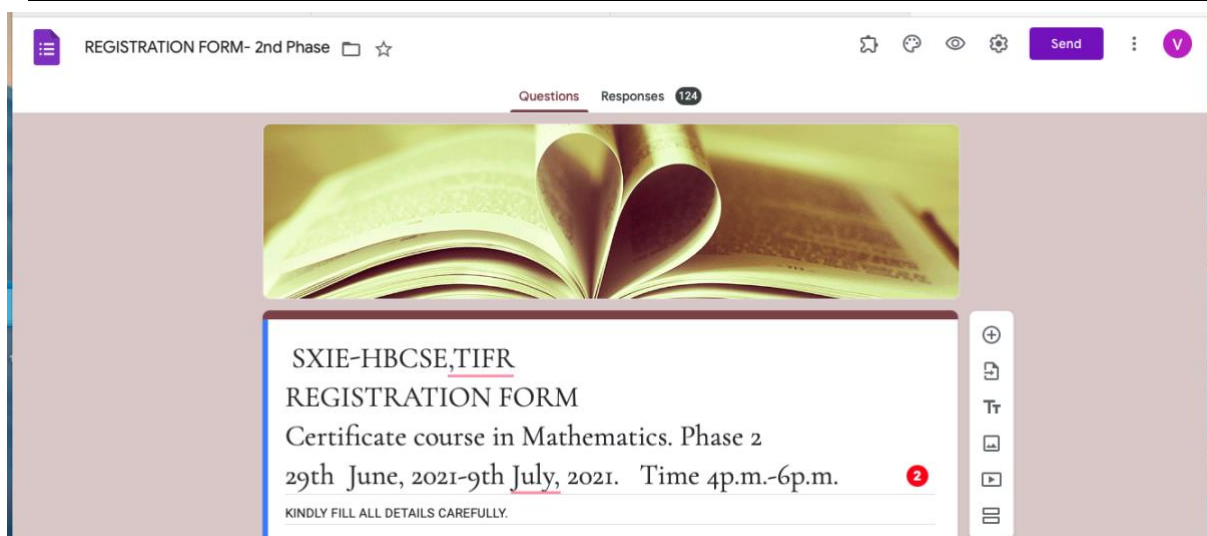
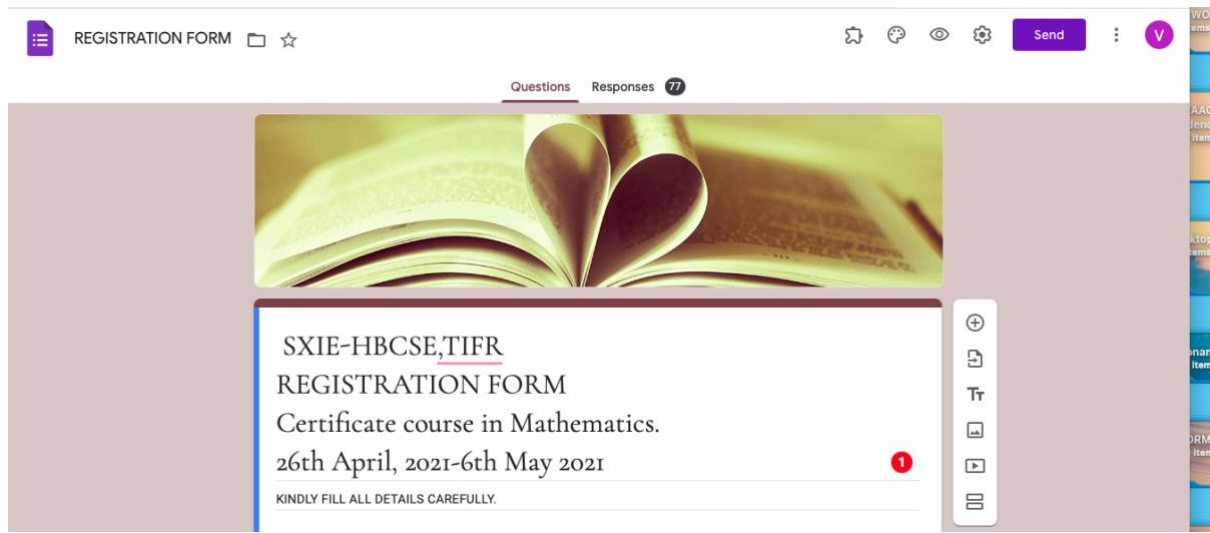
**The course was offered free the SXIE Mathematics Pedagogy students.**

7 students – Phase 1

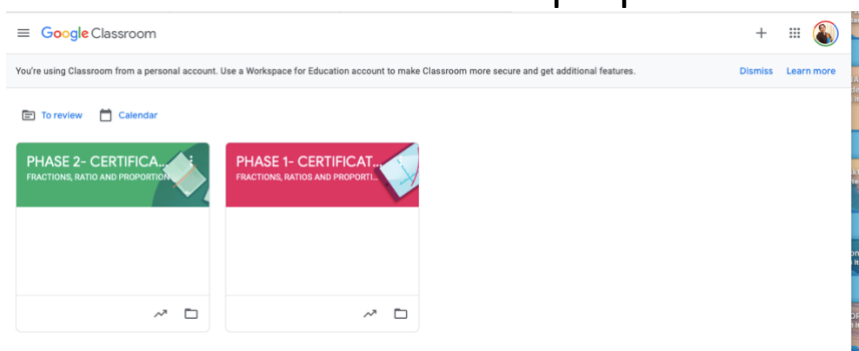
8 students – Phase 2

**DATES OF PHASE 1 : 26<sup>th</sup> April 2021-6<sup>th</sup> May 2021**

**DATES OF PHASE 2 : 29<sup>th</sup> June 2021 – 9<sup>th</sup> July 2021**



The course provided a detailed knowledge and practical application of Ratios, Fractions and Proportions. The course provided assignments to test the knowledge acquired and gave the opportunity to the participants to upload their materials in the LMS created for the purpose.



## **FEEDBACK PHASE 1:**

<b>What were the overall impressions?</b>
There was a lot of learning and a very good experience
Perfectly executed workshop.
Nothing ....only was missing the recordings of the session initially...but later the issue resolved....
It was very well organised and systematic. No suggestions.
Frequency should be increased and variety of topics to be included.
Please keep such courses current in future also so that the mathematics subject can be made easier.
According to me every thing was perfect
Nothing really. Please keep me posted for the upcoming courses. Thank you.
It was very well executed. Thoroughly enjoyed a lot. Got a deeper insight into fractions. Special thanks to Vini Ma'am for organising it for us.Also grateful to Sir Subramaniam and Sweta Ma'am. Eagerly waiting for the next one.
Amazing course! The complete course was conducted very systematically and efficiently.

## **FEEDBACK PHASE 2:**

<b>Your general impression of the course. Write in few words.</b>
Wonderful session, learn a lot
The course was well paced and highly interactive. The professors were patient and thorough with their explanations. Very well organized.
All the content covered was so practical & never learnt before in such a way...
It was very Good. I loved it the way they teach with patience and technique. It was very good.
Enriching, innovative and challenging.
Extremely knowledgeable
This was a truly eye opener session for me
The course was well organised and helpful
It was an enriching experience.
It was a wonderful learning experience.
Informative, practical application, connection to real world
Thoughtfully designed. Ample of examples and suitable explanation. The selection of topic is perfect because a few children always keep adding the denominator. And I think I received the guideline to handle this issue. I will definitely get back with my experience after using the methodology.Thanks a lot for arranging such a workshop.
It was really interesting to see how fractions really are and how we are taught usually in our school

All the sessions were very much informative and enriching. I have never thought about fractions in such a way. Here most of the concepts were taught with help of some real life objects like chikki, chapati. So visualizing and understanding became a little easier. Incorporating all of this while teaching is a task due to time constraints but I'll surely try.

It was really very creative, very useful and a new way of mathematics teaching and experimenting.

Good

I am really satisfied after attending this session which was indeed enriching. I had no idea I would learn about the concepts to such extent from this course.

Overall it was a different experience. Got to learn many new things about fractions and rational numbers. There was variety of thinking in class which brought different rational thoughts.

This course greatly expanded my understanding of the Ratio and Proportions and gave me great understanding of how it can be used & taught to develop students' understanding about this topic. It was very informative and I feel I can use this with my students.

The course was quite helpful to me. I got to learn a lot of new approaches to fractions. The recordings provided made me go back and understand concepts better and at my own pace. Really grateful to Subramaniam Sir and Shweta ma'am for enhancing my content knowledge. Thank you Ms. Vini for this opportunity. Looking forward to more such enriching sessions.

#### What aspects of this course were most useful or valuable?

Explanation through examples like roti, chikki created curiosity in me to learn more

The practicality and applicability of the concepts in our teaching field was the most useful aspect of this course. We were made to think outside the conventional ways of concept understanding which was very valuable in terms of being able to teach the concepts well.

Using the unit fractions with different parts, also Ratio and proportion was well explained..

It is Valuable

Pedagogical and content clarity. Visual examples were very helpful too.

Entire topic of fractions

The conceptual knowledge of fractions and unit fraction was very useful.

Problem solving and different perspectives on solving one problem.

The examples provided help understand the concepts better.

Base of fractions is more stronger and helpful.

Practical relevance and application

Application of unit fraction. The language to be used while introducing the concept of fraction, division, ratio and proportion. The selection of examples was apt.

The examples taken to teach fractions. As well as the fraction strip explanation

The real life examples, fraction strips and even the peer discussion was very much helpful

Explaining fractions using chikki and chapati.

Ratio and proportion

Activities conducted and examples which related with real life. Also different perspectives with respect to a particular sum.

Arvind box, unit fraction, examples of real-life examples like chapattis, rotis and chikkis which are of students' interest were some of the catch as per me.

Presenting real life situation in front of students (i.e. chikki and roti) to visualize and understand the topic easily.

The entire course in whole was quite valuable to me but particularly the representation of diagrams and the usage of different colors added to creativity. This course broadened my thinking skills and I surely know more about Fractions now than I already knew before.

**What are your suggestions to improve this course?**

The content was apt for my grade level (the grade which I teach)..  
Overall, Perfect...

Just to let us know your other program

Some content was repetitive and could be done in one session instead of two. Also the period chosen for the course was not feasible for me as my school has exams coming up and there was tremendous amount of work that was to be done. Doing this course with its assignments and reflections was difficult as i could not find time for it even if i wanted to. If the session was conducted in the beginning of school like month of June or then in August, would have been very helpful to manage school and the course. Thank you

Initial lectures were new later on it felt little stretched. We could have cover other topics during the time.

It was a very well planned session.

It's simply very well planned and organized looking forward for more such workshops

Since I am a parent and not a math teacher, it could have helped if the level of course was lower. May be a separate batch for students like me would be helpful.

It is just perfect. Please arrange more sessions on the concepts of algebra.

The course can also throw light on how to incorporate all of these in a classroom within the given time frame

It was perfect.

Overall it was good

Variety of resource persons could be included next time

Due to working school hours, I couldn't devote enough time for the completion of assignments. Also if the participants could write on the screen, they could portray their thoughts and ideas more clearly and it would be visually appealing to everyone.

**CERTIFICATION OF THE COURSE:** Only those who completed the course requirements were certified. Certificates were endorsed by Dr. Sosamma Samuel, Principal, SXIE and Dr. Subramaniam, Director, Professor, HBCSE.

**BROCHURES ARE ATTACHED.....**



# Teaching Fractions, Ratios and Proportions

## *A Certificate Course in Mathematics Education*

*Presented by Homi Bhabha Centre for Science Education in collaboration with St. Xavier's Institute of Education*

26<sup>th</sup> April, 2021- 6<sup>th</sup> May, 2021

Time : 2p.m.-4p.m.

TARGET GROUP: PRESERVICE AND INSERVICE TEACHERS

St. Xavier's Institute of Education is the oldest non-government, aided, Christian minority Teacher-Training College for the course of B.Ed., affiliated to the University of Mumbai and recognized by the National Council for Teacher Education (N.C.T.E.) The College has completed 65 years as a Teacher Training College par excellence, with alumni ranging from Principals of various colleges, a Vice Chancellor of Mumbai University and Heads of Department of Education. The College aims at imparting Quality Teacher Education and all round development. The College stands for academic excellence and the development of skills, and strives after character formation based on the love of God and the service of man. It seeks to educate citizens distinguished for their integrated development and sincere commitment to God and country, leading lives that are socially meaningful.

### COURSE SUMMARY:

This certificate course aims at developing two broad sets of capabilities that are important for a mathematics teacher. The first set of capabilities involves a profound understanding of fractions, ratios and proportions. The course will provide opportunities for the participants to examine their beliefs, assumptions and understanding of the Specialised Content Knowledge (SCK) for teaching fractions, ratios and proportions. The second set consists of skills essential for the teaching of mathematics and include – learning from student thinking, making and using contexts, models and representations for teaching fractions, ratios and proportions. The instructors will try to achieve this by situating most of the learning activities within teaching contexts.

#### Course Objectives

- Develop a profound understanding of fractions, ratios and proportions
- Develop skills for analysing contexts, models and representations for these topics
- Develop teaching trajectory for these topics

#### Course Outcomes

1. Understand and appreciate the importance of
  - 1.1 deep knowledge of fractions, ratio and proportion for teaching,
  - 1.2 how children learn fractions, ratios and proportions and
  - 1.3 tasks with learner-centred pedagogy for fractions, ratio and proportion
2. Develop skills towards teaching by
  - 2.1 analysing the content knowledge of fractions, ratio and proportion
  - 2.2 developing skills for maximisation of student engagement through effective planning and approaches
  - 2.3 developing reflective skills for effective teaching
  - 2.4 developing effective assessment to measure learning outcomes

### **Homi Bhabha Centre for Science Education, TIFR**

Homi Bhabha Centre for Science Education (HBCSE) is a National Centre of the Tata Institute of Fundamental Research (TIFR), Mumbai. The Centre's broad goals are to promote equity and excellence in science and mathematics education from primary school to undergraduate college level and encourage the growth of scientific literacy in the country. HBCSE is the country's premier institution for research and development in science, technology, mathematics, and teacher education. The Centre is India's nodal Centre for Olympiad programmes in mathematics, physics, chemistry, biology, astronomy and junior science. HBCSE runs a Graduate School in Science Education leading to a PhD degree of the Tata Institute of Fundamental Research, Deemed University.

### **COURSE REQUIREMENTS:**

All candidates selected for the course are required to attend all sessions to maximise their learning of the topics of the course. All candidates must have a good internet connection, display device and audio-video facility. Late entry to the sessions will not be accepted. All assignments should be submitted to the course coordinator on the date announced. The course is a total of 30 hours duration where 20 hours consists of live sessions and the other 10 hours are notional hours which must be devoted to task/assignment requirements.

### **Registration Details:**

The course is proposed from 26<sup>th</sup> April 2021 to 6<sup>th</sup> May 2021. The course will accommodate a maximum of 30 participants only. The participants are required to register for the course in the below-mentioned link. The course fee is Rs. 500/- The fees will not cover any materials in hard copy, some references in a soft copy may be sent by resource persons as and when the need arises. A certificate of completion will be awarded to participants who have completed all course requirements. The registration link is provided in this document.

### **Course Plan:**

The course is divided into three units. Each unit plans to attain the above-mentioned objective in an interwoven manner. The description of the units is as follows.

#### **Unit 1: Specialized Content Knowledge for Teaching Fractions, Ratios and Proportions**

Earlier sessions will cover discussion on readings and problem solving around fractions and five sub-constructs of fractions. Ratio meaning will be discussed as one of the sub-construct and what constitutes proportional reasoning in contrast to additive reasoning will also be discussed.

#### **Unit 2: Approaches to Teaching Fractions, Ratios and Proportions**

Some sessions will cover discussion on readings and scenario working for teaching fractions, ratios and proportions. Learning from various artefacts such as – students' work, videos of teaching, and related curricular material would form the core of these sessions. These sessions would also make use of teachers' own experiences and episodes from their teaching to develop a deeper understanding.

#### **Unit 3: Operations on Fractions and Ratios**

Towards the end of the course, we will work on understanding the meanings of fractions, ratios and proportions situated within operations, such as addition, subtraction, multiplication, and division. We will also see what would be an effective evaluation of students.

*Certificate Course in Mathematics – Teaching Fractions, Ratios and Proportions. Dates: April 26, 2021 – May 6<sup>th</sup> 2021.*

*Last Date for Registration: April 24, 2021.*



**MODE OF DELIVERY:** ZOOM  
videoconferencing  
platform(Synchronous mode)

Google LMS (Asynchronous mode)

**COURSE UTILITY:** The course will help teachers develop a mathematical attitude towards the topics and make them confident to deal with problems of learning.

**EXPECTATION FROM PARTICIPANTS:** Knowledge of the concepts fractions, ratio and proportion.

### Course Assessment

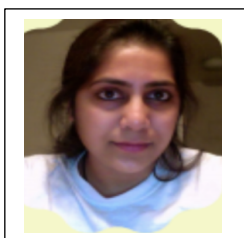
In the overall evaluation different weightage is given to different tasks of participation.

- Attendance in each session is essential and it has a 10% weightage in the overall evaluation.
- Completing assignments (various readings / observations) has 40% weightage in the overall evaluation.
- Classroom interaction [Initiating and contributing to the dialogue through critical and insightful comments, meaningful listening of others' comments and being sensitive about the positions that each participant brings to the discussion] has a 20% weightage in the overall evaluation.
- End of course assignment has 30% weightage in the overall evaluation.

### About Course Instructors:



**K. Subramaniam** is Professor and Centre Director of the Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research in Mumbai, India. His main area of work for the last two decades, through research and teacher professional development workshops, is the improvement of the learning and teaching of school mathematics.



**Shweta Naik** is currently working with the Mathematics Education Research group at Homi Bhabha Centre for Science Education, Mumbai and was an Adjunct faculty position with the University of Northern Colorado for the year 2018-19. She has received her PhD in Mathematics Education from the University of Michigan, USA, Masters in mathematics from Pune University and bachelors in Mathematics from Mumbai University. Her teaching and professional experience are diverse having worked with educational institutes like Central Board of Secondary Education (CBSE), Zonal Institute of Education Technology (ZIET) - KV, St. Xavier's Institute of Education, Tata Institute of Social Sciences (TISS), Centre for Excellence in Basic Sciences (CEBS), HBCSE, University of Michigan and a number of Marathi and English medium schools.

**Course Advisors:** *College Development Cell, St. Xavier's Institute of Education*

**Course Convenor:** *Dr. Sosamma Samuel, Principal, SXIE*

**Course Coordinator:** *Dr. Vini Sebastian, Associate Professor, SXIE*

### IMPORTANT INFORMATION:

**Registration link:** <https://forms.gle/LHFHYvM4UBJgbnVo8>

Confirmed participants will be intimated via email,

Kindly contact for further details : [sxiehcse@gmail.com](mailto:sxiehcse@gmail.com)

**Please visit our websites :** [www.sxie.info](http://www.sxie.info) (St. Xavier's Institute of Education)

<http://www.hbcse.tifr.res.in> (Homi Bhabha Centre for Science Education, TIFR)





# Teaching Fractions, Ratios and Proportions

## *A Certificate Course in Mathematics Education*

*Presented by Homi Bhabha Centre for Science Education for  
St. Xavier's Institute of Education*

**29<sup>th</sup> June, 2021- 9<sup>th</sup> July, 2021**

**4p.m. – 6p.m.**

**TARGET GROUP: PRESERVICE AND INSERVICE TEACHERS**



### COURSE SUMMARY:

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### **Registration Details:**

The course is proposed from 21st June, 2021 to 1<sup>st</sup> July, 2021. The course will accommodate maximum of 30 participants only. The participants are required to register for the course in the below mentioned link. The course fee is Rs. 500/- The fees will not cover any materials in hard copy, some references in a soft copy may be sent by resource persons as and when the need arises. Certificate of completion will be awarded to participants who have completed all course requirements. The registration link is provided in this document for registration.

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*Certificate Course in Mathematics – Teaching Fractions, Ratio and Proportion. Dates: June 29<sup>th</sup>, 2021 – July 9, 2021.*

*Last Date for Registration: June 25<sup>th</sup>, 2021.*

**MODE OF DELIVERY:** ZOOM videoconferencing platform (Synchronous mode)

Google LMS (Asynchronous mode)

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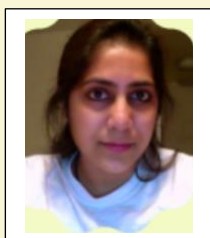
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