

Report on APU-RMS workshops for Secondary and Higher Secondary Mathematics School Teachers held at Chennai, 2014

The workshop was conducted in Chennai during August 8-9 and October 9-10, 2014.

Preparation: In May 2014, it was decided that both the sessions would be conducted at the Department of Mathematics, IIT Madras. Prof. Arindama Singh of IIT Madras agreed to organize the workshops and deliver lectures on behalf of RMS. It was also decided that the theme for the workshop in August would be number system, and for the October session would be infinity.

In June first week, the poster of the workshop was sent to more than 200 schools in Chennai. The schools included all Kendriya Vidyalayas, all CBSE affiliated private schools, all ICSE affiliated schools, some well known matriculation and state board affiliated schools including corporation schools in Chennai. A google page was created for easy registration by the participants. The option of writing an email and sending a written request by post were also open for the participants to register. Thirty six mathematics teachers from Chennai schools registered for the workshop, within the deadline, July 15th, 2014. The participants were sent a confirmation mail by the organizer by July 30th.

Schedule of the workshop

APU-RMS Workshop Program , Chennai,
VENUE: I.I.T. Madras, HSB 357

August 8, 2014

9.00-9.30 : Registration

9.30 a.m. - 9.45 a.m.: Inauguration by Prof. S.H. Kulkarni, Head, Department of Mathematics, IIT Madras

9.45 a.m. - 10.45 a.m.: At Right Angles (AtRiA) session (ice-breaker/warm up).

9.45 – 10.15 a.m. Birthday Paradox: Sneha Titus

10.15 – 10.45 a.m. Origamics : Sneha Titus & Swati Sircar

11.00 a.m. – 1.00 p.m. RMS lecture: What is a real number? : Arindama Singh

1. 00 p.m. – 2.00 p.m. Lunch

2. 00 p.m. – 3. 15 p.m. At Right Angles (AtRiA) session Tessellations: Swati Sircar

3.30 – 4. 00 p.m. RMS lecture: What is circumference of a circle? : Arindama Singh

August 9, 2014

9.30 a.m. - 10.45 a.m.: At Right Angles (AtRiA) session

9.30 – 10.00 a.m. Monty Hall Problem: Sneha Titus

10.00 – 10.45 a.m. DumbleDoor: Swati Sircar

11.00 a.m. – 1.00 p.m. RMS lecture: What is Pi? : Arindama Singh

1. 00 p.m. – 2.00 p.m. Lunch

2.00 p.m. – 3.00 p.m. APU Session: Problem Solving: How to Solve It?: Sneha Titus & Swati Sircar

3.15 p.m. – 4.00 p.m: Presentation by participants, Feedback and Discussion

APU-RMS Workshop Program , Chennai,

VENUE: I.I.T. Madras, HSB 357

October 9, 2014

9.00-9.30 : Registration

9.30 a.m. - 10.45 a.m.: At Right Angles (AtRiA) session (ice-breaker/warm up).

9.45 – 10.00 a.m. Review of last time's program for the benefit of newcomers:
Birtday Paradox and Dumble Door

10.00 – 10.45 a.m. Origamics

11.00 a.m. – 1.00 p.m. RMS lecture: Infinity as a process : Arindama Singh

1. 00 p.m. – 2.00 p.m. Lunch

2. 00 p.m. – 3. 15 p.m. At Right Angles (AtRiA) session Pentominoes: Sneha Titus

3.30 – 4. 00 p.m. Presentation by participants and Discussion

October 10, 2014

9.30 a.m. - 10.45 a.m.: At Right Angles (AtRiA) session

9.30 – 10.45 a.m. Hill Cipher Problem: Sneha Titus

A Fascination for Counting: Sneha Titus

11.00 a.m. – 1.00 p.m. RMS lecture: Infinite sets : Arindama Singh

1. 00 p.m. – 2.00 p.m. Lunch

2.00 p.m. – 3.00 p.m. APU Session:
Paper Folding and Tangrams
Recurring Decimals

3.15 p.m. – 4.30 p.m: Presentation by participants, Feedback and Discussion

Topic-wise Comments:

Dumble Door: Parity of numbers, Patterns formed by perfect squares and relation to prime numbers were very well presented through open and closed doors. The illustration followed by the mathematics behind the methods and the results was indeed an eye opener.

Origamics: The difficult problems of geometry was shown and solved through paper folding. Also how geometry is used in paper folding; these were the main concerns in this topic.

Tessellations: Covering a planar region by patterns and how these tiles are formed was very interesting for the participants. The explanations using theory was beautifully presented.

Birthday Paradox: Though probability is a simple topic as covered in schools, the teachers really appreciated the intricacies involved in the probabilities. This was explained intuitively and with a certain amount of rigour.

Monty Hall Problem: The classic problem was presented and how paradoxically different solutions arise was explained. Finally, the discussions led to a proper solution. This topic was quite engaging for the participants.

Pentominoes: Though each of the participants was familiar with solving jig-saw puzzles, they did not know how the pieces were formed. It was an eye opener for them to use a systematic development of pentominoes and then implement the ideas through paper cutting.

Hill Cipher Problem: This problem was an interesting way to introduce the participants to modular arithmetic and operations with matrices.

Paper folding and Tangrams: This session was really enjoyed by the participants as they could see its imminent implementation in their own classes.

A fascination for counting: This was a nice way of introducing one to simple combinatorics starting from the usual counting methods.

Problem solving: This general topic was most useful for the participants as often they find themselves lost in the prescribed way of solving a problem as found in text books. They could see why the text books approach the particular way of solving a problem, what one could add different variations.

What is a real number?: The concern of the lecture was to introduce the least upper bound (lub) and the greatest lower bound (glb) properties of the set of real numbers in a slow and motivating way.

What is circumference of a circle?: Each one assumes that circumference of a circle can be measured. The reason behind this assumption was cleared by an application of the lub and glb properties of real numbers, in two different ways.

What is Pi?: The mystery behind this number as to how this number comes up in measuring the circumference of a circle was explained.

Infinity as a process: Infinite processes give rise to new real numbers was the main theme of this lecture. It was also explained that infinite processes do not really involve infinity.

Infinity as a number: It was explained that infinity is not a number but it can be viewed as a cardinal number and there exists a hierarchy of infinities.

Presentation by participants: There were three presentations by participants. They talked about magic squares, Pascal's triangles, desmos calculator as an alternative to geogebra, partitions, and packing. They also presented some of the projects their students took and implemented by using softwares. They also discussed the difficulties they face in their teaching at school. They were concerned about the short period within which they are supposed to cover their syllabus so that students would get better marks in the examinations. They feel that the school administration and also the parents, in general, want only good marks for the students leaving their understanding only as a means to this goal.

Feedback by participants: The participants gave very high preference to the paper folding sessions. They expressed their opinion that these methods can be implemented in their teaching to make their teaching attractive and simpler to comprehend. They also appreciated the mathematics behind the fundamentals such as real numbers, infinity, etc. They were of very high opinion about the methods of questioning used in the presentations and the lectures. They hoped that such workshop sessions would be very helpful if done regularly, even in the presence of their students.

Administrative concerns: There was very low participation in the workshop. In the August sessions, there were 21 participants and in October session there were 16 participants only. Some of them could not attend both the sessions. The reasons could be as follows:

In Chennai, most of the schools are concerned about their students getting more marks in the examinations rather than understanding a topic. The school administration is partly responsible for this.

Most of the schools in Chennai do not have sufficient number of teachers for their day-to-day teaching. Some of the principals spelled it out and expressed their inability to allow any teacher for participating in the workshop.

Some of the participants took leave for attending the workshop. There is an inherent paradox in it, since the teachers neither want to use their weekly leaves (Sunday) for this purpose, nor the administration give them leave to attend the workshop.

The participants were provided tea once at 10:45 am and once at 3:15 pm., and also lunch at 1:00 pm. Other than this nothing else is provided by the organizers. They are not provide a note book a pen, or a pencil. They are also supposed to come to the venue by their own. Without any such initiative of providing writing material and transport allowance, the teachers are demotivate to attend the workshop by sacrificing their (casual) leaves.

Quality of participation: It was noted that even though the participation of teachers was low in quantity, it was high in quality. The class room interaction of the participants and the resource persons was excellent. As is clear from the feedback, the participants learnt a lot and also appreciated it.

List of Participants:

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