Report on the 5th International Conference on Mathematics Education

The 5th International Conference of AIMER was conducted during in 19th – 22nd December 2019 in Indore (Madhya Pradesh - India), the venue being Indore Marriott Hotel, Vijay Nagar.

The conference started on 19th December at 1:15 pm with the process of registration upto 3pm. The inaugural function was at 3 pm followed by the facilitation and awarding the Distinguished Teacher Award to the Dr. Amitava Saraswathi from Indore.

After this a written test leading to oral quiz was conducted. Then the delegates enjoyed the high tea from 4:15 pm – 4:45 pm. After the high-tea, Dr Santhanam (President - AIMER) delivered his presidential Address on the topic, Recreational Mathematics – Is it only recreational?

The first day program came to an and after the special lecture given by Dr. Miriam Amit of Ben Gurian University of Israel on Ethnomathematics.

The next two days the deliberations went on exactly as per the program sheet. The 4th day (22nd December) was the celebrations of the 132nd Birthday of the mathematical genius Srinivasa Ramanujan. A special workshop was conducted by Mr. Vinay Nair from 10am – 11am a specific work on Ramanujan (the continued fraction and the solution of certain equations)

The valedictory function was from 3pm – 4pm and the conference ended with a Tea Break from 4:00 pm - 4:30 pm.

Of course, every delegate expressed his/her satisfaction of the venue, the Indore Marriot Hotel.

AIMER thanks the following eminent people for conducting the two valuable workshops.

1. Dr. Miriam Amit
2. Mr. Vinay Nair

AIMER profoundly thanks the following eminent people who gave special lectures.

1. Dr. V. Baskaran
2. Dr. V. Mandrekar
3. Dr. Miriam Amit
4. Dr. Damjan Kobal
5. Mr. Jonathan Crabtree

A special thanks to Dr. Sudhakar Agarkar who efficiently moderated the Debate on the topic

Is an entrance exam necessary to enter into a professional course after schooling?

There were 29 papers presented by students and 20 papers by adults. The papers of two students were selected as the best papers.

1. *Solving Conic Section Problems Using Celestial Mechanics*
   by Shuborno Das
2. *Rudrata Path – Based Image Encryption*
   by Arush Gupta (Bhaskaracharya Pratishana - Pune)

The following are the opinions of some of the delegates attended the conference.

1. Mr. Vinay Nair
2. Dr. Damjan Kobal
3. Mrs. Shailaja Bairy
4. Mr. Shubarno Das
5. Mrs. Deepti Srivastava
6. Dr. Sudhakar C. Agarkar
7. Mr. Nitin Jain

FEEDBACK OF VINAY NAIR

Here's a brief account of my experience at the 5th AIMER conference on Mathematics and Mathematics Education. Once again, it was amazing to meet many amazing people (both educators and students) from different parts of India and also from the world.

1. Jonathan Crabtree - An Australian researcher who is passionate about building a strong foundation of Mathematics in students. Had the opportunity to have a detailed discussion on rules of arithmetic operations that is usually taught in school which is very confusing for students initially. And in many cases, students understand but only superficially and not in depth. He quoted that after he started adopting Brahmagupta's laws of operations with integers, students started finding more meaning in the operations. It was interesting to hear his views on how the calling negative integers 'less than' zero (where zero=nothing) makes no sense. His love towards Indian Mathematics was really commendable. I had the opportunity to record my audio (for the right pronunciation) for the Sanskrit slokas that he used in his classes. He asked a very intriguing question - At what point was Indian Mathematics murdered? His website and twitter handles are very active where he uploads his presentations. www.jonathancrabtree.com

2. Dr. Damjan Kobal - Another amazing professor (who trains teachers) from Slovania was a silent observer at our table. He gave a lovely presentation on we can teach Conic sections to students by introducing them to do some activities with paper folding. He also shared some amazing applets of Geogebra and at the same time was very critical about how we use technology for Mathematics education.

3. Dr. Mariam Amit - A Mathematician from Israel who was passionate about Ethnomathematics. She shared some very important aspects that we miss in Mathematics education when we miss out the ethnic aspects and try to standardise a one-size-fit for all in Mathematics. She shared some interesting ways and units of measurements in different civilisations. She loved birthday Magic Squares and at the age of 70+, she has the zeal to learn how to create birthday Magic Squares.

4. Dr. Sudhakar Agarkar - Adjunct faculty at VPM college, Thane, who shared his experience of popularising the work of Bhaskaracharya II - Lilavati. He shared how he was motivated to learn and popularise the book and also some pedagogical nuances of the book that we often miss. A very encouraging, loving and motivating person who nudged me to write and present a paper at the Conference of Mathematical Creativity and Giftedness (which I did in August), Hamburg.

5. Prof. Santhanam - The man behind the event and organisation. A ball of energy, Prof. Santhanam, often makes us think whether we are younger or is it him? A very passionate man of action who served in various positions at Association of Mathematics Teachers of India.

Some interesting presentations by the students.

1. Toroidal Geometry (Donut shaped) - During Raising a Mathematician Training Program 2019, I had taken a few sessions on constructing a theory on Spherical Geometry. Two students took inspiration from that and decided to explore a whole new world of Toroidal Geometry. They constructed their definitions and axioms and came up with their observations and theorems. They were completely into the topic and their exploration was quite evident from the way they presented.

2. Omkar Sambare - a young Commerce graduate who is a passionate Mathematics teacher at Ramanujan Academy, Nasik, presented his exploration on Chessboard problems in a chessboard with n x n dimension. It was very abstract and his imagination was amazing. His paper inspired a 12 year old homeschooler, Arush Gupta to work on the problem ahead.

3. Arush Gupta - presented a beautiful paper on chessboard problems, magic squares and how the idea can be used in encryption and decryption. His idea was very novel and I am almost certain that his idea can be very good to put to use.

There were many other presentations that were exciting. There were also presentations where the students didn't know what was expected out of them. For a few, memorising was the sign of excellence. For some of them, reading out the presentation was the way they thought it ought to be done. I got the opportunity to go through many presentations and give them some feedback a day before their presentations.

I got two opportunities to present - one on Ramanujan Yatra and the other on two topics pertaining to Ramanujan - Nested Radicals and Continued Fractions.

Such conferences can be good opportunities for students and teachers who wish to take up ideas from conferences, collaborate and network. It is also a very good opportunity for students to learn the art of presenting an idea in front of an august audience.

FEEDBACK OF DAMJAN KOBAL

It was my second participation at AIMER. As the first one two years ago it was an inspiring event. Lots of the credit goes to the conference leadership (Dr. Santhanam). The conference is a good mixture of more advanced and truly superior presentations and content to lighter and more popular perspectives which are most welcome to motivate and attract especially younger students. AIMER is a conference which does not want to be an elite and from school distant endeavour but is rather a motivational machine to animate teachers and students, to learn to enjoy school, learning and especially mathematics. As such it does more good for education than dozen of 'theoretical conferences' on mathematics education. Many mathematics education researchers would profit from visiting AIMER, because at AIMER you really get the feeling that improving education and practical teaching of mathematics is the main goal of all activities, spanning from samples of good teaching practice, to exploratory research into different elementary mathematics and teaching issues, to inspiring historical overviews, to reports of highly sophisticated science achievements and use and to overviews of genius mathematical minds (like Ramanujan)

To be especially praised: An inspiring atmosphere of interaction between students and teachers. It is to be believed that such an atmosphere is crucial to motivate and inspire students. That through such interaction and activities students are inspired to get that appealing feeling of the beauty and nobility of ideas, intellectual rigour and human dignity. I would especially praise the atmosphere of dignified, sensitive but yet critical critique in cases of weaker argumentations in presentations. It is an essential part of high quality interaction and teaching to enhance also student's sensitiveness and confidence for critical, rigorous and dignified discussion. Within mentioned praise, there might be space (likely requiring an impossible amount of additional academic work with conference organization and preparation) for further improvements in the form of subtle but nevertheless more explicit distinction of truly superior ideas and presentations from average ones. As important as motivating students and likely even more long term important is to inspire teachers, not by telling them what and how to teach but simply by showing them how to do it. And there is no doubt that teachers can get many ideas and lots of inspiration at AIMER.

Dr. Damjan Kobal
Department of Mathematics
University of Ljubljana, Slovenia

FEEDBACK OF SHAILAJA BAIRY

True to the title `Association for International Mathematics Education and Research', AIMER provides a meaningful opportunity to mathematize oneself- An absolute learning atmosphere, which is a perfect blend of mathematics research and mathematics education. The unique feature of a AIMER conference is its oral presentations (Other conferences usually have parallel sessions). All the delegates are actively participating in each of the deliberative sessions. The session includes a broad range of content/ activities, from Presidential Address to special lectures, panel discussion, presentations, debate, quiz, workshops and exhibits. Educationists, mathematicians, math enthusiasts, students, researchers, teachers from across the country and the globe meeting at one forum, is really a wonderful experience.

Dr. Damjan Kobal, a Professor from Slovania spoke on teaching conics as an inspiring chapter of geometry. He mentioned ways to connect the idea to its origin by using the intuitive notion of a distance between points, lines, and circles. The technology (demonstrated Geogebra and its use) and its application in an appropriate manner is motivational /and rich insights into math research area, he said.

Dr. S. C. Agarkar, Professor at VPM's Academy of International Education and Research, (Thane India) elaborated on his experiences of popularising Lilavati (Written by Bhaskaracharya in 12th century) by conducting more than 100 workshops across the country. Sharing his rich experiences, he voiced the sincere attempt to generate mathematical attitude/ interest in students and reflected a real concern for the pedagogical implications to today's mathematics teaching/ curriculum. Being a Chair person for the debate titled `Is an entrance exam needed for professional courses', he moderated the sessions efficiently.

Dr. Bhaskaran, a retired scientist from Australia presented on certain basics of `Quaternion Mathematics'. Demonstrating the complexity of resolving vectors in 3 dimensions, he explained how the concept of quaternion brings in a new perspective of varied applications. He ably illustrated how the discovery of quaternion has lead to new branch of mathematics.

Jonathan Crabtree - An Australian researcher who is passionate about building a strong foundation of Mathematics in students uses his website and twitter www.jonathancrabtree.com innovatively to interact with math enthusiasts. He was very resourceful and his words depicted high regard for Indian mathematics. His thoughts and views are unique and he feels there is urgent need to repair our math curriculum and integrate the original understanding of zero, along with several other findings of Indian mathematics.

Vinay Nair, Director, School of Vedic maths, TedX speaker, Co founder of RAM training program conducted workshop on Ramanujan's contributions to Nested radicals, Continued fractions, Primes and Partitions. Ramanujan's inspiring works and how Ramanujan Yatra could get math enthusiasts closer to the Wizard of Numbers- Srinivasa Ramanujan. His talk gave an insight to people who know Ramanujan only a little.

Dr. Amit Miriam, resource person from Israel, a mathematician/ researcher from Israel is very passionate about Ethno mathematics. She shared some very important aspects that we miss in Mathematics education, when we don't realise the importance of encouraging creative/ holistic approach to problem solving. As mathematical age rises, creative and holistic solutions decrease and hence flexible thinking gets eliminated. She shared her experiences on ways of promoting formal knowledge without harming creativity.

Dr. Santhanam, the key person behind AIMER, is and has been truly resourceful. His lectures are really interesting. Serving in various positions at AMTI, travelling across India and abroad as resource person, teaching for more than 4 decades, he rightly is an inspirational personality. 100% involvement, planning well in advance, fine-tuning every minute detail, aim highly resourceful environment by inviting famous speakers from India and abroad, exclusively guiding and selecting research papers to match the international standards, making the conference educationally inclusive for teachers/mathematicians/students, Providing STEAM (Science, Technology, Engineering, Arts, Mathematics) relevance to themes are all unique features of AIMER conferences. The question- time / interaction period following every presentation is meaningful as it is truly insightful and expects depth and originality in research participants. The total approximate registered participant number of upper limit 100 makes it apt for an international forum and helps retain the charm of event. I remember him mentioning about the importance of actively involving in all the deliberations of the conference and also being present in the hall for other presentations too. `What if you are given a chance to present your paper in a room with no audience?' he asked me once. Thus he urges for full time participation (all the 4 days).

AIMER conference at Bengaluru was my first exposure to math conferences. Supported by Dr. Santhanam's valuable inputs and guidance, I have presented some papers/ posters in next four AIMER conferences. He guided me to present paper & poster at an international conference at Philippines (May 2019; He was a plenary speaker representing India at Philippines) which could fetch me Best paper prize. I give full credits of this success to Santhanam Sir. Later in Manipal, at a conference on CLIL, my presentation was applauded by Bhutanese Ex Education Minister Thakur S Powdyel and other guests. My daughter Maithri Bairy also is constantly motivated to explore maths and we never miss AIMER conferences. Since her Grade 9, she has been presenting her original research works in maths. Today's young generation are least exposed to innovativeness/creativity and originality in math research area. `Cut and Paste' fully or partially from internet has become today's mantra. Hats off to Dr. Santhanam's passion for mathematics education! He extracts the best from students and teachers. He is definitely a role model to us. `Age is just a number'. Dr. Santhanam is very young in terms of his zeal to `make a difference in math education'. God Bless!

FEEDBACK OF SHUBORNO DAS

AIMER was my first experience of presenting a paper in an external conference and I must say it was a very pleasant one.
Everything was organized extremely well and it was always ensured that things were happening on schedule. The other aspect which was very heart-warming was Dr. Santhanam's caring attitude towards each and every student, teachers, professors, visitors and parents. Despite his age, he never seemed tired and was always enthusiastic right from the first presentation to the last presentation - for each of the 3 days of the conference.
Personally, I learnt a lot from this conference including from the tutorials that the teachers and professors delivered. I also enjoyed the experience of presenting a paper in front of such a huge crowd. To be honest, I was a bit nervous coming in but soon felt at ease presenting my work on "Solving Conic Section Problems Using Celestial Mechanics".
The best paper award was just an icing on the cake!

It would have been better if conference details, call for paper, detailed agenda of the event once available, etc. were shared in AIMER website. This would also help in promoting this conference to wider set of students, teachers, etc.

FEEDBACK OF DEEPTI SRIVASTAVA

It has been pleasure attending AIMER for the past two years. The organization is always to a very high standard and the team should be congratulated for that. There are always huge challenges to organize such an event where you need to cater to people across the globe but the key to success is creating memorable environments. I would say AIMER should be complemented for making it possible where teachers, researchers and students work together, discuss and share knowledge.
It is rightly said "An investment in knowledge pays the best interest"
It is a wonderful platform for igniting the spark of interest for Mathematics in students and building their base stronger to boost their confidence. The best part of the AIMER conference is the execution of various activities like quiz, research based paper presentations, workshops, open discussions pertaining to educational objectives. Dr. Miriam’s workshop on ethnomathematics and its utility, Dr. Damjan’s paper on conics and usage of technology in subject, Historical essence of the subject in various presentations by Dr. Agarkar, Mr. Vinay Nair, Dr. Santhanam, Jonathan Crabtree's Indian Vedic approach to basic mathematics were quite a few among many more presentations worth attending.
It is encouraging to see students’ enthusiasm towards attending the conference and building healthy relationships to share ideas.

FEEDBACK OF SUDHAKAR C. AGARKAR

The fifth AIMER international conference was held in Indore from Dec 19 to 22, 2019. I have attended all the five conferences held so far by AIMER at different places in the country. I have been immensely impressed by the organisation and outcomes of all these conferences. Here I am specifically referring to the conference held at Indore.

1. Duration: It was a four day conference that began in the evening on Dec 19. It made all the members reach the venue comfortably. As the inaugural part was completed on the first day all the time next day could be allocated for deliberations. It was good on the part of the organizers to end the conference on Dec 22, the birthday of Ramanujan and arrange a simple tribute to this great soul of India.
2. Venue: The choice of a venue, the Marriott Hotel, was very good. Organising the conference in a five star hotel might have put financial burden to the organizers but the facilities provided were excellent. The hall had a good sound system and the lunch provided was sumptuous and tasty.
3. Mixed audience: The choice of the participants was made with utmost care. It had experts in pedagogy, history and classroom practices. At the same time the team had novices and practicing mathematics teachers. Participation of school students can be stated as the special feature of the conference. It had about half the number of participants from high school and junior colleges.
4. Choice of speaker: Apart from India the speakers in the conference were drawn from Australia, Europe and Israel. The academic programme of the conference had a judicious combination of plenary lectures, paper presentations and experience sharing sessions. In my opinion this combination worked well.
5. Quiz: Organising a quiz contest is the special feature of the AIMER conference. It has two parts: written test and oral questioning. It was noticed that a large number of teachers and students took active part in the quiz. Three teams, chosen based on the performance, were invited for the oral round. The questions framed for the round were quite intellectual. They not only enriched the direct participants but also the audience.
6. Debate: It is customary to arrange a Panel Discussion or a Debate during AIMER Conference. Invariably I have been entrusted to coordinate the activity. This time debate on "Role of Coaching Classes" was announced. Participants taking for and against stands argued vehemently based on their experiences. It was a pleasure to coordinate the debate and present the summary.
7. Opportunity for interaction: I feel that adequate time span was given for informal interaction among the participants during the event. Apart from tea and lunch breaks they could squeeze time in the evening to interact as all of them lived close by.
8. Personal Gratitude: On the special permission of Dr. Santhanam I invited Shri Neelkanth Kawadkar who taught me mathematics 50 years ago in the city of Chandrapur in Vidarbha region of Maharashtra. Apart from providing him an opportunity to express his views the

organizers made it a point to felicitate him during the conference. I was overwhelmed by this positive gesture and would like to express my gratitude to Santhanam sir and his colleagues for their timely decision.

9. Take home: Like earlier ones this conference has offered so much to take home. One notable aspect was the staunch advocacy of Jonathan Crabtree to look at school Mathematics through Indian eyes. After my retirement from a research institute I have been concentrating on understanding the genesis of Indian mathematics. In this regard interaction with Jonathan Crabtree played a catalytic role to my work. At the same time listening to Vinay Nair's experiences of arranging a Ramanujan tour enhanced my ideas of cultural and educational tours that I have been organising for the last two decades.
10. Concern: The conference was organised in the city of Indore which has a good name in education. There are many good institutions offering quality education in the city. Nonetheless, the local attendance was very poor. This has been the case in earlier conferences also. I would like to urge the organizers to enhance local participation in the next conferences.

Dr. Sudhakar C. Agarkar
Professor and Dean
VPM's Academy of International Education and Research
Naupada, Thane 400602
Maharashtra State, India
sagarkar@vpmthane.org

FEEDBACK OF NITIN JAIN

First of all, I would like to thank Dr. Santhanam and AIMER for giving me this opportunity to be a part of this conference. This was my first international conference involving young learners and it was a great learning experience to meet them along with some senior enthusiastic mathematicians from across the world. With support and guidance from Dr. Santhanam, I presented my first paper on "An analysis on the Pedagogical aspects of number theory to school students". After being part of this conference, I got the idea that there are many things which I can incorporate into my teaching learning plans with my students to encourage and prepare them to individual investigations so that they could also present papers in such conferences in the future. I always look forward to get many more such opportunities.

All the papers presented in this conference were worth noting, especially the efforts and energy of our young students. There were many interesting and thought provoking topics taken up by the presenters including "Short term memory" tricks by Dr. Santhanam, "Image encryption" by Arush Gupta, "Beauty of conics" using Geogebra by Dr. Damjan Kobal, "Related sets of primes" by Mr. Meghraj J Bhatt, "Lilavati Darshan" by Dr. Agarkar, "The story of Quaternion" by Dr. Baskaran and "Nested radicals" & "Continued fractions" by Mr. Vinay Nair.

The very big positive impact on me personally is that my passion for researching in mathematics becomes active after attending this conference which had become dormant due my various social and professional commitments. For that I would like to thank Dr. S. R. Santhanam for showing confidence in me and giving me the opportunity to be a part of this conference. It was very kind of him to hold this conference in Indore. I look forward to the next AIMER conference and wish to contribute to teaching mathematics in a creative and constructive way.

Nitin Jain
Choithram International, Indore
+91 9977 000 197