



M. T. & T. S.
Programme

Ajit Kumar,
ICT, Mumbai
(INDIA)

MATHEMATICS TRAINING AND TALENT SEARCH PROGRAMME

(FUNDED BY: NBHM)

Ajit Kumar, ICT, Mumbai (INDIA)

Homepage: <http://www.mtts.org.in/>

CMUC, Coimbra

Oct. 18, 2010



Key Points of the presentation

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Ajit Kumar,
ICT, Mumbai
(INDIA)

- Brief introduction of MTTTS Programme



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- Brief introduction of MTTS Programme
- Historical Perspective



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- Selection Procedures



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- Teaching Methodology



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- Brief introduction of MTTS Programme
- Historical Perspective
- Selection Procedures
- Teaching Methodology
- Evolution of this programme



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- Evolution of this programme
- Challenges and Hurdles



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- Historical Perspective
- Selection Procedures
- Teaching Methodology
- Evolution of this programme
- Challenges and Hurdles
- Impact of this Programme



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- Brief introduction of MTTS Programme
- Historical Perspective
- Selection Procedures
- Teaching Methodology
- Evolution of this programme
- Challenges and Hurdles
- Impact of this Programme
- Benefits of this Programme (via VYM)



What is MTTTS Programme?

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Programme

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Mathematics Training and Talent Search Programme (M.T. & T.S.) is a national level four weeks intensive summer training programme in mathematics. It has been running for last 18 years (since 1993) in India. This programme is funded by the National Board for Higher Mathematics (NBHM) and is directed by Prof. S. Kumaresan, Univ. of Hyderabad, since its inception. It is one of the most significant and successful training programmes and has made an impressive impact on mathematical scene in India over the years, especially at undergraduate and post graduate levels.



What is MTTT Programme?

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About 180-190 talented students in three different levels, selected from all over India, undergo this training programme every year at various centres.



How it began?

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Prof. S. Kumaresan submitted a proposal along the lines of MTTS in the Conference “Development of Mathematics” organized by NBHM in 1989. During “Discussion Meeting on Harmonic Analysis” held at the Indian Institute of Science (I.I.Sc.), Bangalore in 1992, a session was devoted to discuss the academic preparation of the students who come for Ph.D. programmes in Mathematics. S. Kumaresan suggested that a training programme with the aim to expose young minds to the excitement of doing mathematics and enabling them to have a meaningful career in mathematics should start at an early stage perhaps at B.Sc. level itself. The NBHM was approached with the proposal, which promptly agreed to support such an endeavour and the programme, christened as MTTS Programme, took off in 1993.



Aims of MTTTS

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- To expose and attract young minds to the excitement of doing mathematics and choose mathematics as a career.



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- To promote independent mathematical thinking and exploration.



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- To expose and attract young minds to the excitement of doing mathematics and choose mathematics as a career.
- To promote independent mathematical thinking and exploration.
- To provide a platform for students where they can interact with their peers and experts in the field
- To improve the teaching methodology of mathematics in the country in the long run.



Academic Programme

Eligibility Criteria for Different Levels

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There are THREE Levels: Level 0, Level I & Level II



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There are **THREE** Levels: **Level 0, Level I & Level II**

Levels	Eligibility
Level 0	1st Year B. Sc./B.Tech./B.Stat.
Level I	2nd Year B. Sc./B.Tech./B.Stat.
Level II	3rd Year B. Sc., B.Tech. & 1st years M. Sc.



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Level I	2nd Year B. Sc./B.Tech./B.Stat.
Level II	3rd Year B. Sc., B.Tech. & 1st years M. Sc.

Classes are held from **MON** to **SAT** from **9:00 AM** to **5:30 PM**



Academic Programme

What Courses are Taught?

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Levels I and II have courses in the four basic streams of Mathematics: Algebra, Analysis, Geometry and Topology.



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To give a proper grounding in the fundamentals, there is foundations course in the Level 0 which mainly deals with logic, concept of a proof, and a rigorous acquaintance with sets and function etc. This also serve a purpose of introducing standard examples which arises naturally in mathematics, rather than giving contrived/artificial examples.



Faculty selection for MTTs

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From various leading institutions of the country, not confined to the institute of the venue. People who are experts in the field, who are known for their teaching and who have a commitment towards betterment of mathematics. As a rule each course is taught by a single expert. This paves the way for better interaction between the faculty and students and also imparts a perspective of the field among the students. **The faculty is required to be present for all the sessions — not for their sessions only!** The teachers identify the difficulties of the individual students.



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Giving individual attention is one of the unique features of mttts which makes it highly successful.



Advertisement of MTTS

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The programme is advertised in the national newspapers and The Employment News (a highly popular fortnightly among college/university students) every year sometime in the month of December.

From the very inception, we are directly mailing the posters to colleges which offer B.Sc. (Mathematics), universities and institutes. The announcement is also made on the MTTS website. It is also sent to the large number of mathematics teachers via email.



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Now a days major advertisement is through the **word of mouth** by the former participants and the teachers.



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- No. of applications received: more than 2000



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- No. of actual participants: about 180



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- Regional students of the MTTS Venues are given importance. Quite a few local candidates are given opportunities.



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Round I & II: arranging region wise and essentially elimination rounds



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Round III & IV: comparison with other shortlist of the same state and states of similar grading pattern



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 - Round V: Comparison at national level



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 - Round V: Comparison at national level
 - Round VI: To take care of regional imbalances
- Selection of girl students



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- Allotting centres to Level 0 students



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- Selection of girl students
- Allotting centres to Level 0 students
- Selection procedure is completed by February end, and selected candidates are informed by the 1st week of March.



Facilities to the Selected Students

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- Sleeper class return train fare and free board and lodging.



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- Sleeper class return train fare and free board and lodging.
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- Free and open source mathematical software
- MTTS spends about 10 to 12 thousand rupees (approximately 200 EURO) on each student.



Teaching Methodology is different in MTTTS

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Its radically different from the formal academic courses. The faculty is discouraged to deliver well polished lectures.



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All sessions are highly interactive and the students are asked to think and understand in the classroom.



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“The best way to teach students is to think in front of them”.

All sessions are highly interactive and the students are asked to think and understand in the classroom.

When a new concept is introduced or a new result is proved, students are given typical situations or problems. Many examples are given as soon as new definitions are made and the students have to verify that they are examples of the concept just introduced. Only if the teacher is convinced that the majority has understood he proceeds further.



Teaching Methodology Cont...

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Sometime, another teacher present in the class, gives different perspective to the concept. (faculty work as a team.) Teachers make cross-references of concepts introduced in other lectures.



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Students are given outline, strategies or the idea of the proof they need to work out the details in the class itself and is to be submitted as writing assignments next day. **Most often proofs (complicated thm) are explained without writing a word on the board.**



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The students are encouraged to discuss among themselves before writing the final proof. It has two benefits;

- (i) they can learn thoroughly by discussing with their peers
- (ii) they can enhance their communication skills and consolidate their understanding while explaining others.



Teaching Methodology Cont...

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While asking any questions in the class:

Students are asked to write brief answer, which is examined by the instructors. This allows us to identify the problem area of the students in the beginning and remedial measures are taken.



Teaching Methodology Cont...

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Students Seminars after two weeks.





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Students Seminars after two weeks.



Benefits of students seminars

- (i) builds the confidence level of the students,
- (ii) removes stage fear and the fear of talking in front of experts.
- (iii) It enhances their presentation skills.



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Invariably while giving seminars, the students follow the methodology of MTTTS by making it highly interactive.



Teaching Methodology Cont...

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Group Discussion:

For last few years after one week or so, students are divided into groups of 4-5 and are encouraged to discuss topics. At times each group is assigned some topic for discussion which they need to present at the end in front of the entire class. This feature has been so successful that students want more time for the group discussion.





Teaching Methodology Cont...

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Writing Assignments:

In each level, almost every day one writing assignment is given to the students which is critically evaluated by the concerned teacher. The assignment is discussed either with the entire class or individually.



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Quizzes since last year



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It is a matter of great pride that no student 'fails'.



Evolution of MTTTS

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- In the beginning Level I and Level II at one center



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- Level 0 since 1995, also at different places



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- Morning lectures and problems solving in afternoon in the beginning.



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- Counseling Session on the first day for Level I & II



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- Mini feedback form at the end of the first week. Extensive feedback at the end which is discussed with students and teachers.



Evolution ...

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- Eligibility criteria has been suitably modified so that students can attend two consecutive levels
- Online applications and registration.
- So far at 20 different venues



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The continuous evolution of this programme is due to the extensive feedback sought from the faculty and the participants.



Difficulties and Challenges

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- Dedicated faculty who can work as a team for entire period



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- Finding a suitable venue with proper accommodation.



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- Reaching out to every nook and corner of the country.



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- Follow-up of MTTTS



Impact of MTTTS

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Impact of MTTTS

M. T. & T. S.
Programme

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- Large no. of requests from college teachers to attend MTTTS to learn and adopt its teaching methodology.



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To quote one of the senior professors from Tata Institute of Fundamental Research, India, "Earlier, when we interviewed candidates for Ph.D., we would be happy to find 2 or 3 out of 100. Due to efforts of MTTS programme, we now interview about 30 to 40, none of them is a dud, we could see that they are confident to tackle unseen problems and have a clear understanding of the concepts and all of them can be traced back to MTTS"



MTTS@ICM 2010

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There were about 80 mtts participants who were delegates at recently concluded ICM at Hyderabad India.





Some Views from Past Participants

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MTTS is a great program to channel mathematics talent from all over India by exposing bright young students to rigorous mathematics, terrific teachers and a charged environment. The MTTS experience is memorable, creating numerous opportunities for students and motivating them to choose their careers in mathematics. In addition to propelling students towards research careers, it has influenced a generation of mathematics teachers all over India. I truly admire Professor Kumaresan's vision and efforts in setting up and running this highly successful program.

–Dr. Abhijit Champanerkar, Asst. Prof., City Univ. of New York, MTTS 95 & 96



Some Views from Past Participants

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MTTS has been a major influence in my life. The stress was on what one understood, rather than what one scored. It was at MTTS that we were first given the chance to discuss with and to closely observe professional Mathematicians. The discussions, both inside the classroom and out, were immensely helpful. In fact, what was learnt at MTTS continues to undergo the process of assimilation after all these years. MTTS is a great platform for anyone who wishes to learn Mathematics, and so much more.

**–Dr. Vikram Aithal, Asst. Prof., CBS, Mumbai, MTTS
2000-2002**



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I see radical change in myself. The way mtts teaches its students, the way it motivates them to study on their own, and effectively, is really amazing. This is the only programme in the country at undergraduate level which helps students coming from various parts of the country with various backgrounds to reach a specific level from which they can carry on.

–Anand P Sawant, MTTS 06-08, Fellow at TIFR



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I think attending MTTTS was one of the turning point for me, it helped me to have clarity in thinking and also helped me to gain broader attitude towards life. That one month is still fresh in my mind.

–Saurabh S. Bhangaonkar, Connizant Technology Solutions Ltd.
Pune, MTTTS 2000

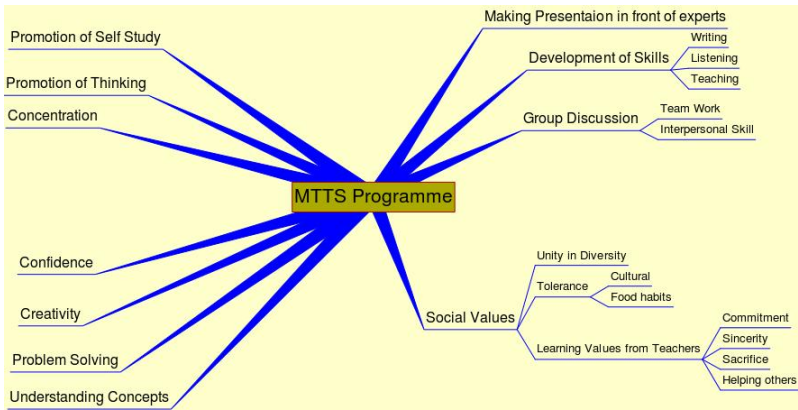




Benefits of MTTTS via VIEW YOUR MIND

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Conclusion

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MTTS programme is one of most popular and intensive summer training programmes of this country. It has made a remarkable impact on mathematical scenario in India. However, catering to only 170-180 students annually for a country as big as India is not sufficient. MTTS programme has shown that if its methodology is followed and more such programmes are organized at many more places, it can really change the face of mathematics of the nation. We sincerely hope that lot many mathematicians, mathematics teachers across the country and also MTTS alumni would come forward and take a lead to get involved in such endeavors and make a valuable contribution for the course of mathematics in India.



Conclusion

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Research in fundamental sciences is key to scientific innovations. However, trends show that recently not many students opt for higher studies in basic sciences due to various reasons. Therefore, if programmes like MTTS are organized in other sciences like Physics and Chemistry, it can revolutionize education in basic sciences. Many developing countries can also start such a programme to improve mathematical background of the students and to encourage them to make a career in mathematics.



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For More Details

<http://www.mtts.org.in/>



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I INVITE you to come and VISIT the MTTS camp.



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THANK YOU!

