MHRD
Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching
सत्यमेव जयते
CENTRE OF EXCELLENCE IN SCIENCE AND MATHEMATICS EDUCATION, IISER PUNE

IISER PUNE

Centre of Excellence in Science and Mathematics Education (CoESME)

at

Indian Institute of Science Education and Research (IISER) Pune

CoESME at IISER Pune aims to strengthen science education in India by engaging with various stakeholders, in particular teachers of school & undergraduate level science and mathematics. Our focus is **pedagogy for inquiry- and concept-based learning** (www.iiserpune.ac.in/outreach/coesme). Since its inception in October 2015, CoESME at IISER Pune has conducted pedagogy training workshops for over 9,000 school and college teachers, and other programmes for students & educators at various levels. We have established a hands-on Science Activity Centre on campus which has given a hands-on science experience to thousands of teachers, students and citizens. To pool expertise, reach shared goals, optimise resources, and maximise reach CoESME has followed a policy of collaborating with various organisations and funding agencies. We have implemented projects in collaboration with several governmental as well as non-governmental agencies at the local national and international level.

Science Activity Centre

Experiential learning is considered to be an effective way of learning. To encourage its incorporation in classroom practice, CoESME develops low-cost interactive science toys that can be used to effectively explain scientific concepts in a hands-on, engaging way. In the **Science Activity Centre** established on campus, we demonstrate such toys and conduct trainings for school teachers & students. Over 4,500 school teachers and nearly 18,000 students have so far attended such workshops and demonstrations. Science exhibitions organised through the activity centre have been visited by over 20,000 people. Participants and visitors get to see and explore toys demonstrating scientific concepts on electricity, magnetism, chemical reactions, working of human organs, and many more. With an aim to generate educational resource material, we are documenting these hands-on activities in the form of sequential photographs and short videos.

To encourage sustained use of these hands-on science toys in regular classroom practice, we have recently initiated a project supported by Tata Technologies. In this project, 200 school teachers teaching class VI to X will attend ten day-long workshops on how to use science toys for teaching various concepts from the syllabus. Selected forty teachers from this group will get a further advance training on designing toys. These Level 2 participants will then train others and also generate videos and lesson plans for specific chapters in the textbook.

Pedagogy Training and Other Domains of Work:

Towards promoting inquiry-based teaching and learning of STEM, one of CoESME's main activities is an on-going series of **workshops on research-based pedagogical tools (RBPTs) for teachers of undergraduate science and mathematics**. The workshops introduce teachers to a teaching method that helps students learn the process and methods of science, rather than just facts. CoESME is implementing this project with funding from DBT/DST and in collaboration with Newton Bhabha Fund (British Council). Teachers are trained in designing & using RBPTs, which can develop critical thinking and analytical abilities of students. The workshops are carried out at three levels for college teachers from all over India. It includes a training-of-trainer module for selected teachers, which prepares

them to become trainers themselves. We have so far conducted twenty-eight workshops at 17 locations in thirteen Indian states, with about 2200 college teachers from all over India trained as part of the project.

Another major activity is conducting month-long, fulltime, residential **Induction Training Programmes for newly recruited college teachers of basic sciences**. Unlike school teachers, college teachers do not get any training for teaching. The Induction Programme orients them on various aspects of teaching-learning, instructional methods (with emphasis on conceptual understanding & inquiry), assessment & evaluation techniques, and use of technology for teaching. Principles like student-centric, outcome-based and active learning, continuous & rigorous assessments, inclusivity; etc. are implemented at these Programmes, to demonstrate their effectiveness and encourage new teachers to adopt them.

In addition, we also conduct some discipline-specific workshops for teachers of physics, chemistry, mathematics, etc. We run programmes for educators and policy makers, that have included a series of workshops on **Science Administration & Management, Science Journalism and Science Policy** for women. We conduct science camps for students with the objective of motivating & exciting them about STEM and broadening their exposure. We also organise and host visits from school and college groups to IISER Pune, where they are told about the institute and are shown the campus and labs. Listing of CoESME's past & upcoming activities can be found on our website.

General Approach and Philosophy:

Our workshops are designed to be **activity-based, engaging, and interactive**. We focus on learning-by-doing, group work, and collaborative learning. We work with teachers from all over India and endeavour to be inclusive in all aspects, to accommodate participants from diverse socio-economic & cultural backgrounds. Most of our trainings are customised to suit local contexts of the target audience. We usually have multiple trainers for each workshop and often adopt team teaching. In addition to Continuing Professional Development (CPD), our programmes provide a platform for teachers to meet their peers, form professional networks, and exchange ideas & challenges in teaching and science education.