



Figure 1: L: Advisor's meeting at OSU in Feb 2016, R: Visit to USIEF office in Delhi, Feb 2016

STEM FACULTY TRAINING FOR INDIAN INSTITUTIONS ACHIEVES THE MILESTONE

Sultana N. Nahar

**Department of Astronomy, The Ohio State
University**

**Columbus, Ohio, USA
Email: nahar.1@osu.edu**

I left for India on February 14, 2016. This report is on the program and our relevant activities in India.

We held meetings with all advisors before leaving for India. One first item on the agenda was to discuss issues on students, conference, next batch, funding distribution etc at the USIEF office.

The new STEM (Science, Technology, Engineering, Mathematics) Faculty training project of the Ohio State University (OSU) achieved the milestone with the graduation in May 2016 of the first batch of Indian students from Aligarh Muslim University (AMU) in Uttar Pradesh. To administer the final exams and research presentations of the students, the OSU team traveled to AMU in March 2016. This a new and unique dual degree M.Ed. STEM program for the Ph.D. students in STEM disciplines studying in Indian institutions. The program, although under the department of Education with STEM specialization, is unique in two respect: i) the students



Figure 2: L: The four students, Nida Rehmani, Hala, Malik Azeem, and Asim Rizvi at front and their OSU advisors are forming the "O-H-I-O" sign at the completion of the all requirements of the MEd degree of STEM faculty training. R: Nahar at AMU.

took classes in Education for training to teach undergraduate students in contrast to K-12 grade students as done in Education Departments, and ii) carried out advanced research, with equal number of research credits as that of the education, at the Ohio State in the respective discipline of the student which would comprise in a chapter in the Ph.D. thesis along with the OSU professor as official co-advisor. Research part is expected to be a long term collaboration. Under the program, named as STEM ER (Education and Research), a student, while still in the Ph.D. program, spends the first year at the Ohio State for classes on teaching skills in education and for research and the following year at his/her Indian institution for field experience in teaching undergraduate students and continuing research under Ohio State enrollment. Hence the student is trained for world-class teaching skills for undergraduate students and for leading advanced research in Indian institutions. The program was developed for the need of better and effective educational foundation in India by Anil Pradhan and Sultana Nahar of Astronomy and Karen Irving of Education at OSU and under a competitive Obama-Singh 21st Century Knowledge Initiative award of US India Education Foundation where OSU partnered with AMU. India produces the best students mainly at IITs, but that is only a very tiny fraction of 150 million students in need for better education.

We, all four OSU fellows from AMU and their advisors, met PVC after couple of days to make all issues clear out the AMU ordinance that OSU research is a part



Figure 3: Meeting at Nanotechnology center and at PVC's office.

of the Ph.D. thesis and OSU advisor is an official co-advisor for each fellows. This needed clarification due to Asim's early submission of Ph.D. without the prior consent of his OSU advisor.

As one of the objectives of the USIEF award, OSU organized along with AMU the joint international conference on STEM Education and Research (STEMCON16) and Aligarh NANO-V in Aligarh during March 12-15, 2016. It was participated by various institutions in India, Bangladesh, Egypt, Russia, USA. Inclusion of both the teaching skills and scientific research in the presentations by the OSU participants caused some confusions for the Indian news reporters, but it was eye opening for the attending scientific community to appreciate the value of skills of teaching of large number of undergraduate students. Presentations included internationalization of the program to developing countries, such as, Bangladesh, Egypt, Saudi Arabia, Republic of Georgia. The message of the program was communicated as every day events of the conference became topics to be published in the newspapers, however, more emphasize was given to the research part. A half day session was dedicated on strategies in seeking fundings to continue the project at AMU and expand to other Indian as well as international institutions in developing countries.

We have been promoting the program along with some popular scientific presentations in various Indian institutions and received enthusiastic welcome. I gave a public lecture on astrophysics "The Universe through the hot atoms" at Sri Mata Vaishnu Devi University and we met with the VC, Dean of Faculty of Science regarding the



Figure 4: Meeting of advisors and fellows at PVC's office. L: AMU advisors and fellows meeting on the degree related issues at PVC's office.



Figure 5: L:Inauguration session of the conference where Pradhan, Irving, Nahar presented summary of the STEM ER project and Vice Chancellor Zameerddin Shah and Pro Vice Chancellor Ahemd Ali commented on importance and appreciation of the program. R: Professor Salah Obayya, Vice Chair of Zewail City of Science and Technolgy, Egypt, found the STEM ER program matching the same objective that City has for its postgraduate students.



Figure 6: Meeting with (L) VC Khurshid Andrabi of Kashmir University, (R) Public lecture after meeting VC S. Jain of Sri Mata Vaishnu Devi University in Jammu.

STEM ER project. During this 2016 visit, we met Vice Chancellor (VC) and high officials of government subsidised universities of University of Kashmir, Central Kashmir University, Central University of Jammu, and privately supported institutions of Sharda University near Delhi and Sri Mata Vaishnu Devi University in Jammu. The most attractive part for each university is the research under STEM disciplines and continued collaboration. But high cost US tuition for the classes do not get support any support from any private institutions while government institutions are ok if University Grant Commission (UGC) is willing to pay for them. Hence we are re-evaluating the scope of on-line course. Our past experience for the summer semester of distant learning for the AMU students did not work out because of communication time lag and unstable internet connections.

Under the STEM ER project, I taught a 3-weeks condensed course on atomic astrophysics and conducted computational workshops on R-matrix codes and SUPERSTRUCTURE at AMU from Feb 20 to March 11, 2016 It is very gratifying to observe the sincerity and interest of the participants from physics, chemistry, computer science in the course and 85 of them received certificates from the course at the National Science Day celebration on March 12, 2016. At this event physics prizes were given to Professor Tauheed Ahmed as Distinguished Teacher, Professors Sabbir Ahmad and Abbas Ali for the best teaching, Prof. Nasra Neelofar for best teaching at the Women's college, for the best Ph.D. thesis Dr. Mohammad Jane Alam (male), and Dr. Lila Abdalaziz Aid Al-Khataby (female), Mr. Sajad Ahmad Shiedk (best



Figure 7: L: Class in the Physics Department. R: Computational Lab at AMU

bachelor male student), Ms Fauzia (femal), that I founded.

I also introduced recognition program in the Department of Mathematics of AMU and University of Kashmir. I introduced two annual mathematics research prizes, one for a faculty member and one for the best Ph.D. thesis. The first prize recognition for the calendar year 2015 was held on March 1, 2016 inaugurated by Vice Chancellor Zameeruddin Shah.

University of Kashmir organized a computational workshop on atomic processes that I delivered during March 2016 visit. It was attended by an enthusiastic members from physics and chemistry. Government imposed load shedding of electricity every-day from 7 to 8 pm and 7 - 8 am in Kashmir is an deterrant to academic excellence. We had to rush to wrap up before the darkness of 7 pm. Rarely anyone returns after 8 pm. One of the items of my agenda was to visit 9000 ft up in the mountains the Gulmarg Research Observatory which had the inauguration opening by Nobel Laureate Arthur H. Compton in 1954 for cosmic rays research and explore the possible collaboration with OSU Astronomy. It remained closed for 20 years until 2010 due to unrest but has the infrastructure including a library to install a telescope for space research. It is being used for some geophysics and botany research. Similar to AMU, I introduced two prizes in Mathematics.

Number of OSU team participated the international conference organized by the Biochemistry Department of Aligarh Muslim University. participated in the international conference on Emerging Trends in Biomedical Sciences, Biochemistry De-



Figure 8: L: Winners of Math prizes 2016 at AMU, R: Sultana and Professor Pirzada the Chair of Mathematics meeting for acceptance of the math prize guidelines with VC Khurshi Andrabi of University of Kashmir



Figure 9: L: Gulmarg Research Observatory up on 9000 ft high. It has the infrastructure to set up a telescope for space research.



Figure 10: L: OSU members p R: Nida Rehmani presenting her research

partment, Aligarh Muslim University, March 6-9, 2016 - Karen Irving was a keynote speaker, and Altaf Wani, Qien Wang, Sultana Nahar were invited speakers

I had opportunities to work with female students and educators. I gave a public presentation on education particularly on STEM at the Government Degree College for Women on Maulan Azad Road in Kashmir. The principle informed of its opening recently after repair of damages from the 2016 high flood of river Jhelum. But the conference room was full with inquisitive faces as they seemed to have heard about me before. A student from Ladakh who felt very much inspired came to me and gave an emotional recitation of the Quran to express herself. We spent over a day in Sri Mata Devi Vaishnu University in the flourishing city Jammu. It was warmer and lively with signs of prosperity.

In between these events, we worked on the collaboration with University of Delhi and with USIEF office in Delhi.

We celebrated a events at AMU, i) International Women’s Day where STEM ER was emphasized and 22 women were recognized, iii) held a meeting at the organization for Women Power I came to know Dr. Bazigha Dhuru, who is the mother-in-law of Nida Rehmani and invited me for dinner in her in-law’s house, a woman leader for Council for Research and Empowerment of Women (CREW) empowerment of Muslim women. A dedicated woman with a very supportive husband Dr. Kirmani and has raised two high moral smart children.

Attended as Guest of Honor at two events



Figure 11: L: Seminar presentation based on ISMWS principles at the Government Degree College on Maulana Azad Road, Srinagar, Kashmir, March 24, 2016 R: student from Ladakh who was very much inspired and gave an emotional recitation of the Quran to express herself.



Figure 12: Group meeting at Manmohan's office at Delhi University



Figure 13: L: International Women’s Day plaque with citation ”, ”For her contributions in Atomic Astrophysics and promoting STEM education and research internationally”, from Chair of the Physics Department Professor Afzal Ansari R: At the induction of Patron event of CREW March 2016



Figure 14: L: Speech at the International Mother Language Day celebration of AMU, February 2016. R: Provost Professor Subuhi Khan introducing Begum Sultana Jahan hall for girls at AMU, March 9, 2016