

**TEQIP Workshop
Indian Institute of Technology Hyderabad
TEQIP-Sponsored Faculty Development Programme**

EDUCATORS FOR 21ST CENTURY ENGINEERS

February 27-28, 2015

Faculty Coordinators: Dr. Mudrika Khandelwal and Dr. Shubha Ranganathan

A two-day faculty development workshop was conducted on ‘Educators for 21st Century Engineers’. The main focus of the workshop was to emphasize the need to think of contemporary engineering education beyond the traditional focus on subject-specific technical knowledge. The workshop therefore emphasized the inculcation of broader transferable skills in critical thinking and analysis.

There were two main segments in the workshop – teaching methods and research approaches. With regard to teaching, the main goal was to share ideas about new teaching methods and evaluation strategies that are specifically adapted to the changing needs of contemporary youth. In terms of research, the workshop highlighted the need to consider various non-technical dimensions while conducting engineering research, such as social and environmental awareness.

OVERVIEW OF MAIN SESSIONS

Day 1: Pedagogic Approaches for Global Engineering

The day opened with Dr. Shubha Ranganathan (Faculty in the Department of Liberal Arts, IIT Hyderabad) introducing the genesis of the idea for the workshop. Given that IIT Hyderabad has been experimenting with several innovative approaches in teaching and curriculum, we felt that it was important to share the lessons learnt from our experience with others. Based on the fundamental belief that teaching as a set of learnable skills and not just innate qualities, the workshop will be inviting participants to reflect on ways by which they can strengthen their own methodologies.

The first talk was then delivered by Dr. Mudrika Khandelwal (Faculty in Department of Material Science and Metallurgical Engineering, Indian Institute of Technology Hyderabad) on ‘The 21st century Engineer’. Dr. Khandelwal traced the changes that have occurred in global engineering in the past few decades. There is a need to keep up with the changes by altering one’s approach to the material. Pedagogic practices have to shift from content delivery to skill impartment. There is also increasing interdisciplinarity and creation of newer and newer specializations and areas within



engineering, so that knowledge has expanded considerably.

Session II by Dr. Harish Nagaraj Dixit (Faculty in Department of Mechanical and Aerospace Engineering, IIT Hyderabad) was on 'Teaching methodologies and evaluation strategies' where he gave an overview of the new methods that are now available, given the advances in information technology in recent times. He illustrated the use of flip teaching, technological gadgets such as clickers, strategies such as mind-mapping, use of toys and models in classrooms, and web-based materials. He also gave examples of continuous evaluation procedures that combined a range of approaches beyond the traditional examination system (e.g. viva, discussion, projects, etc.)



After lunch there was a panel discussion with faculty from different streams: Dr. Harish Nagaraj Dixit, Dr. Neelakantan (Faculty in Department of Visual Design, IIT Hyderabad), Dr. M.V. Panduranga Rao (Faculty in Department of Computer Science and Engineering, IIT Hyderabad), and Dr. Akella Prabhakar (Faculty in Department of Mathematics, IIT Hyderabad), with Dr. Mudrika Khandelwal and Dr. Shubha Ranganathan facilitating the discussion. This session addressed the specific issues that engineering faculty in colleges faced in their own contexts, such as dealing with large classes or heavy syllabus content, etc. Through brainstorming, solutions and strategies that could be used in such contexts were proposed.



Finally, participants were encouraged to reflect on what challenges they faced and come up with ideas that could be implemented by them in everyday teaching. A group exercise facilitated this reflection.



Day 2: Contextualizing Engineering Research in Society

Day 2 opened with Dr. Mudrika Khandelwal emphasizing the need to bring social responsibility into one's research process. This involves considering various non-technical dimensions of engineering research such as sustainability, social inclusion, environmental costs, etc.



Dr. Neelakantan then did a session on 'Learning Environments', speaking about the importance of thinking of teaching and research in different spatial contexts. Taking teaching and research outside the classroom opened up new vistas and also created new relationships with students, where teaching moved from the traditional teacher-student focus to peer learning and sharing.



Participants then participated in an exercise where they presented a lecture for 15 minutes, which was followed by a discussion about the strengths of the lecture and possible ideas for improvement.



After lunch, Dr. Shubha Ranganathan delivered a talk on ‘Social science research methodologies for engineers’, where she introduced some qualitative research methods (such as interviews and observations) that are used in the social sciences to study social dimensions. An illustration was provided of interview research drawing on an example from a student research project.



Finally, the workshop concluded with each participant one key idea from the workshop that they planned to take home and implement in their teaching and research practices.

