INTER-DISCIPLINARY PROGRAMME IN EDUCATIONAL TECHNOLOGY
Annual Report 2013-14

Introduction

The Inter-Disciplinary Programme in Educational Technology (IDP-ET) started in the Institute in the Autumn semester of the academic year 2010-11. The IDP-ET has core faculty members as well as faculty members from various departments of the Institute. The IDP-ET has conducted research in areas such as pedagogies and tools for technology-enhanced learning, organized short intensive courses on effective teaching-learning and educational research methodologies through QIP, CEP and the Teach 10000 Teachers project, played a significant role in the organization of IEEE conference on Technology for Education (T4E), carried out sponsored projects for the National Mission on Education through ICT (NMEICT) and provided consultancy to industries working in the education sector.

Academic Programme

The IDP in Educational Technology (IDP-ET) offers a Ph.D. programme in Educational Technology. Currently, 20 students are enrolled in the Ph.D programme, and 3 more have been admitted as of May 2014. These Ph.D. students include engineering college teachers from colleges in and around Mumbai. The IDP-ET continues to offer core courses and electives in educational technology content and methods. These courses have had enrollment from B.Tech, M.Tech and Ph.D students in other academic programmes within the Institute.

R & D Activities

The main areas of research of the IDP-ET are:
- Technology-enhanced learning environments for pan-domain cognitive abilities such as, engineering design, problem-posing, estimation, algorithmic thinking, modeling, data representation & analysis.
- Frameworks for teacher use of educational technology tools and strategies
- Development of AI & ICT based tools for teaching-learning goals such as automated content generation and assessment.

The main areas of development are focused on:
- Educational products and tools – scientific visualizations, spoken-tutorials, virtual labs, tutoring systems, and assessment instruments.
- Creation of online courses and multimedia textbooks
- Guidelines for teachers - on classroom practice, effective strategies, large classes, incorporation of ICT tools, teaching in new situations such as online education and flipped classrooms

Sponsored Projects
Completed
"OSCAR++ (Open Source Courseware Animations Repository) sponsored by Ministry of Human Resource Development
"Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning"

Conferences/Symposia/Workshops/Seminars (Participated/ Papers presented)

Sahana Murthy.
Presented paper: "Program visualization: Effect of viewing vs. responding on student learning". 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, Nov 18-22, 2013.

Sridhar Iyer.
Presented paper: "Effect of think-pair-share in a large CS1 class: 83% sustained engagement". ACM conference on International Computing Education Research (ICER 2013), San Diego, USA, Aug. 12-14, 2013.
Presented paper: "A model for active learning in Synchronous Remote Classrooms: Evidence from a large-scale implementation". International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, Nov 18-22, 2013.

Papers published

Journals

Ramkumar Rajendran, Sridhar Iyer, Sahana Murthy, Campbell Wilson, and Judithe Sheard.
A Theory-Driven Approach to Predict Frustration in an ITS. IEEE Transactions on Learning Technologies, Vol 6 (4), pages 378-388, Oct-Dec 2013.

Peer-reviewed conference proceedings

Gargi Banerjee, Sahana Murthy and Sridhar Iyer.
Program visualization: Effect of viewing vs. responding on student learning. In 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, Nov 18-22, 2013.

Gargi Banerjee, Mrinal Patwardhan, and Madhuri Mavinkurve.
Teaching with visualizations in classroom setting: Mapping instructional strategies to instructional objectives. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20 2013.

Anita Diwakar, S. Poojary, R. Rokade, Santosh Noronha and Kannan Moudgalya.
Control systems virtual labs: Pedagogical and technological perspectives. In IEEE Multi-conference on Systems and Control, Hyderabad, India, Aug. 28-30, 2013.

Kiran L. N Eranki and Kannan M. Moudgalya.
Application of puzzles to unpuzzle the programming difficulty through spoken tutorial workshops. In IEEE 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, 2013.

Kiran L. N. Eranki and Kannan M. Moudgalya.
An integrated approach to build programming competencies through spoken tutorial workshops. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20 2013.

Kapil Kadam, Sameer Sahasrabudhe, Sridhar Iyer and Venkatesh Kamat.
Integration of Blender 3D in a basic computer graphics course. In IEEE 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, 2013.

Aditi Kothiyal, Rwitajit Majumdar, Sahana Murthy and Sridhar Iyer.
Effect of think-pair-share in a large CS1 class: 83% sustained engagement. In Proceedings of the ninth annual international ACM conference on International Computing Education Research (ICER 2013), San Diego, USA, Aug. 12-14, 2013.

Rwitajit Majumdar and Aditi Kothiyal.
PULSE: A Framework for Protocol Based Utility to Log Student Engagement. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20, 2013.

Rwitajit Majumdar and Sridhar Iyer.
LAMP: A framework for Large-Scale Addressing of Muddy Points. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20, 2013.

Madhuri Mavinkurve and Sahana Murthy.
Comparing self-learning behaviour of low and high scorers with engineering design interactive visualization. In 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, Nov 18-22, 2013.

Shitanshu Mishra and Rekha Ramesh.
A software solution to facilitate moderation, observation and analysis in a focused group interview. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20, 2013.

Shitanshu Mishra and Sridhar Iyer.
Problem Posing Exercises (PPE): An instructional strategy for learning of complex material in introductory programming courses. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20, 2013.

Sahana Murthy and Sridhar Iyer.
Guidelines and templates for planning, conducting and reporting educational technology research. *(Tutorial).* IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, India, Dec. 18-20, 2013.

Jayakrishnan M. Warriem, Sahana Murthy and Sridhar Iyer.
A model for active learning in synchronous remote classrooms: Evidence from a large-scale implementation. In 21st International Conference on Computers in Education (ICCE 2013), Bali, Indonesia, Nov 18-22, 2013.

Jayakrishnan M. Warriem, Sahana Murthy and Sridhar Iyer.
Training in-service teachers to do action research in educational technology. In IEEE Fifth International Conference on Technology for Education (T4E 2013), Kharagpur, Dec. 18-20, 2013.

Conferences and Workshops (Co-ordinated / chaired)

Sridhar Iyer.
Program Co-chair, IEEE International Conference on Technology for Education T4E 2013, Kharagpur, Dec. 18-20, 2013.

Sahana Murthy and Sridhar Iyer.
Co-ordinated 1-week QIP course on "Effective Teaching-Learning Strategies for Quality Engineering Education", June 24-28, 2013.

IDP-ET Workshop series on effective teaching-learning.
"Think-Pair-Share, an active learning strategy: Experiences from CS101 and a how-to for your course". Sridhar Iyer. December 5, 2013.
"Peer-instruction: An interactive learning strategy to promote conceptual reasoning in your course". Sahana Murthy. February 27, 2014.

Invited Lectures

Sahana Murthy
- "Visualizations in Facilitating Learning: Some myths and realities". National Symposium on Future Directions for Technology in Education, SNDT Women's University, March 21, 2014.
- Keynote address, AICTE National Seminar on Academic Excellence through Quality Technical Education - Opportunities & Challenges, Thakur College of Engineering & Technology, Mumbai, January 23, 2014.
- "Effective teaching-learning strategies from Physics Education Research". As part of UGC Refresher course for B.Sc physics instructors. Mumbai University. November 13-14, 2013.

Visitors to the IDP

- Dr. Michael Hewner, Rose-Hulman Institute of Technology delivered a seminar on 'Student conceptions in the field of computer science.'
- Prof. Eric Mazur, Harvard University, delivered a Workshop on 'Peer Instruction', a seminar on 'Problem-based Learning' and an Institute Colloquium on 'Interactive Teaching, Flipped Classrooms and Peer Instruction'.
- Dr. Gwen van der Velden, University of Bath, delivered a seminar on 'E-learning issues in the UK'.
- Dr. Ashok Basawapatna, University of Colorado delivered a lecture on 'Scalable game design'.
- Prof. Aman Yadav, Purdue University, delivered a seminar on 'ABCs of active learning teaching practice in engineering education: Project-based learning and case-based instruction'.

Honorary Work

Sridhar Iyer
Program Chair, IEEE International Conference on Technology for Education T4E 2013, Kharagpur, Dec. 18-20, 2013.
Executive Committee member, 2014-17, Asia Pacific Society of Computers in Education.

Kannan Moudgalya

Steering Committee member, IEEE International Conference on Technology for Education T4E 2013, Kharagpur, Dec. 18-20, 2013.

Sahana Murthy

Executive Committee member, 2014-17, Asia Pacific Society of Computers in Education.

Steering Committee member, IEEE International Conference on Technology for Education T4E 2013, Kharagpur, Dec. 18-20, 2013.