

INTER-DISCIPLINARY PROGRAMME IN EDUCATIONAL TECHNOLOGY

Annual Report 2015-16

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, adjunct faculty members, visiting faculty members, as well as faculty members from various departments of the Institute. The IDP-ET conducts research in areas of pedagogies and tools for technology-enhanced learning. In addition to Institute courses at a Ph.D. level, the IDP-ET organizes short-term intensive courses on effective teaching-learning and educational research methodologies through QIP, CEP and the Teach 10000 Teachers project. Faculty members and Ph.D. research scholars of the IDP-ET play a significant role in the organization of IEEE conference on Technology for Education (T4E), carry out sponsored projects for the National Mission on Education through ICT (NMEICT) and provide consultancy to educational technology industries.

Academic Programme

The IDP in Educational Technology (IDP-ET) offers a Ph.D. programme in Educational Technology.

Status of Ph.D students

Ms. Madhuri Mavinkurve defended her thesis in January 2016 (she is the first PhD student in the IDP-ET to do so). In addition, two students submitted their thesis and two have completed pre-synopsis. Other than those, 25 students are currently enrolled in the Ph.D programme. These Ph.D. students include engineering college teachers from colleges in and around Mumbai.

Courses

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.

Two new elective courses were introduced in the 2015-16 academic year:

- 1) ET808 Knowledge structure and learning system design
- 2) ET803 Advanced topics in cognition

People

New faculty: The IDP-ET welcomes Prof. Sridhar Iyer who is on full time deputation from Dept of CSE, and Prof Sanjay Chandrasekharan, Adjunct faculty, from HBCSE, TIFR.

Visiting faculty: Prof Maiga Chang from Athabasca University, Canada visited the IDP-ET from July-December 2015. He taught a course and advised PhD students.

R & D Activities

The main areas of focus of the R&D activities of the IDP-ET are:

- Technology-enhanced learning environments for thinking skills, which are pan-domain cognitive skills 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.

Areas of development focus for the IDP-ET are:

- 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”

Papers published

Journals

- Sahana Murthy, Sridhar Iyer and Jayakrishnan Warriem. (2015) ET4ET: A large-scale professional development program on effective integration of Educational Technology for engineering faculty. *Educational Technology & Society*, 18(3), 16-28.
- Shitanshu Mishra and Sridhar Iyer. (2015). An Exploration of Problem Posing Based Activities as an Assessment Tool, and as an Instructional Strategy. *Research and Practice in Technology Enhanced Learning (RPTEL)*, 10:5.
- Gargi Banerjee, Sahana Murthy and Sridhar Iyer. (2015) Effect of active learning using program visualization in technology constrained college classrooms. *Research and Practice in Technology Enhanced Learning*, 10:15.
- Madhuri Mavinkurve and M. B. Patil. (2016). Impact of Simulator as a Technology Tool on Problem Solving Skills of Engineering Students-A Study Report. *Journal of Engineering Education Transformations*, 29(3), 124-131.
- Anita Diwakar and Santosh B. Noronha. (2016). The effectiveness of Virtual Labs in engineering education- What do we measure? *Journal of Engineering Education Transformations*.
- Kiran L N Eranki, Kannan M Moudgalya. (2016). Comparing the effectiveness of self-learning Java workshops with traditional classrooms. *Educational Technology & Society*, 19(3), 14-36.

Peer-reviewed conference proceedings

- Kavya Alse, Mukund Lahoti, Meenakshi Verma, Sridhar Iyer, GATutor: A guided discovery based tutor for designing greedy algorithm, IEEE 7th International Conference on Technology for Education, T4E 2015, Warangal, Dec. 10-12, 2015
- Vasanta Akondy and Sahana Murthy. From Novice to Expert Instructional Designer: A Training Based on Cognitive Apprenticeship Model. IEEE 7th International Conference on Technology for Education, T4E 2015, Warangal, Dec. 10-12, 2015.
- Abhinav Anand, Shitanshu Mishra, Anurag Deep and Kavya Alse. Generation of Educational Technology Research Questions through Design Thinking Framework”. IEEE 7th International Conference on Technology for Education, T4E 2015, Warangal, Dec. 10-12, 2015
- Anurag Deep, Sahana Murthy and P. J. Bhat. Designing a Technology Enhanced Learning environment for Hypothetico---Deductive Reasoning in Genetics. 6th International conference to review research on Science, Technology and Mathematics Education (epiSTEME 6). Mumbai, India. Dec.15-18, 2015.

- Rwitajit Majumdar and Sridhar Iyer. Beyond Clickers: Tracing Patterns in Students' Response through iSAT. 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Mrinal Patwardhan and Sahana Murthy. How Reciprocatve Dynamic Linking Supports Learners' Representational Competence: An Exploratory Study. 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Gargi Banerjee and Sahana Murthy. CuVIS Tool to Develop Instructors' Competency in Creating Meaningful Learning Designs. 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Jayakrishnan M Warriem, Sahana Murthy and Sridhar Iyer. Sustainability at Scale: Evidence from a Large Scale Teacher Professional Development Program. 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Kavya Also, Anurag Deep and Sridhar Iyer. Teaching Hypothetico-Deductive Reasoning through murder mystery game. Workshop on Technology Enhanced Learning on Thinking Skills (TELoTS), at the 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Aditi Kothiyal and Sahana Murthy. Exploring Student Difficulties in Divide and Conquer Skill with a Mapping Tool. Workshop on Technology Enhanced Learning on Thinking Skills (TELoTS), at the 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Madhuri Mavinkurve and Archana Deshpande. Design of TEL environment to develop Multiple Representation thinking skill. Workshop on Technology Enhanced Learning on Thinking Skills (TELoTS), at the 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
- Aditi Kothiyal. Supporting Engineering Students' Estimation Skill using a Collaborative Digital Learning Environment. In the Doctoral Consortium Proceedings of the 11th International Conference on Computer Supported Collaborative Learning (CSCL 2015), Gothenburg, Sweden. June 7-11, 2015. pp. 949-951.
- Kapil Kadam and Sridhar Iyer. Impact of Blender Based 3D Mental Rotation Ability Training on Engineering Drawing Skills. IEEE 15th International Conference on Advanced Learning Technologies (ICALT 2015), Hualien, Taiwan, July 7-9, 2015.
- Madhuri Mavinkurve and Sahana Murthy. Development of engineering design competencies using TELE-EDesC: Do the competencies transfer? IEEE 15th International Conference on Advanced Learning Technologies (ICALT 2015), Hualein, Taiwan, July 7-9, 2015.
- Yogendra Pal and Sridhar Iyer. Classroom Versus Screencast for Native Language Learners: Effect of Medium of Instruction on Knowledge of Programming. In ACM International Conference on Innovation and Technology in Computer Science Education (ITiCSE 2015). Vilnius, Lithuania. June 2015.
- Shitanshu Mishra, Sridhar Iyer. Question-Posing strategies used by students for exploring Data Structures. In ACM International conference on Innovation and Technology in Computer Science Education (ITiCSE 2015). Vilnius, Lithuania. June 2015.
- Peter Hubwieser, Michail N. Giannakos, Marc Berges, Torsten Brinda, Ira Diethelm, Johannes Magenheimer, Yogendra Pal, Jana Jackova and Egle Jasute. "A Global Snapshot of Computer Science Education in K-12 Schools." Pp. 65–83 in Proceedings of the 2015 ITiCSE on Working Group Reports – ITiCSE-WGR '15. New York, New York, USA: ACM Press, 2015.

- Daniela Giordano, Francesco Maiorana, Andrew Paul Csizmadia, Simon Marsden, Charles Riedesel, Shitanshu Mishra, Lina Vinikienė. New Horizons in the Assessment of Computer Science at School and Beyond: Leveraging on the ViVA Platform. Proceedings of the 2015 ITiCSE on Working Group Reports. ACM, 2015.
- Aditi Kothiyal, Bipin Rajendran and Sahana Murthy. Delayed Guidance: A teaching-learning strategy to develop ill-structured problem solving skills in engineering. 3rd International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2015), Taipei, Taiwan. April 9-12, 2015.
- Deepti Reddy, Shitanshu Mishra, Ganesh Ramakrishnan and Sahana Murthy. Thinking, Pairing, and Sharing to improve learning and engagement in a Data Structures and Algorithms (DSA) class. 3rd International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2015), Taipei, Taiwan. April 9-12, 2015.
- Yogendra Pal and Sridhar Iyer. “Effect of medium of instruction on programming ability acquired through screencast.” 3rd International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2015), Taipei, Taiwan. April 9-12, 2015.
- Kiran L N Eranki, Kannan M Moudgalya. Evaluation of Programming competency through Student Error Patterns. 3rd International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2015), Taipei, Taiwan. April 9-12, 2015

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

- Participated and presented paper(s) in the 3rd International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2015), Taipei, Taiwan. April 9-12, 2015:
 - Sridhar Iyer, Yogendra Pal, Rekha Ramesh, Deepti Reddy
- Participated and presented paper(s) in ACM International conference on Innovation and Technology in Computer Science Education (ITiCSE 2015). Vilnius, Lithuania. June 2015.
 - Shitanshu Mishra, Yogendra Pal
- Participated and presented paper(s) in IEEE 15th International Conference on Advanced Learning Technologies (ICALT 2015), Hualein, Taiwan, July 7-9, 2015.
 - Sridhar Iyer, Sahana Murthy
- Participated and presented paper(s) in 23rd International Conference on Computers in Education, (ICCE 2015), Hangzhou, China. November 30- December 4, 2015.
 - Gargi Banerjee, Anurag Deep, Aditi Kothiyal, Rwitajit Majumdar, Madhuri Mavinkurve, Sahana Murthy, Jayakrishnan M. Warriem
- Participated and presented paper(s) in IEEE 7th International Conference on Technology for Education, T4E 2015, Warangal, Dec. 10-12, 2015

International Working Groups participation

- Working Group on “A repository for high school computer science questions, visual assessment tools and metadata annotations”
 - Total 7 Members from 5 countries (India, Italy, Lithuania, UK, USA)
 - IDP-ET Representative: Shitanshu Mishra. Shitanshu’s primary role was to conceptualize and develop a web-based platform which enables teachers and students to contribute to a Computer Science question repository.
- Working Group on “Computer Science Education in K-12 Schools”
 - IDP-ET Representative: Yogendra Pal. Yogendra’s primary role was to do qualitative content analysis, specially related to South Asian CS Education perspectives.

Conferences and Workshops organized

- LaTiCE 2016 – 4th IEEE International Conference on Learning and Teaching in Computing and Education, March 31 - April 3, 2016, IIT Bombay.
- Effective Teaching-Learning using Visualizations. Pre-conference workshop in T4E 2015 - IEEE International Conference on Technology for Education, Dec 9, 2015. Sridhar Iyer, Sahana Murthy
- iSAT: A Visual Learning Analytics Tool to trace Educational Datasets, Workshop in the 7th IEEE International Conference on Technology for Education, Warangal, India, Dec 10-11, 2015. Rwitajit Majumdar, Jayakrishnan M. Warriem
- Technology enhanced learning of thinking skills (TELoTS). 2nd Workshop at the International Conference on Computers in Education, ICCE 2015, Hangzhou, China, Nov. 30- Dec. 4, 2015. Sahana Murthy, Sridhar Iyer, Madhuri Mavinkurve.

Conferences chaired

- Sridhar Iyer, Program Co-chair, LaTiCE 2016 – 4th IEEE International Conference on Learning and Teaching in Computing and Education, IIT Bombay, Mumbai. March 31 - April 3, 2016.
- Sahana Murthy, co-Convener, episteme-6. Sixth international conference on STEM education research, Homi Bhabha Centre for Science Education, TIFR, Mumbai. Dec. 15-18, 2015.
- Sridhar Iyer, Program Co-chair, T4E 2015 – IEEE International Conference on Technology for Education T4E 2015, Warangal, India, Dec. 10-12, 2015.

Faculty professional development courses

- Educational technology for engineering teachers. ET601Tx. MOOC on IITBx. Jan. 7 – Feb 18, 2016. Sahana Murthy, Sridhar Iyer, Jayakrishnan M.
- Mentoring Educators in Educational Technology - 2015, blended training program from Jun 1- Dec 31 (with a 3-day face-to-face session)

Invited Talks

- Active learning strategies for improving student learning and engagement. Sahana Murthy. Invited talk in seminar on ‘Conversations across disciplines – Teaching & learning’, IIT Gandhinagar. Feb. 13, 2016.
- Going beyond Learning Management to Active Learning Management: Experience of using MOODLE for Active Learning. Jayakrishnan M. Warriem. Invited Talk at ‘MOODLE Moot India - 2016’, New Delhi. Feb 6, 2016.
- Educational Technology Research: Planning, conducting and reporting your ET research study. Sahana Murthy. University of Goa, Oct. 11, 2015.
- Learning from digital technologies – cognitive aspects. Sahana Murthy. Invited talk at Tata Institute of Social Sciences. May 21, 2015.

Honorary Work

- New Initiatives Chair - IEEE Technical Committee on Learning Technologies. Sridhar Iyer.
- Executive Committee Member, Asia Pacific Society of Computers in Education (APSCE). Sahana Murthy, Sridhar Iyer.
- Steering Committee Member International Conference on Technology for Education (T4E). Kannan Moudgalya, Sridhar Iyer, Sahana Murthy.
- Reviewer: various journals such as Educational Technology Research & Development, Educational Technology & Society, IEEE Transactions on Education etc.
- Conference PC Member Various conferences such as ICALT, SIGCSE, ITiCSE, ICCE, ICSLE.