INTER-DISCIPLINARY PROGRAMME IN EDUCATIONAL TECHNOLOGY
Annual Report 2016-17

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 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 and MOOCs on effective teaching-learning and educational research methods through CEP, Train 10000 Teachers project and IITBombayX. Faculty members and Ph.D. research scholars of the IDP-ET play a significant role in the organization of international conferences , carry out sponsored projects for the National Mission on Education through ICT (NMEICT) and provide consultancy to educational technology industries. In 2016-17, the IDP-ET organized three large international conferences in Educational Technology at IIT Bombay: ICCE 2016, T4E 2016 and LaTiCE 2016.

People

Convener: Prof Vikram Gadre concluded his term, and Prof. Sridhar Iyer took over as Convener ET, on Feb 10, 2017.

Faculty members: The IDP-ET has 2 core faculty, 2 adjunct faculty and 19 associate faculty from academic units across the Institute. 2 new faculty members have accepted offers.

Academic Programme

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

Ph.D students
Currently enrolled: 19
Degrees awarded: 05

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.

R & D Activities

The main research areas of focus of the IDP-ET are:

- TELoTS: Technology-enhanced learning of thinking skills. Develop students' pan-domain cognitive skills such as engineering design, problem-posing, estimation, algorithmic thinking, modeling, data representation & analysis. Design, develop and evaluate TELoTS systems for various thinking skills in different domains.
- TUET: Teacher use of educational technology. Develop and evaluate models for various modes of training such as MOOCs and blended learning. Develop tools to assist teachers in technology integration, analytics.
- Discipline based education research. Technology-enhanced learning of specific topics; Action research of in engineering courses.

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

Ongoing
- Teaching learning centre for information and communication technologies. Sponsored by MHRD – Pandit Madan Mohan Malaviya National Mission on Teachers and Training.
- Teaching-learning with ICT in schools. Sponsored by Birla CSR.
- Benchmarking digital content. Sponsored by Next Education India Pvt Ltd.
- Pedagogy for effective use of ICT by School teachers. Sponsored by Next Education India Pvt Ltd.

Completed
- MITACS. Internally funded MHRD project.

Consultancy Projects
Ongoing
- Advice on R&D of current and future education projects. Next Education India Pvt Ltd.

Papers published

Journals
- Mrinal Patwardhan and Sahana Murthy. Designing Reciprocative Dynamic Linking to improve learners' Representational Competence in interactive learning environments. Research and Practice in Technology Enhanced Learning, 12:10. 2017.
- Rwitajit Majumdar, Sridhar Iyer. iSAT: A Visual Learning Analytics Tool for Instructors. Research and Practice in Technology Enhanced Learning 11:16 2016

Book Chapters
- Sahana Murthy, Jayakrishnan M Warriem, & Sridhar Iyer (2017). Technology Integration for Student-Centered Learning: A Model for Teacher Professional Development Programs *in Kong, S.C., Wong, T.L., Yang, M., Chow, C.F., Tse, K.H. (Eds.) Emerging Practices in Scholarship of Learning and Teaching in a Digital Era*, 55-74.

Peer-reviewed conference proceedings
- Anurag Deep, Sahana Murthy and P. Jayadeva Bhat. Geneticus investigatio: An agent-based modeling system for teaching-learning hypothetico-deductive reasoning in Mendelian genetics. Proceedings of the 8th IEEE International Conference on Technology for Education (T4E 2016) Mumbai, India, December 2-4, 2016.
- Ming C. Law, Rwitajit Majumdar, and Few K. Hew. Tracing Phonological Processing Skill in Early Childhood Through iSAT. Proceedings of the 8th IEEE International Conference on Technology for Education (T4E 2016) Mumbai, India, December 2-4, 2016.

- Soumya Narayana, Prajish Prasad, T.G.Lakshmi and Sahana Murthy. Geometry via Gestures: Learning 3D geometry using gestures. Proceedings of the 8th IEEE International Conference on Technology for Education (T4E 2016) Mumbai, India, December 2-4, 2016.
- Anura Kenkre and Sahana Murthy. Students learning paths in developing micro-macro thinking: productive actions for exploration in MIC-O-MAP learning environment. 24th International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Lakshmi T.G., Prajish Prasad, Soumya Narayana, Sahana Murthy and Sanjay Chandrasekharan. Geometry via Gestures: Design of a gesture based application to teach 3D geometry. In Proceedings of Workshop on Emerging Pedagogies for Computer-Based Learning in the International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Sameer Sahasrabudhe, Rwitajit Majumdar. Content Creation and Pedagogic Strategies for Skill Development MOOC. 24th International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Jayakrishnan M Warriem, Sahana Murthy and Sridhar Iyer. Shifting the focus from Learner Completion to Learner Perseverance: Evidences from a Teacher Professional Development MOOC. In Proceedings of 24th International Conference on Computers in Education (ICCE2016), Mumbai, India,November 28- December 2, 2016.
- Madhuri Mavinkurve, Soumya Narayana, Mahesh Patil. Exploring effects of immersivity across three dimensions in Training Design: Technology Integration Training Workshop for Engineering Teachers in India. 24th International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Kavya Alse, Sridhar Iyer, Sasikumar, M. Designing PHyTeR: a system to teach troubleshooting skill. In proceedings of Workshop on Technology Enhanced Learning of Thinking Skills in the International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Anurag Deep, Prajish Prasad, Soumya Narayana, Maiga Chang, Sahana Murthy. Game Based Learning of Blood Clotting Concepts. IEEE 16th International Conference on Advanced Learning Technologies (ICALT 2016), Austin, Texas, USA. July 25-28, 2016.
- Sameer Sahasrabudhe,Rwitajit Majumdar. MOOC for skill development in 3D animation.IEEE 16th International Conference on Advanced Learning Technologies (ICALT 2016), Austin, Texas, USA. July 25-28, 2016.
- Kavya Alse, T.G.Lakshmi, Prajish Prasad, Maiga Chang and Sridhar Iyer. Assessing Students' Conceptual Knowledge of Computer Networks in Open Wonderland. IEEE 16th International Conference on Advanced Learning Technologies (ICALT 2016), Austin, Texas, USA. July 25- 28, 2016.
- Deepti Reddy, Alka Mahajan. Expert System for Generating Teaching Plan Based on Measurable Learning Objectives and Assessment. IEEE 16th International Conference on Advanced Learning Technologies (ICALT 2016), Austin, Texas, USA. July 25-28, 2016.
- Aditi Kothiyal, Sahana Murthy and Sanjay Chandrasekharan. Hearts pump and hearts beat": Engineering estimation as a form of model-based reasoning. 12th International Conference of the Learning Sciences, ICLS 2016, Singapore. June 20-24, 2016.
- Rwitajit Majumdar. SAT Diagram: An Interactive Visual Representation for Learning Analytics. In the Proceedings of Graduate Symposium of the 9th International Conference on the Theory and Application of Diagrams. Philadelphia, USA, August 9, 2016.

Conferences and Workshops organized

At IIT Bombay:

- IEEE 8th International Conference on Technology for Education (T4E 2016), Mumbai, India. December 2-4, 2016.
- 24th International Conference on Computers in Education (ICCE 2016), Mumbai, India. November 28- December 2, 2016.
- Technology enhanced learning of thinking skills (TELoTS). 3rd Workshop at the International Conference on Computers in Education, ICCE 2016, Mumbai, India. November 28- December 2, 2016.
- IEEE 4th International Conference on Learning and Teaching in Computing and Education (LaTiCE 2016), Mumbai, India. March 31-April 3, 2016.
- iSAT: An Interactive Visualization for Cohort Analysis in Educational Datasets. Tutorial at the International Conference on Computers in Education, ICCE 2016, Mumbai, India. November 28- December 2, 2016.
- 2 Day workshop on "Use of R for Learning Analytics" jointly organized with Knowledge Based Computing System Group, CDAC, Kharghar. March 23-24.

Conferences chaired

- Sahana Murthy, International Program Committee Co-chair, ICCE 2016 – International Conference on Computers in Education, Mumbai, India. November 28 - December 2, 2016.
- Sahana Murthy, Program Co-chair, T4E 2016 – IEEE International Conference on Technology for Education T4E 2016, Mumbai, India. December 2-4, 2016.
- Sridhar Iyer and Sahana Murthy, Track Program Chairs of TELoTS track in ICALT 2016 - IEEE International Conference in Advanced Learning Technologies, Austin, Texas, USA. July 25-28, 2016,
- Sridhar Iyer, Program Co-chair, LaTiCE 2016 – 4th IEEE International Conference on Learning and Teaching in Computing and Education, Mumbai, India. March 31 - April 3, 2016.

CEP and Faculty Professional Development courses

- Strategies for developing effective e-learning content. Sahana Murthy and Sridhar Iyer. In-house CEP course for Next Education India. September 2-3, 2016.
- Four Week AICTE approved FDP on Use of ICT in Education for Online and Blended Learning, May 2 - July 10, 2016
- Orientation Workshop for top performers of FDP on Use of ICT in Education for Online and Blended Learning, March 25-26.
- 2-day workshop in Faculty Conclave on "Effective Integration of Technology for Outcome Based Education", Atharva College of Engineering , Mumbai, March, 2016.
- 1-day workshop on 'Active Learning' , BITS Pilani, Hyderabad campus, April, 2016.

Invited Talks

- Sahana Murthy. Student-centric techniques in f2f classrooms, flipped classrooms and MOOCs: Improving learning and engagement. Invited talk in Engineering Conclave, IIT Madras, September 1, 2016.

- Sahana Murthy. Project TUET: Teacher Use of Educational Technology. Invited seminar at Tata Institute of Social Sciences, August 10, 2016.
- Sridhar Iyer. Moving from teacher-centric to student-centric learning. Invited talk at Principal's conference, Next Education, Hyderabad, Dec 2016.
- Sridhar Iyer. Active learning in large classes. Distinguished Lecture Series, Singapore University of Technology and Design, Singapore, June 2016.

Honorary Work
- New Initiatives Chair - IEEE Technical Committee on Learning Technologies (TCLT). Sridhar Iyer. 2015-18.
- Executive Committee Member, Asia Pacific Society of Computers in Education (APSCE). Sahana Murthy, Sridhar Iyer. 2014-17.
- 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. Various faculty members and PhD research scholars.
- Conference PC Member Various conferences such as ICALT, SIGCSE, ITiCSE, ICCE, ICSLE.