INTER-DISCIPLINARY PROGRAMME IN EDUCATIONAL TECHNOLOGY
Annual Report 2012-13

Introduction

The Interdisciplinary Programme (IDP) in Educational Technology was started in the institute from the autumn semester of the academic year 2010-11. Faculty members from almost all the departments of the institute are participating in the IDP. Various research groups are addressing different aspects of research in educational technology. Some of the areas are instructional design in different streams of science and engineering, video coding for the purpose of distance education - technology of coding and transmission, learner-centric tutoring systems, pedagogy and evaluation for online learning, concept inventory development, use of technology in classroom pedagogy, specific use of WEB 2.0 technologies, transformative pedagogical engagement for the student and the teacher, implementation and assessment of ICT tools to enhance learning in new or constrained situations, open source software, open source hardware, synchronous and asynchronous education, educational methodologies, mining for textbook generation, design and deployment of virtual laboratories and remote triggered experiments, employing multivariate statistical/pattern recognition methods for use in evaluating research methodologies, technology – enhanced learning in different areas of science and engineering, exploring the role of simulations, models and animations in teaching large classes, designing collaborative environments for learning and social interaction, scaffolding for online teaching of programming to Hindi-medium students, methodology for creating 3D educational visualizations and exploring their effectiveness as compared to 2D animations, economic impacts of technology-enabled education and socioeconomic empowerment through technology education.

Academics Programme

The IDP in educational technology offers a Ph.D. programme in educational technology and now, 15 students are pursuing their Ph.D programme. The two courses that are offered to these students are, "Introduction to Educational Technology" and "Research Methods in Educational Technology". The students are also encouraged to take additional courses in their core disciplines. These students include several teachers from colleges in and around Mumbai.

Research Projects

Murthy, Sahana

Project OSCAR++, Open Source Courseware Animations Repository, sponsored by the Ministry of Human Resource Development under the National Mission on Education through Information and Communication Technologies.

Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning, sponsored by the Ministry of Human Resource Development under the National Mission on Education through Information and Communication Technologies.

Iyer, Sridhar

Project OSCAR (Co-PI-Sahana Murthy). This is a part of the National Mission on Education through ICT. The project aims to develop a large number of web-based learning objects (animations and simulations) for various subjects in engineering.

Publications:

1. Kapil Kadam, Sameer Sahasrabudhe and Sridhar Iyer. Improvement of mental rotation ability using Blender 3D. IEEE International Conference on Technology for Education (T4E), Hyderabad, India, July 2012.

2. Yogendra Pal and Sridhar Iyer. Comparison of English versus Hindi medium students for programming abilities acquired through video-based instruction. IEEE International Conference on Technology for Education (T4E), Hyderabad, India, July 2012.

3. Sridhar Iyer and Sahana Murthy. Demystifying Networking: Teaching non-majors via analogical problem solving. ACM Symposium on Computer Science Education (SIGCSE), Denver, USA, March 2013.

4. Mrinal Patwardhan, Anita Diwakar and Sahana Murthy. Pedagogical Analysis of Content Authoring Tools for Engineering Curriculum," Proceedings of the 4th IEEE International Conference on Technology for Education (T4E 2012), pp. 83-89, Hyderabad, India, July 2012.

5. Anura Kenkre, Gargi Banerjee, Madhuri Mavinkurve and Sahana Murthy. Identifying Learning Object pedagogical features to decide instructional setting. Proceedings of the 4th IEEE International Conference on Technology for Education (T4E 2012), pp. 46-53, Hyderabad, India, July 2012.

6. Madhuri Mavinkurve and Sahana Murthy. Interactive visualization to teach engineering design competencies. Workshop Proceedings of 20th International Conference and on Computers in Education (ICCE 2012), Singapore, November 2012.

7. Gargi Banerjee and Sahana Murthy. Effect of Instructors' Pedagogy and TPACK on integration of computer based visualizations. Workshop Proceedings of 20th International Conference and on Computers in Education (ICCE 2012), Singapore, November 2012.

8. B. L. Tembe and S. K.Kamble, Use of concept maps as an assessment tool in mechanical engineering education. International Conference on Learning and Administration in Higher Education, May 2-5, Nashville, Tennessee, 2012

9. S. K. Kamble and B. L. Tembe. Teaching of the Second Law of Thermodynamics: Evaluation of learners' concept maps. The Second International Congress on Interdisciplinary Research and Development, Bangkok, Thailand, 31 May - 1 June **2012**.

10. S. K. Kamble and B. L. Tembe, The effect of concept maps on achievement and attitude in a mechanical engineering course. IEEE International Conference on Teaching, Assessment and Learning for Engineering 2012, Hongkong (TALE2012).

11. S. K. Kamble and B. L. Tembe. The effect of concept maps on problem solving performance in a mechanical engineering course. 2nd World Conference on Educational Technology Researches Near East University June 2012 Nicosia – North Cyprus.

Workshops Conducted:
Research Methods in Educational Technology, under the "Teach 10000 Teachers" project of the National Mission in Education through ICT, MHRD, Feb 2nd to Feb 9th 2013.

Faculty members and their Specializations:

1) **P. J. Bhat**
   Educational Technology in Biosciences

2) **M. C. Deo**
   Instructional Design for Civil Engineering

3) **T. L. Eldho**
   Role of Geospatial Technologies in Enhancing Technical Learning, New Instructional Design Paradigms for fluid mechanics learning

4) **V. M. Gadre**
   Video Coding for the purpose of Distance Education – technology of coding and transmission

5) **U. N. Gaitonde**
   Instructional design in Mechanical Engineering and Thermodynamics

6) **Meenakshi Gupta**
   Educational Psychology

7) **Sridhar Iyer**
   Learner-centric tutoring systems, Pedagogy for online learning, Concept inventory development

8) **Shishir K. Jha**
   Use of technology in classroom pedagogy, Specific use of WEB 2.0 technologies, Transformative pedagogical engagement for the student and the teacher

9) **Anirudha Joshi**
   Visual Design, Usability Studies, Human-Computer Interface Design, Interface Evaluation, Interface Design for Indian languages, New Media Design

10) **A. V. Mahajan**
    Technology Enhanced learning, Physics Education

11) **Kannan Moudgalya**
    IT literacy, bridging digital divide, virtual labs, open source software, open source hardware, synchronous and asynchronous education, educational methodologies, mining for textbook generation

12) **Sahana Murthy**
    Pedagogy and evaluation of e-learning content Implementation and assessment of ICT tools to enhance learning in new or constrained situations, Use of technological tools in physics education

13) **K. Narayanan**
    Economics of Education Economics impacts of Technology-enabled Education, Socioeconomic empowerment though technology education

14) **Santosh Noronha**
    Design and development of remote triggered experiments, Employing multivariate statistical/pattern recognition methods for use in evaluating research methodologies

15) Prita Pant

Technology- Enhanced learning in metallurgical engineering and materials science, Exploring the role of models and animations in teaching large classes (up to 100 students)

16) M. B. Patil

Design and deployment of virtual laboratories and remote triggered experiments

17) D. B. Phatak

Educational Technology for Countrywide Education, particularly in Computer Science and Engineering

18) Ravi Poovaiah

Designing collaborative environments for learning and social interactions, Designing for children- with a focus on 'play and learn', Information design, structuring and visualisation, Interface design and Designing interactions, Temporal and spatial aspects of visual language

19) C. S. Solanki

Educational technology for photovoltaics

20) K. Sudhakar

Educational methodology

21) B. L. Tembe

New instructional design paradigms for thermodynamics and statistical mechanics, Application of methods of educational technology in chemical education

22) S. Umashankar

Technology – enhanced learning, Physics education

23) J. K. Verma

Technologies for mathematics education for large classes