Emerging Technologies for Effective Teaching & Learning

Continuing Education Program for Next Education India Pvt Ltd

Conducted by Educational Technology, IIT Bombay

January 09-11, 2020

IIT Bombay

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Introduction to EdTech at IIT Bombay

Sridhar Iyer

Activity 1 – Each one say one

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What comes to your mind when you hear the term

-Educational Technology?

Activity 1 – Audience responses

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Note them here:

Or on board:

A glimpse of Educational Technology @ IITB

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Play video - https://www.vimeo.com/iitbombay/et

What is Educational Technology?

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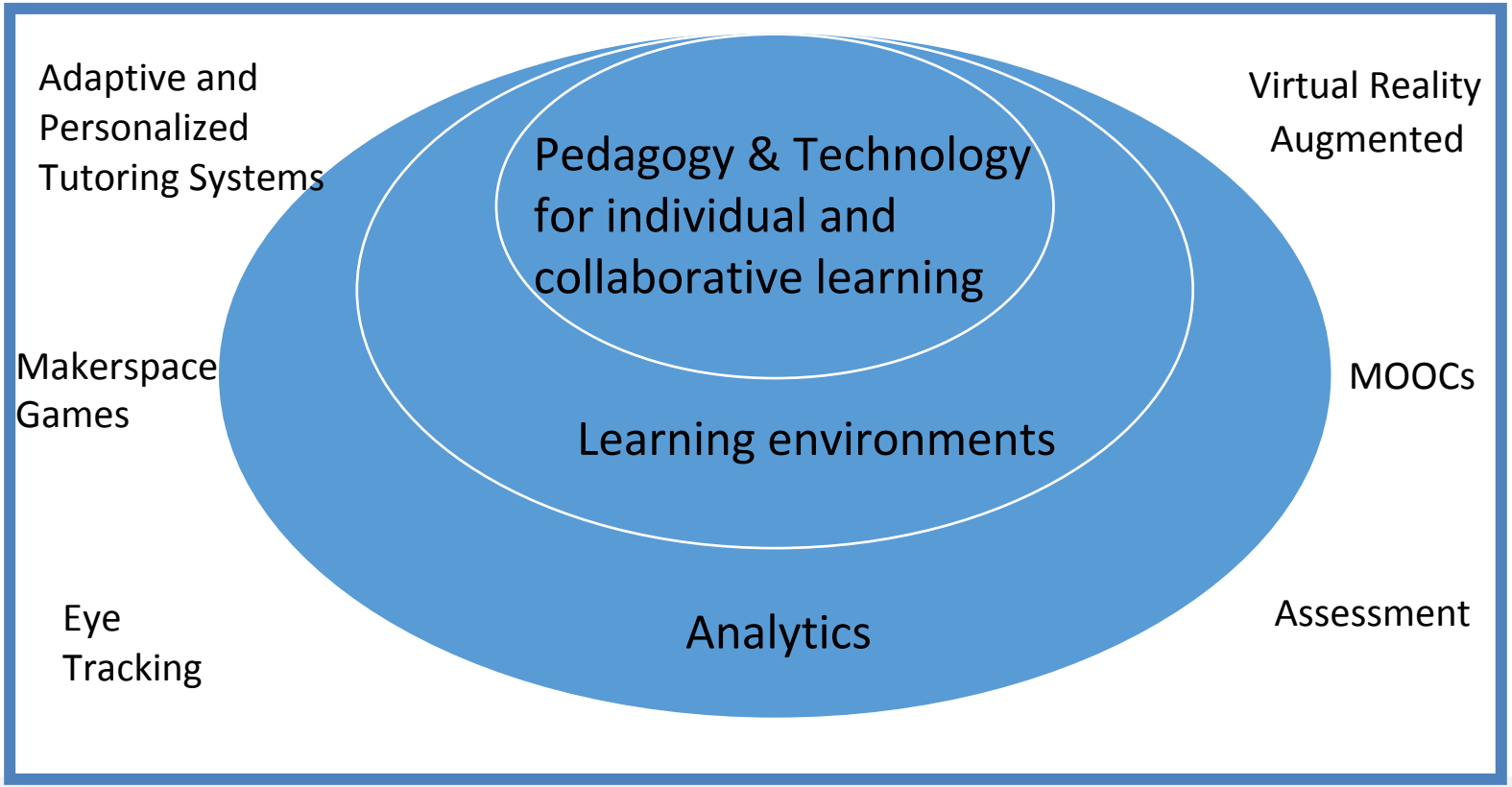

EdTech@IITB – 2010 - 2019

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Interdisciplinary Programme in Educational Technology
Indian Institute of Technology Bombay

Home | Research | Academics | Admissions | People | Resources | Sponsored Labs | Professional Services | Events | About Us

Welcome to EdTech @ IIT Bombay

The Interdisciplinary Programme in Educational Technology at IIT Bombay is actively involved in research and education in the area of technologies to promote the learning-teaching process. The IDP is composed of faculty members from various departments in the Institute. The thrust areas of research of the IDP-ET are:

- Technology-enhanced learning environments for pan-domain cognitive abilities.
- Frameworks for teacher use of educational technology tools and strategies.
- Using technologies such as GSR, EEG and eye tracking to understand teaching-learning processes

Tweets by @edtechIITB

Educational Technology, IIT Bombay
@edtechIITB

Call for Papers: The 10th IEEE International #Conference on Technology for Education (T4E) 2019 will be held at Goa University, Goa, India, from December 9 - 12, 2019.
Deadline: Submit your paper by July 18, 2019.
More here: t4e2019.unigoa.ac.in

Educational Technology, IIT Bombay

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Inter-Disciplinary Program, started 2010

- 5 Core faculty
- Associate faculty from other departments
- 2 Post-docs
- 25 PhD research Scholars; 12 PhDs graduated

- Started an M.Tech program in 2019
    - Includes 2 months internship/field work

What do we do? – At a glance

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Research:

- *TELoTS:* Technology enhanced learning of thinking skills
- *TUET:* Teacher use of educational technologies
- *EDA:* Educational data analytics
- *EmergE:* Emerging technologies

Development:

- *MOOCs:* Massive open online courses – IITBombayX
  - Trained 5000+ college teachers, 5000+ school teachers
- *Handbooks:* Resources for ET researchers and teachers
  - RMET, LOBE, …
- *Tools:* To support teaching-learning process
  - iQuE, iSAT, CuVIS, …

Consultancy

Outreach

Sponsored Projects

Sponsored Research Labs

Research Area - TELoTS

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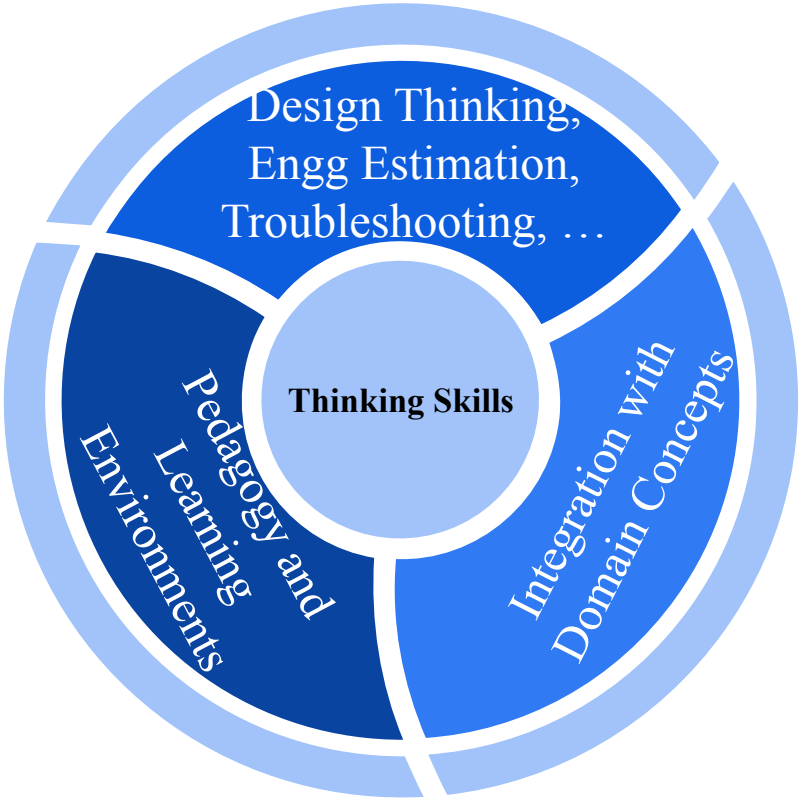

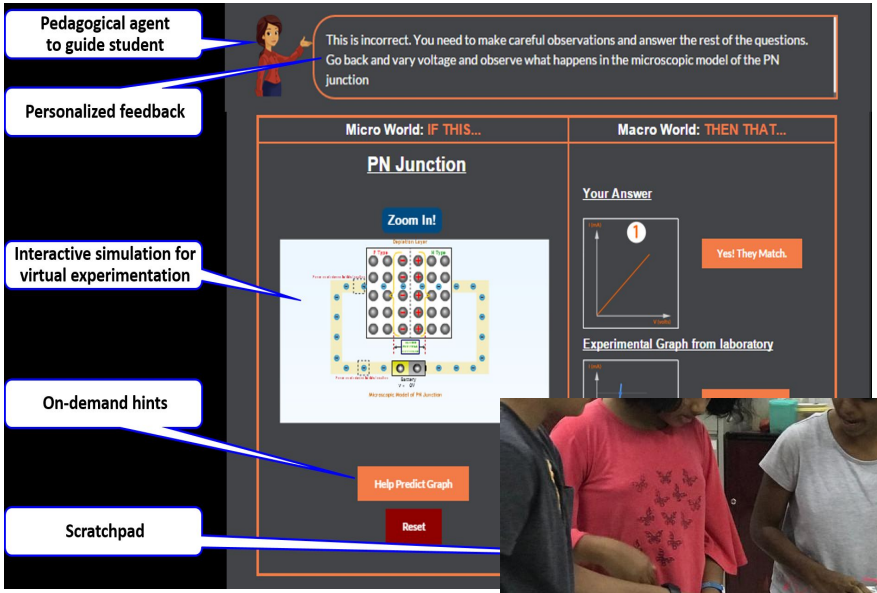

TELoTS example – Engg Estimation

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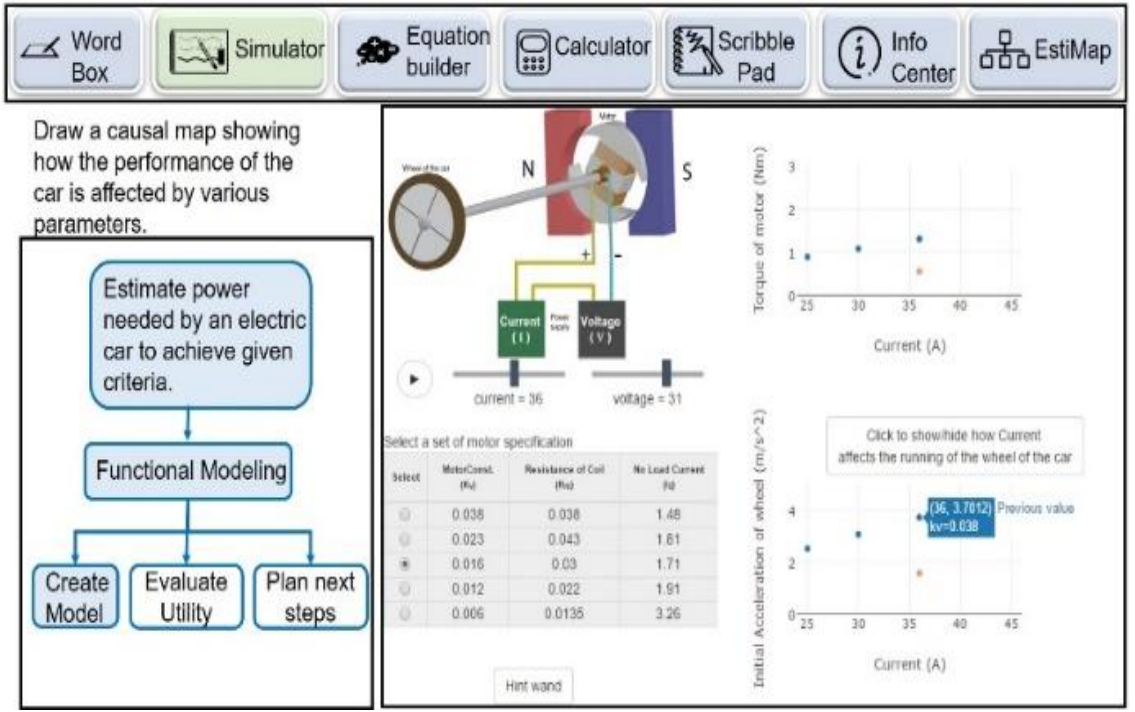
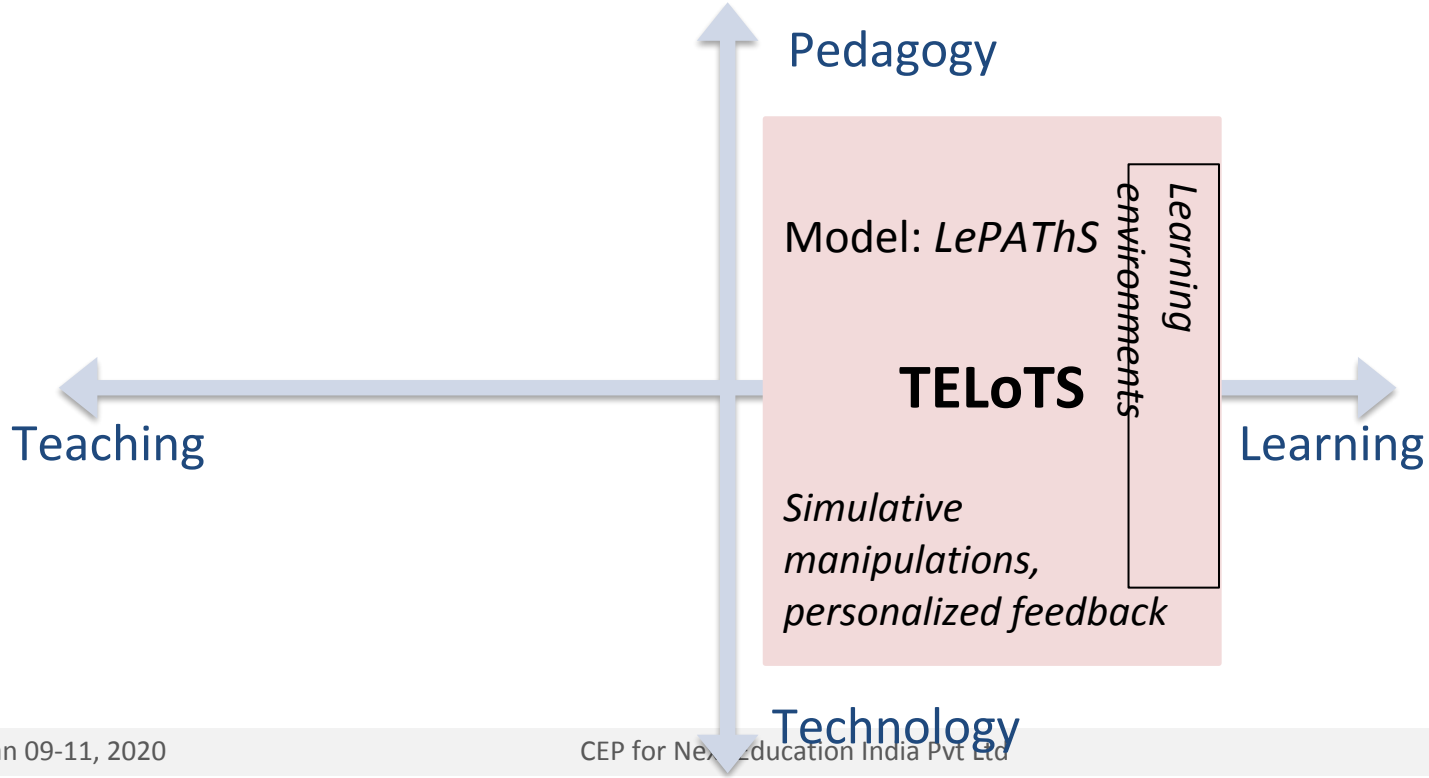
Play Mettle video

First 10 seconds and
last 10 seconds

PhD Theses



TELoTS Summary



Research Area – Teacher Use of Ed Tech

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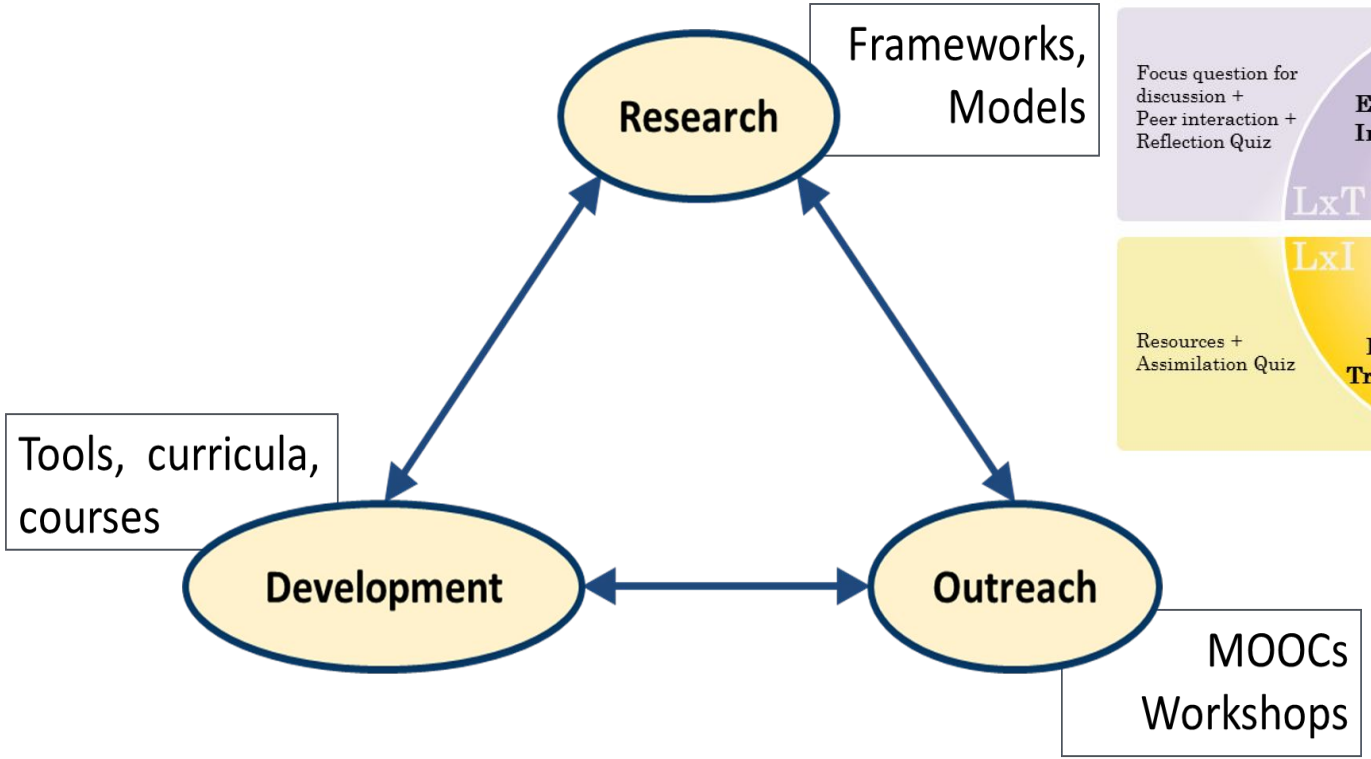
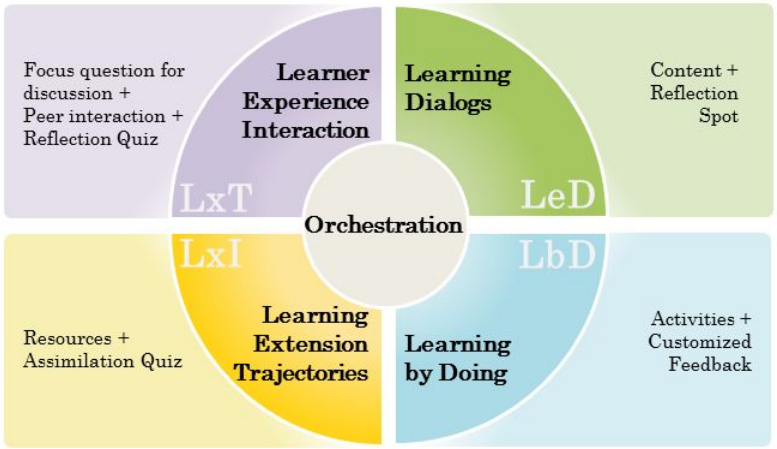




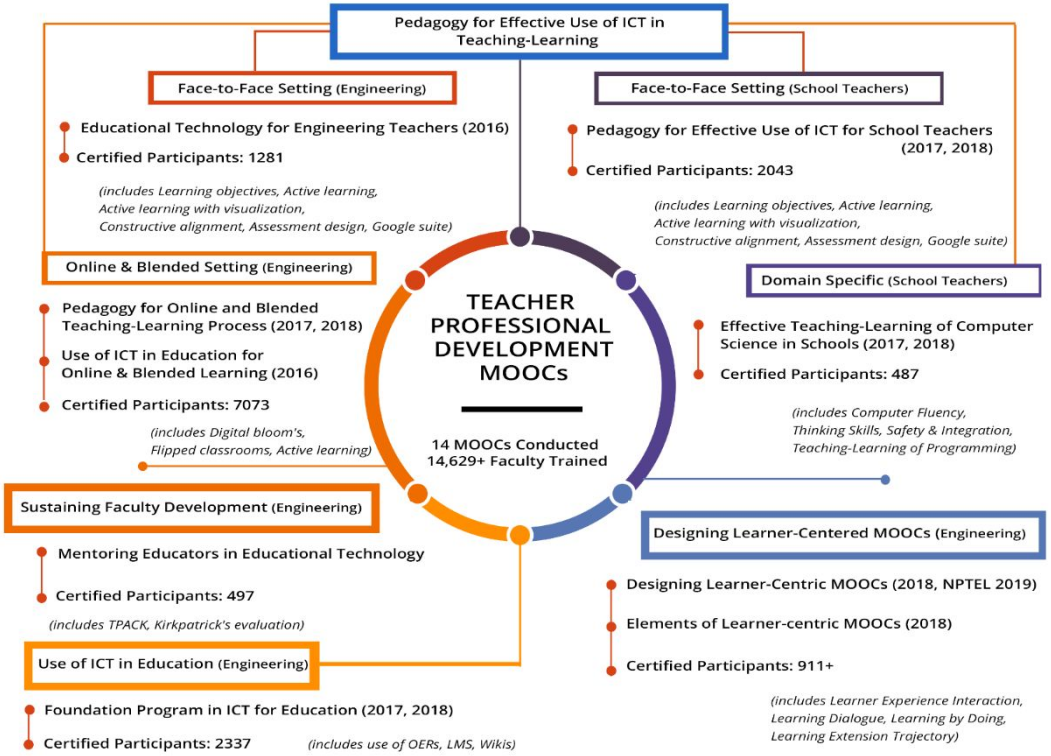
TUET example

Zoom adjoining infographic!

PhD theses

Show of hands:

- Familiar with MOOCs
- Have sampled a MOOC
- Have done an IITB MOOC



TUET Summary

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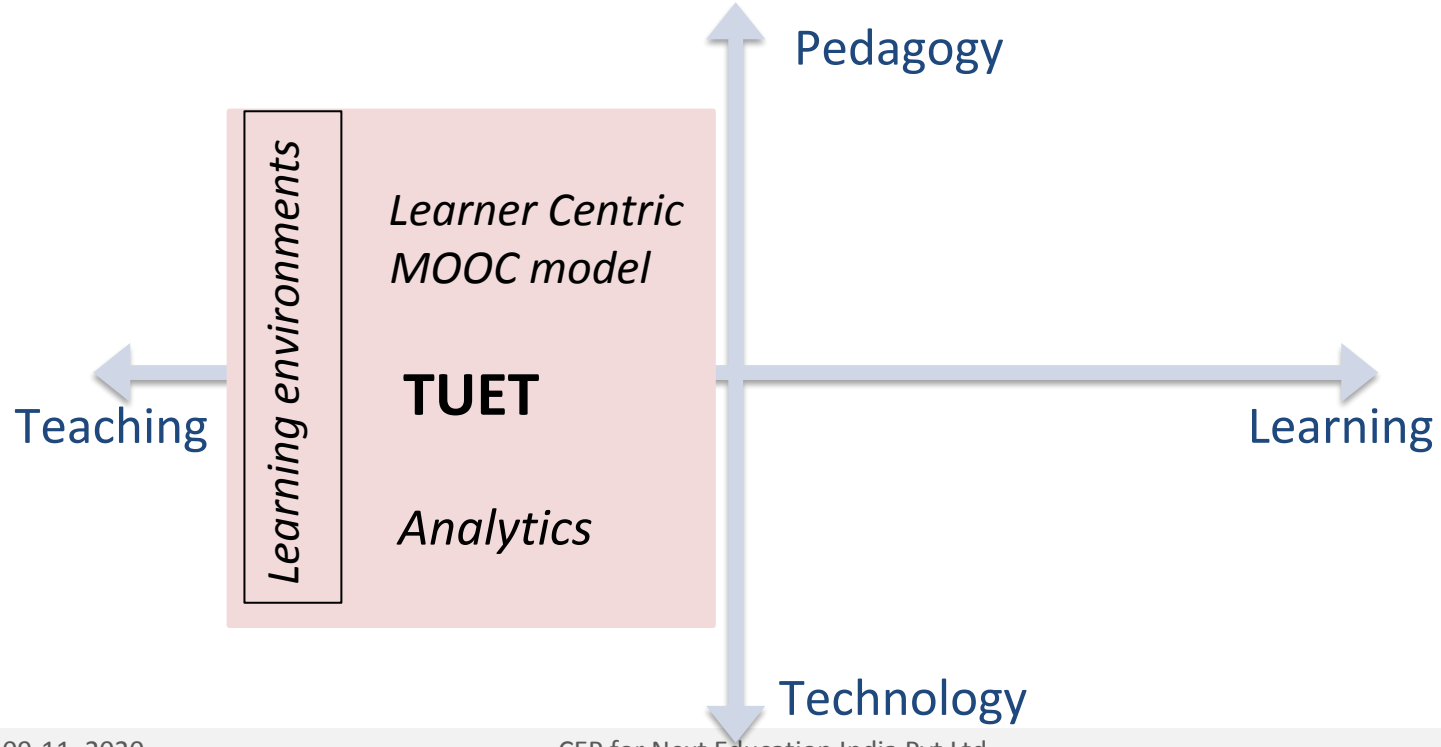

Activity 2 – Using a technology - Padlet

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Go to padlet.com and open link below:
padlet.com/iyer_sridhar/7umhz4heg1ud

OR

Open padlet App and scan the QR code

- Do the activity mentioned in padlet:

What are your top teaching-learning concerns?

Activity 2 – continue later …

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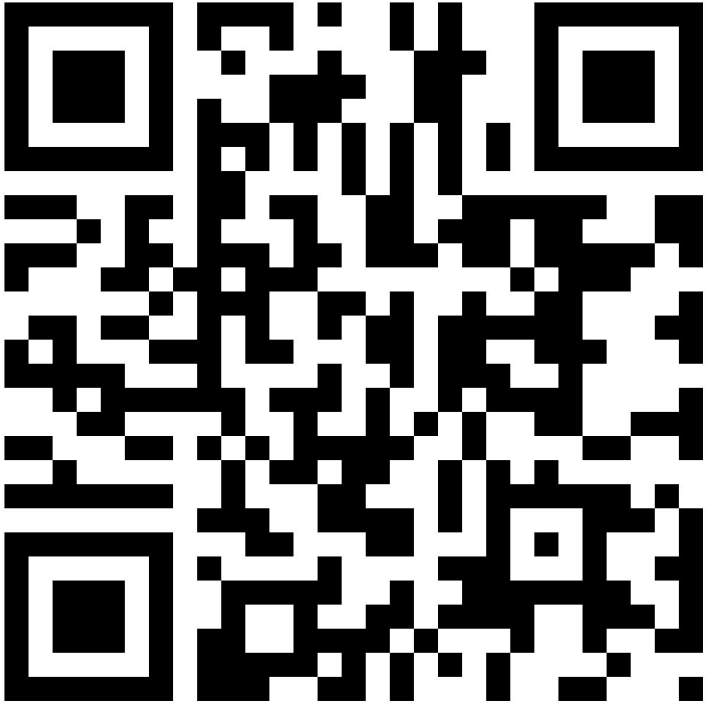
- Write one or two of your concerns in the padlet.
- See other posts. If you agree with any of the others being a top concern, click on up-vote on that post.

We will try to discuss these tomorrow.



Research Area – Educational Data Analytics

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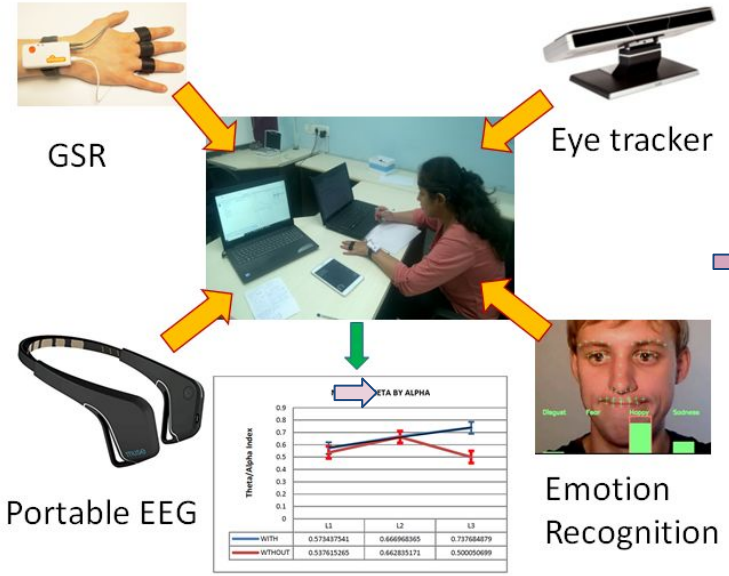

- Cognition
- Metacognition
- Motivation
- Affective States
- Attention

Learner/ User Model

Personalized and Adaptive Feedback

Research Area - Exploring Emerging Technologies

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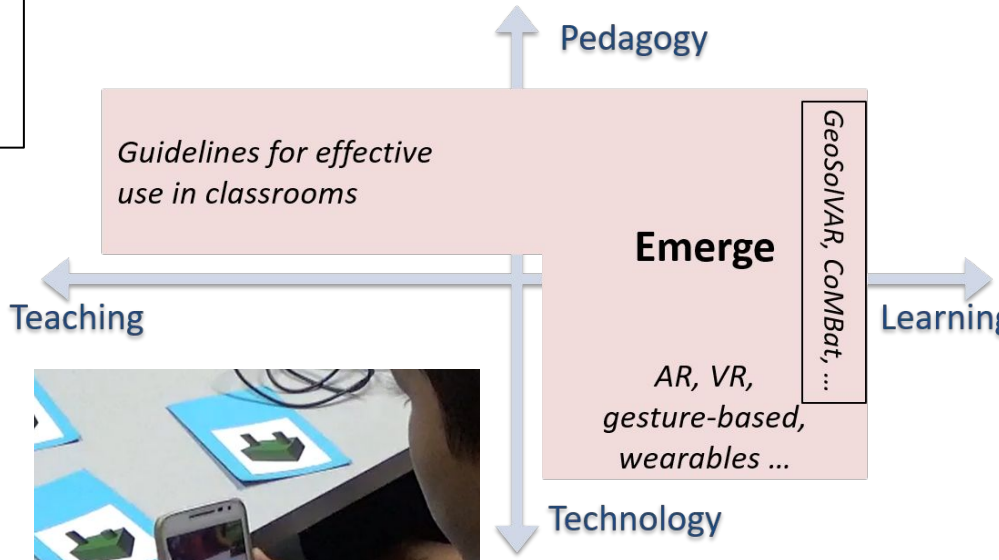
Goal: Explore emerging tech to identify pedagogical usefulness, recommendations for best practice.

StereoChem



Next Education Research Lab

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et iitb | NEXT EDUCATION RESEARCH LAB | Next Education Transforming Education

About Us:

The Next Education Research Laboratory has been setup in Inter-disciplinary Program in Educational Technology at IIT Bombay in 2017. The lab is funded by Next Education Private Ltd.

The goals of the lab are:

- Identify potential benefits that emerging technologies might afford in the teaching-learning process and design appropriate learning activities.
- Teacher training through multiple Massive Open Online Courses (MOOC) that run on IITBombayX on :
  - Pedagogy of effective use of ICT in teaching
  - Effective teaching of Computer Science topics in schools
- Design & develop evaluation instruments like analytical rubric to test quality of digital learning materials and textbooks from Science and Mathematics

Next Education Research Lab - Outreach

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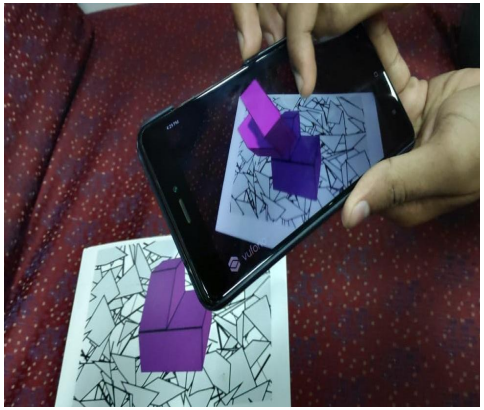

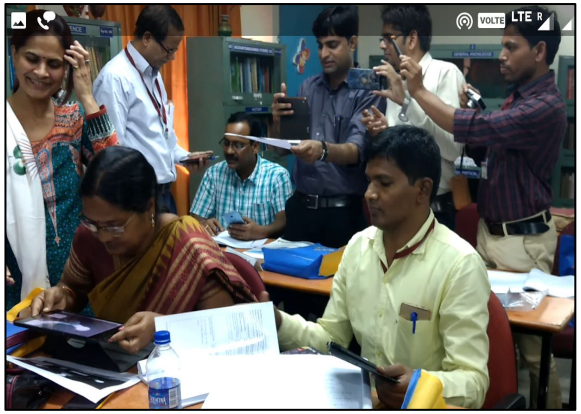

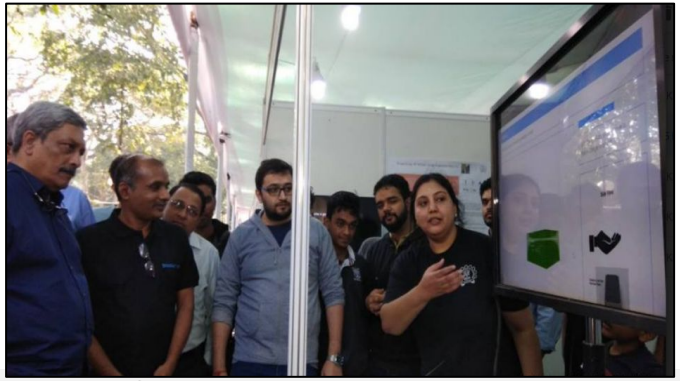

Next Education Research Lab - Publications

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Publications

1. Rathod B. B., Murthy S., and Bandyopadhyay S. (2019), "Is this Solution Pink Enough? A Smartphone Tutor to Resolve the Eternal Question in Phenolphthalein-Based Titration", Journal of Chemical Education, 2019, 96 (3), 486-494.

2. Shah V., Banerjee G., Murthy S. & Iyer S. (2018), "Learner-centric MOOC for teachers on effective ICT integration: Perceptions and experiences", Proceedings of IEEE Ninth International Conference on Technology for Education (T4E).

3. Kaur, N., Pathan, R., Khwaja, U., Sarkar, P., Rathod, B., and Murthy, S. (2018), " GeoSolvAR: Augmented Reality based Application for Mental Rotation", Proceedings of IEEE Ninth International Conference on Technology for Education (T4E).

4. Banerjee G., Warriem J. , and Mishra S. (2018), Learning experience interaction (LxI): Pedagogy for peer-connect in MOOCs, in Yang, J. C. et al. (Eds.), Proceedings of the 26th International Conference on Computers in Education. Philippines: Asia-Pacific Society for Computers in Education.

5. KL, N. S., Chavan, P. S., & Murthy, S. (2018, July), " StereoChem: Augmented Reality 3D Molecular Model Visualization App for Teaching and Learning Stereochemistry", IEEE 18th International Conference on Advanced Learning Technologies (ICALT) (pp. 252-256).

6. Kaur N., Pathan R., Khwaja U. and Murthy S. (2018), "GeoSolvAR: Augmented Reality Based Solution for Visualizing 3D Solids", IEEE 18th International Conference on Advanced Learning Technologies (ICALT), pp. 372-376.

7. Raina, A., Lakshmi, T. G. & Murthy, S.(2017), "CoMBaT: Wearable Technology Based Training System for Novice Badminton Players", IEEE 17th International Conference Advanced Learning Technologies (ICALT), pp. 153-157.

8. Narayana, S., Prasad, P., Lakshmi, T. G., & Murthy, S. (2016), "Geometry via Gestures: Learning 3D geometry using gestures", IEEE Eighth International Conference on Technology for Education (T4E), pp. 26-33.

9. Lakshmi, T. G., Narayana, S., Prasad, P., Murthy, S., & Chandrasekharan, S. (2016), "Geometry-via-Gestures: Design of a gesture based application to teach 3D Geometry", 24th international conference on computers in education (ICCE), pp. 180-189.

Other Work - OSCAR

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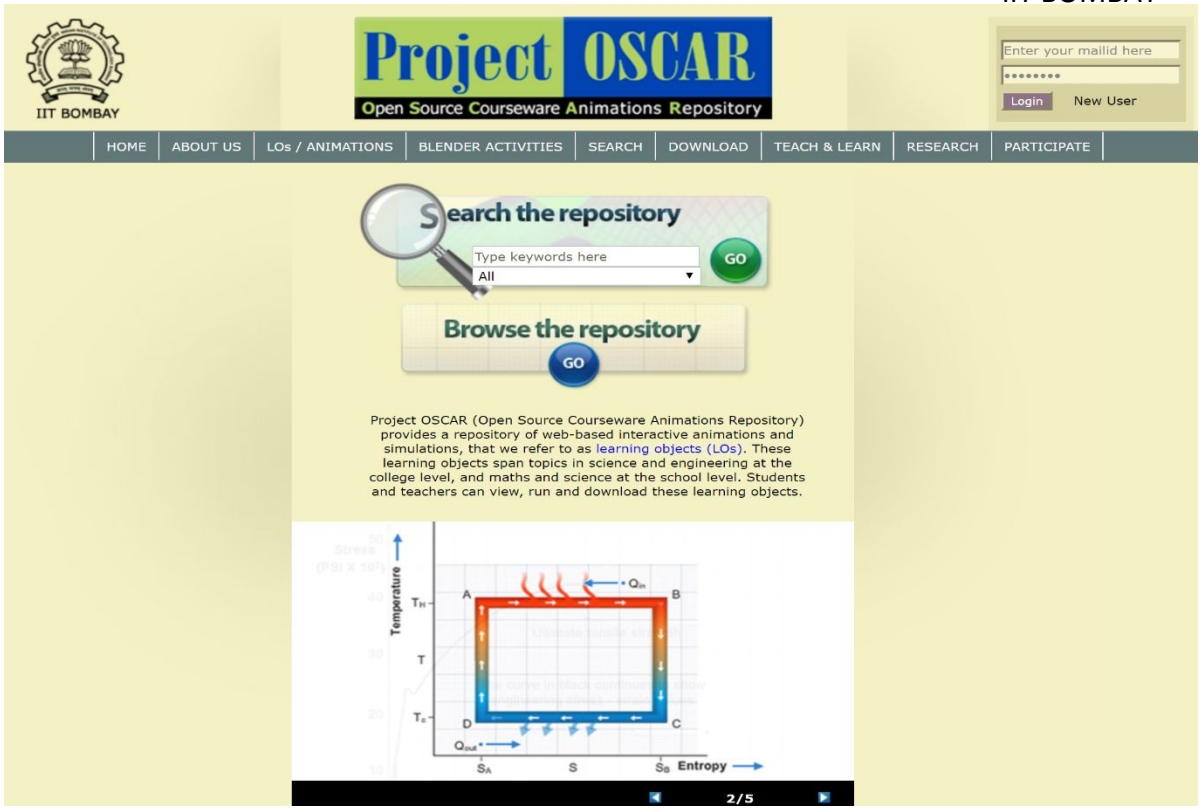
~300 interactive visualizations, at school and college levels

Released in Creative Commons licence

~50K downloads

PhD research theses



Computer Masti

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2007 - Curriculum for teaching Computers in schools

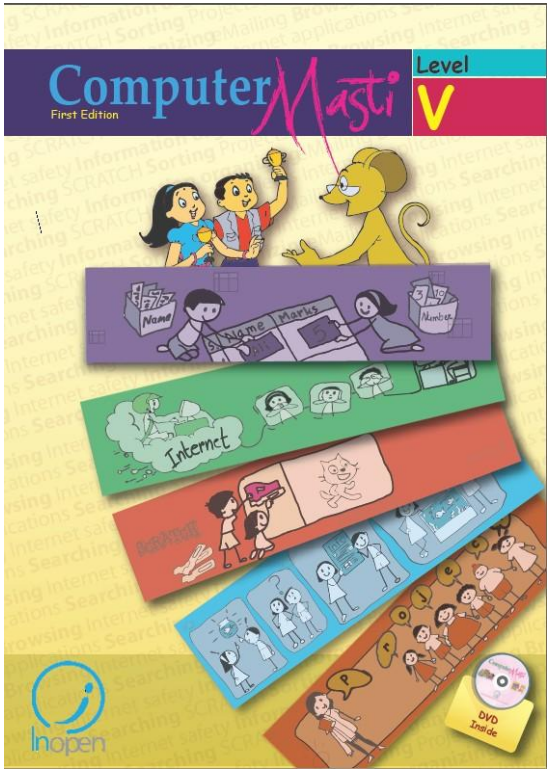
Writing of Books – Grades 1-8

~100K downloads

2009 - company – InOpen

2016 – Acquired by NextEducation

Used by ~1000 schools in India



Activity 3 - Debate

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Think about the two activities that you did in this session.

- Activity 1 (using board) – What comes to your mind when you hear EdTech?
- Activity 2 (using padlet) – What are your top teaching-learning concerns?

Group A – Argue for using padlet

- What are the advantages? Why not just use the board?

Group B – Argue against using padlet

- What are the disadvantages? When is it better to use the board?

Reflection on Debate – Role of technology

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Technology for its own sake can only provide initial engagement.

Technology must be chosen so that it can support meaningful pedagogy.
Pedagogy must be designed so that it exploits technology meaningfully.

Example: In activity 2 (using padlet), technology supports pedagogy:

- Simultaneous, real-time view of all posts.
- Up-voting feature to decide top concerns.
- Comments for participants to interact with each other.
- Instructor can view and respond to participants immediately.
- …

Take-away

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Strong pedagogy + meaningful technology

trumps

Sophisticated technology + mediocre pedagogy

Existing & emerging technologies: A spectrum

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- Information and communication technologies
- Display and user interface
- Computational technologies
- Internet technologies
- AI based technologies
- Simulation and modelling tools

Technology Roadmap Education, Technology Vision 2035, TIFAC

Existing & emerging technologies: Examples

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Animations
Simulations
Games
3D printing

Mobile apps
MOOCs

Augmented Reality
Virtual worlds
Multi-touch interface

Wearable technologies
Gesture recognition

Context aware technologies
Learning analytics
Adaptation & personalization
Natural language recognition

Coming up in this course …

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- Demo of some emerging technologies for teaching and learning

- Effective teaching with technology
- Learner-centered approach for technology integration

- Exploring technology solutions to teaching-learning challenges

- Augment Reality
- Virtual Reality
- MOOCs
- Learning Management Systems
- Learning Analytics
- Adaptive Tutoring Systems

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Thank you

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