Large-scale teacher professional development for effective technology integration

Sahana Murthy

Indian Institute of Technology Bombay

December 6, 2017

Educational Technology, IIT Bombay

- Inter-Disciplinary Program, started 2010
  - Core faculty, also from departments of Engineering, Science, Design, H&SS

- Focus on:
  - *TELoTS:* Technology enhanced learning of pan-domain thinking skills
  - *TUET:* Teacher use of educational technologies

- Hosted ICCE 2016 ☺

This talk is about research, development and outreach from Project TUET.

The problem

- ICT is everywhere, but potential lost without integration strategies

- Barriers: Access & infrastructure; attitudes & beliefs towards ICT

- Difficulty in designing and implementing learner-centric practices with ICT

How to promote effective ICT integration practices of teachers?

(Ertmer 1999, Angeli & Valanides, 2009, Tsai & Chai, 2012)

Existing work

- Courses on ICT-integration in pre-service education

- Theoretical frameworks - TPACK, SoLT

- Government led initiatives – ProInfo (Brazil), ITT (Chile), PT3 (US), …

- Research - many studies, some metastudies

(Mishra & Koehler, 2006; Hutchings, Huber & Ciccone, 2011; Joia, 2001; Brun & Hinostroza, 2014; Tondeur et.al, 2012)
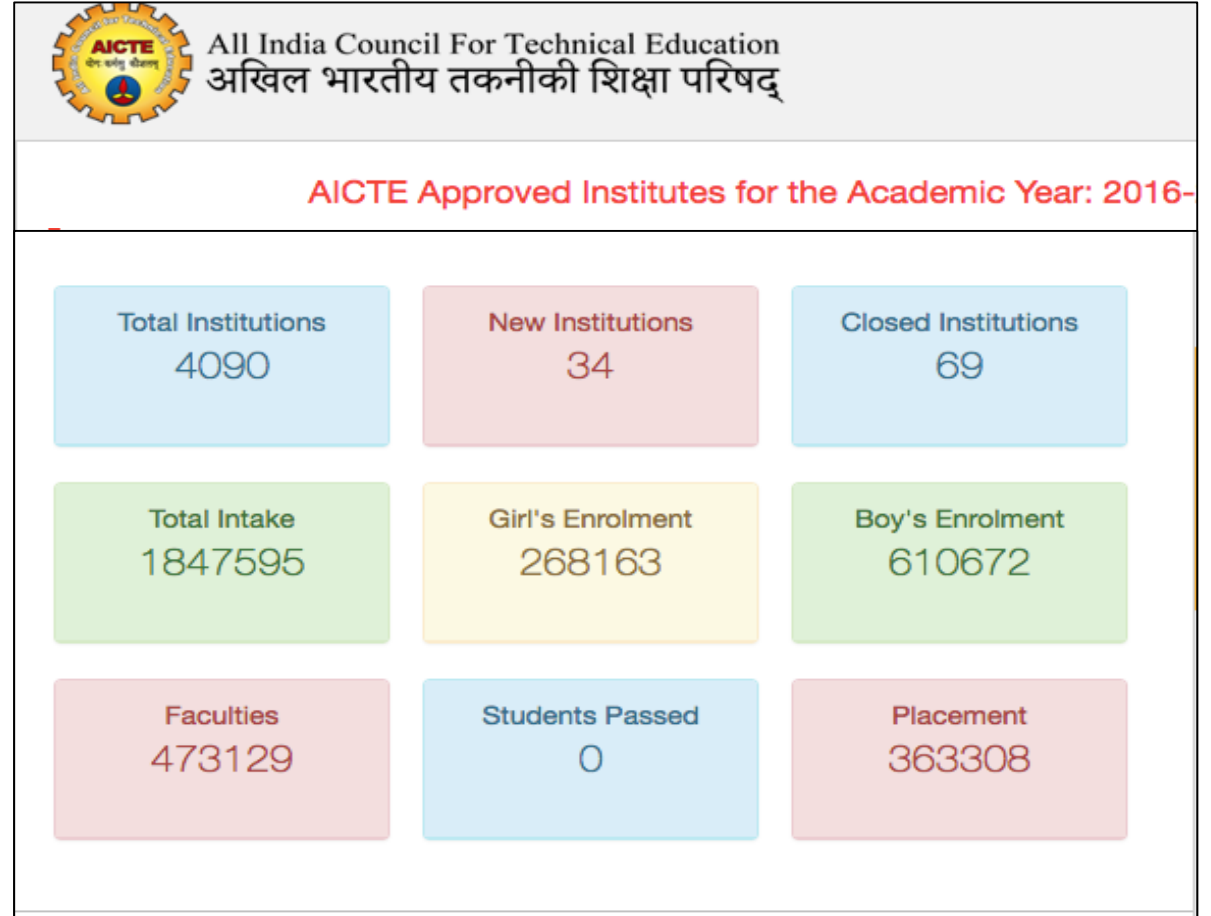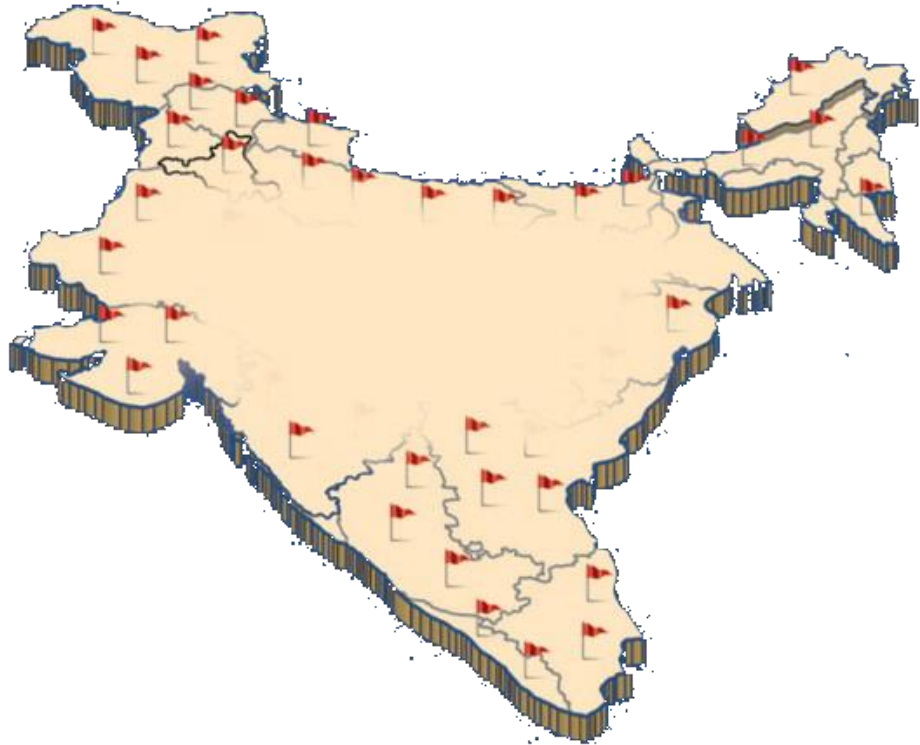
The problem in Indian context

Effective integration of ICT:

- Problem pronounced since resource constrained

- Problem compounded since scale is large

- Existing solutions need examination since tertiary-ed context

- Solutions unsustainable since pay-off is low
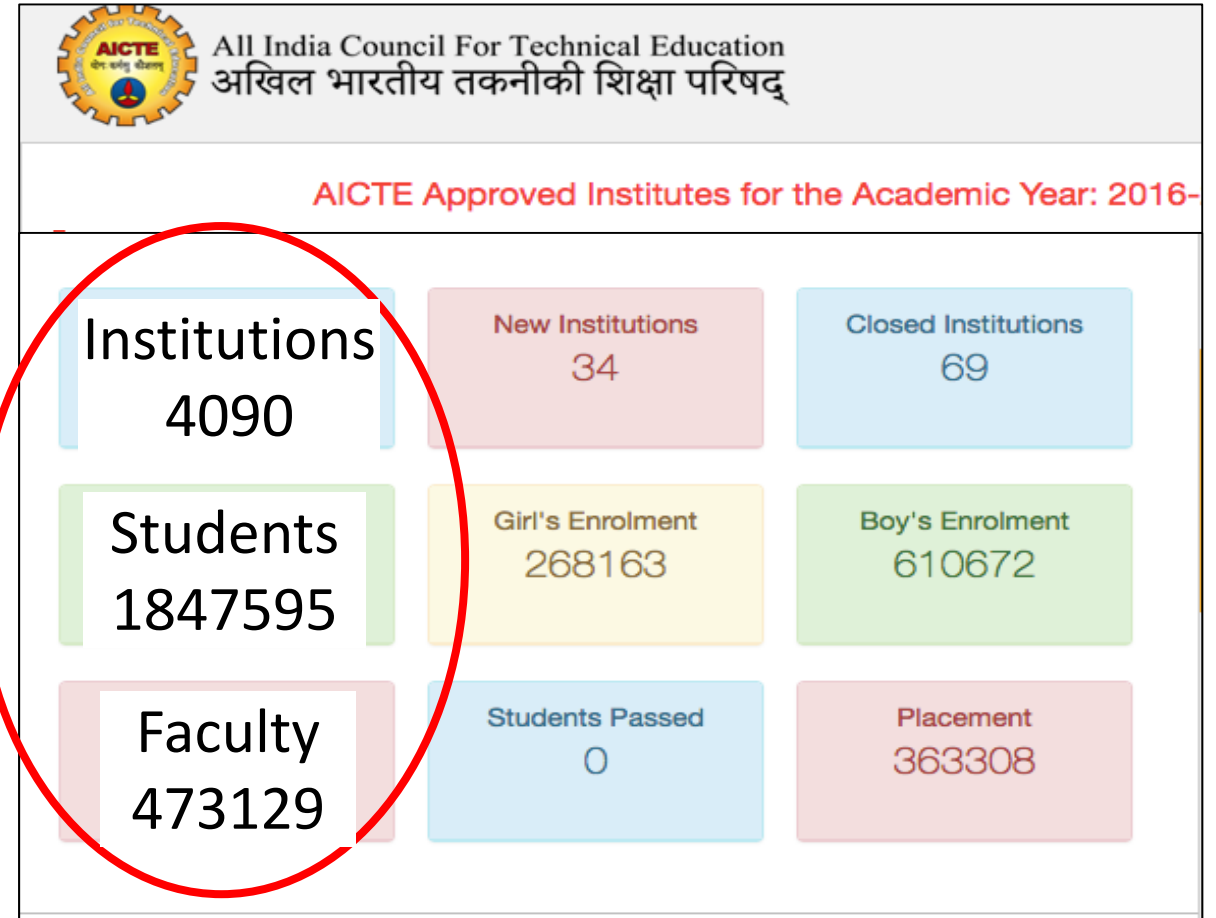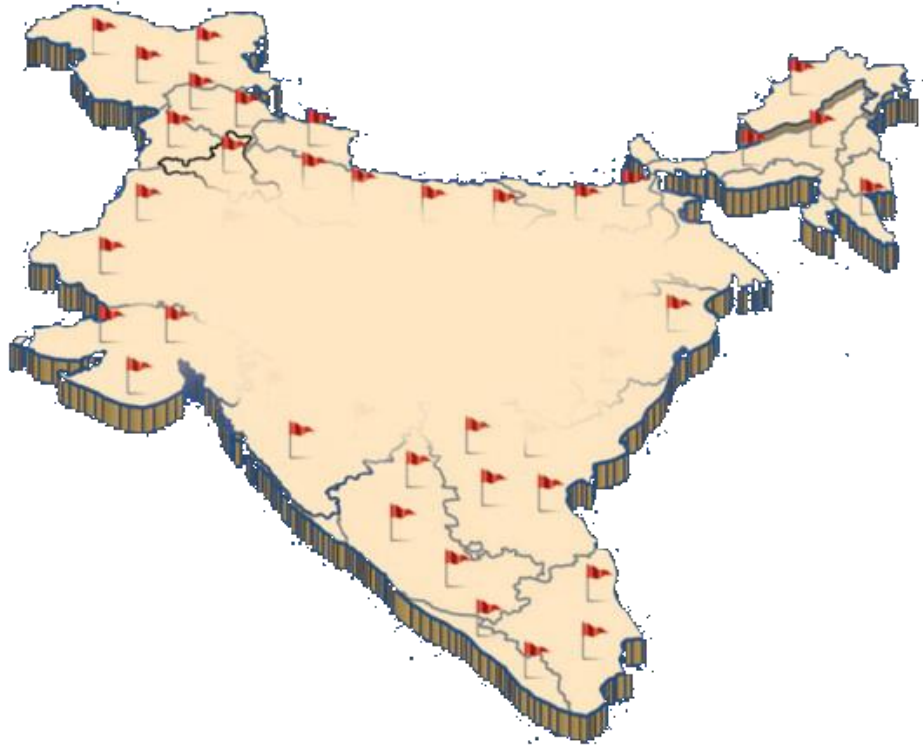
(Murthy, Iyer & Warriem, 2015)

Large-scale in India

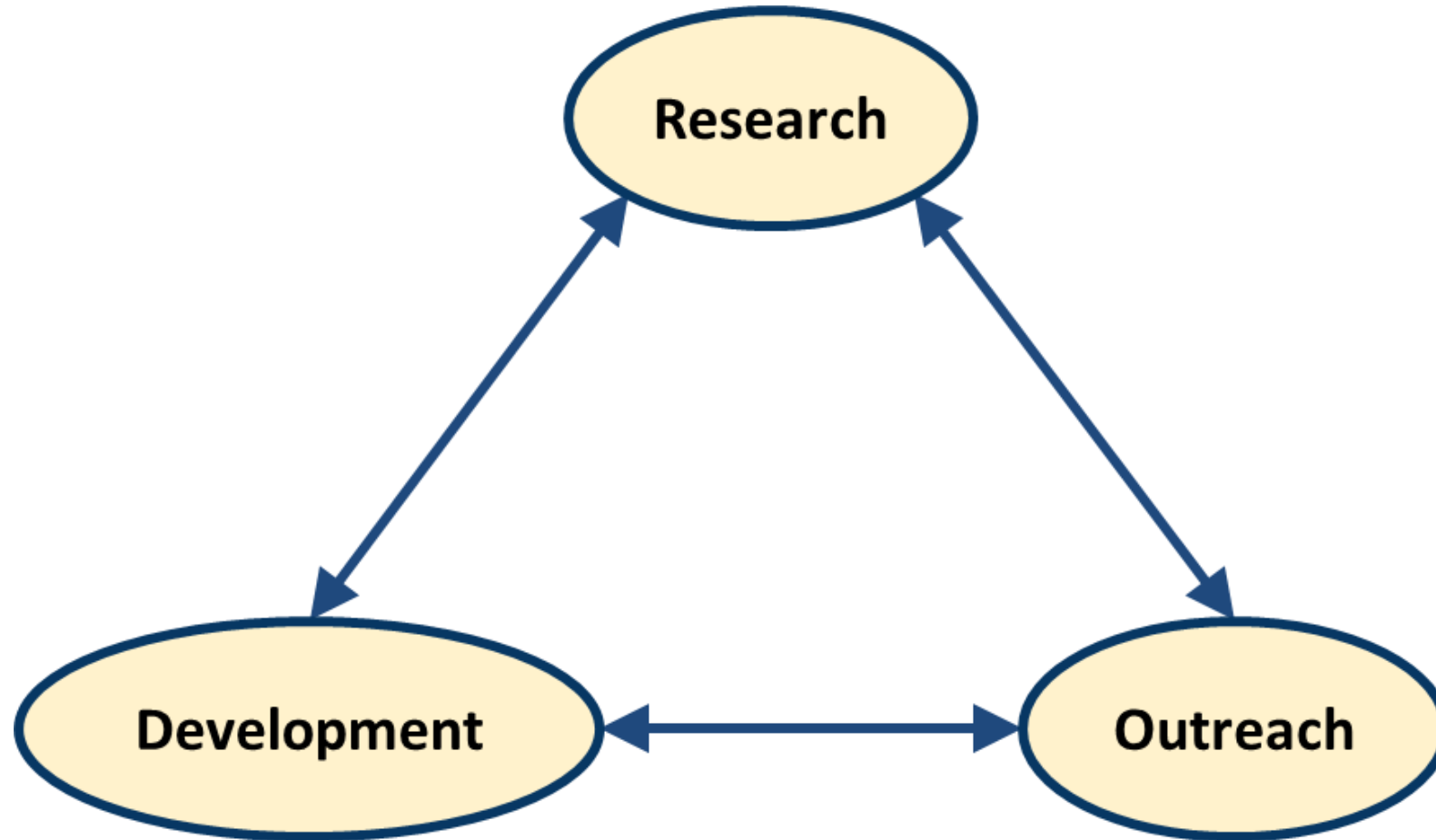

Geographical distribution (> 3,00,000 km^2)

Source: http://www.facilities.aicte-india.org/

Large-scale in India

All India Council For Technical Education
अखिल भारतीय तकनीकी शिक्षा परिषद्

AICTE Approved Institutes for the Academic Year: 2016-

Institutions 4090	New Institutions 34	Closed Institutions 69
Students 1847595	Girl's Enrolment 268163	Boy's Enrolment 610672
Faculty 473129	Students Passed 0	Placement 363308

Geographical distribution (> 3,00,000 km^2)

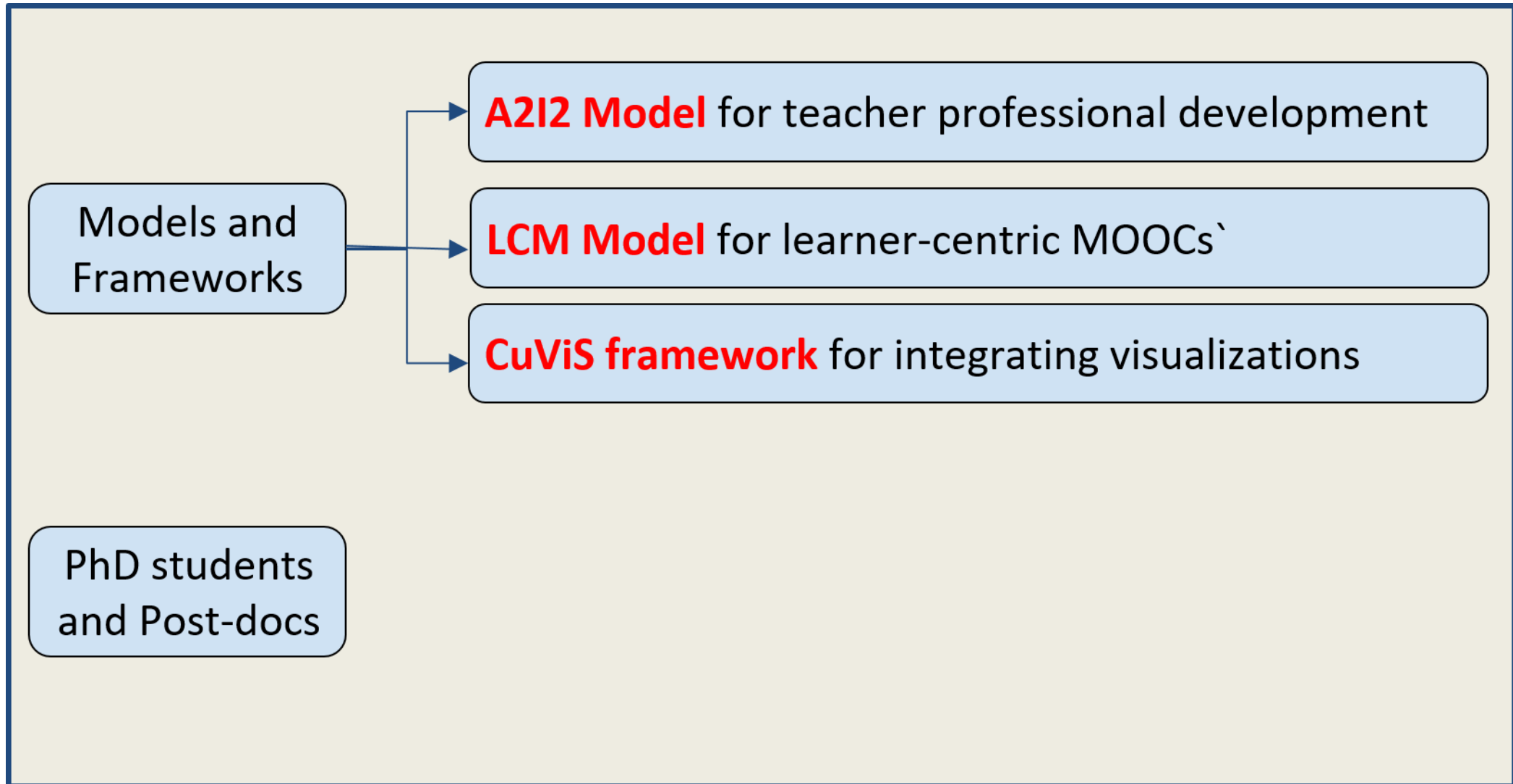*Source: http://www.facilities.aicte-india.org/*

Requirements

Instructors need explicit training in ICT integration- knowing & doing

customized to their own context
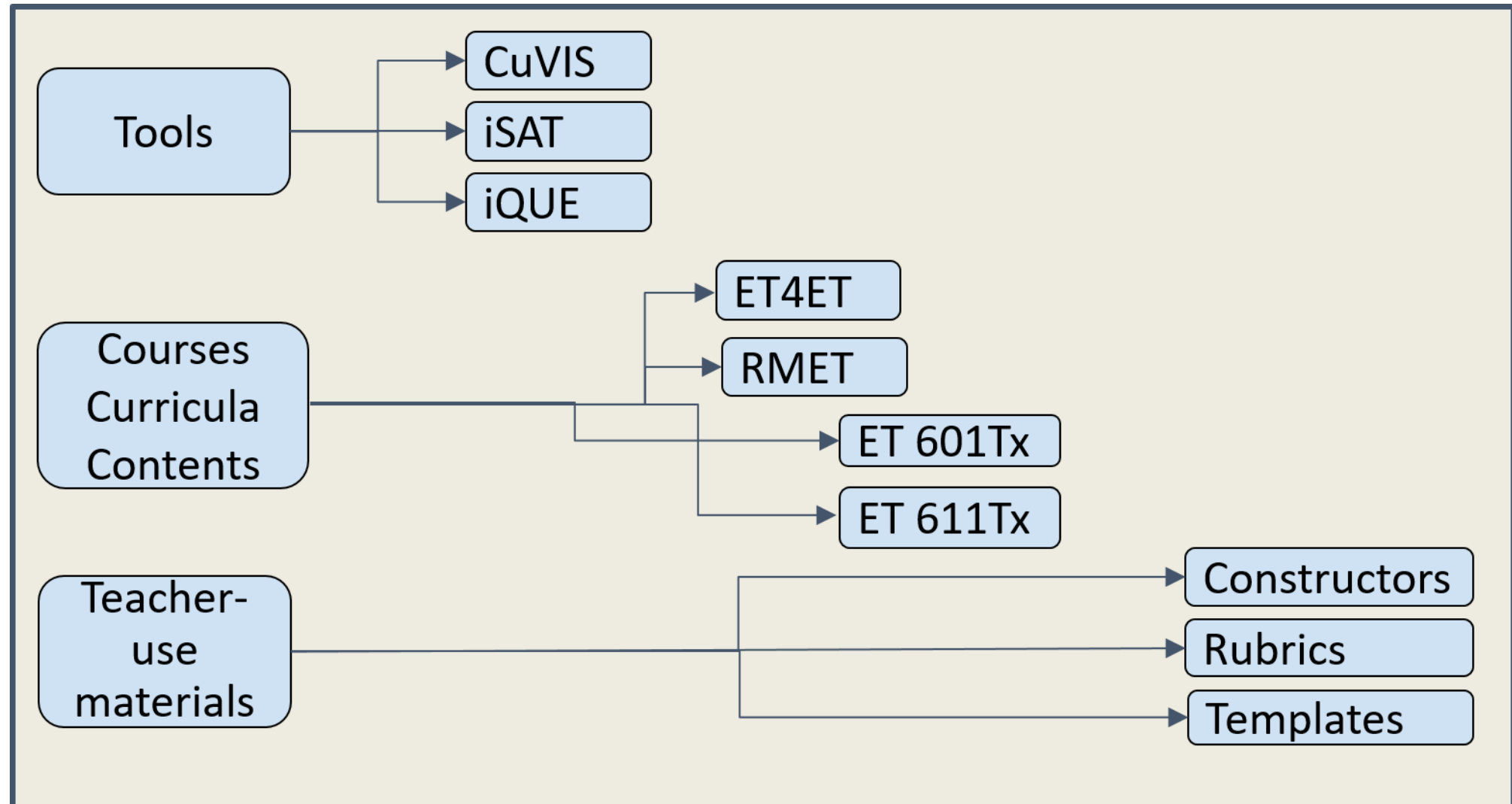
with specific, meaningful and immediate takeaways

Project TUET: Efforts at IIT Bombay India

Project TUET: Research

Models and Frameworks

- **A2I2 Model** for teacher professional development
- **LCM Model** for learner-centric MOOCs`
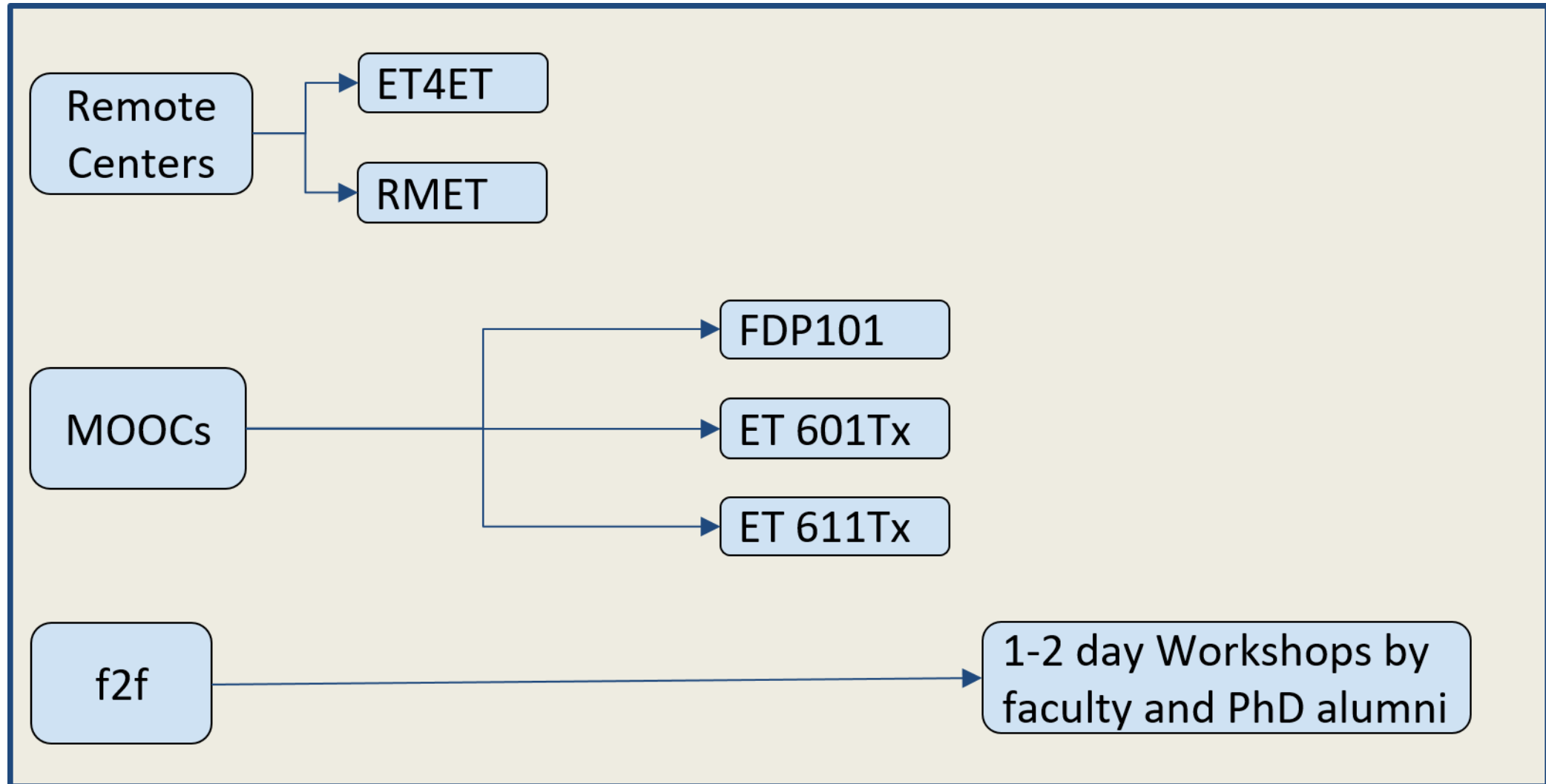- **CuViS framework** for integrating visualizations

PhD students and Post-docs

Project TUET: Development

Project TUET: Outreach

What is this talk about?

How to design effective training programs to develop teachers' ICT integration practices?

How to scale such training programs?

How to promote sustainability of teachers' practices?

Why should you believe me …

- To what extent did our efforts work?

Case 1:
ET4ET Teacher Professional Development Program
(Educational Technology for Engineering Teachers)

Context of ET4ET program

Goal: Integrate learner-centric pedagogy with meaningful ICT

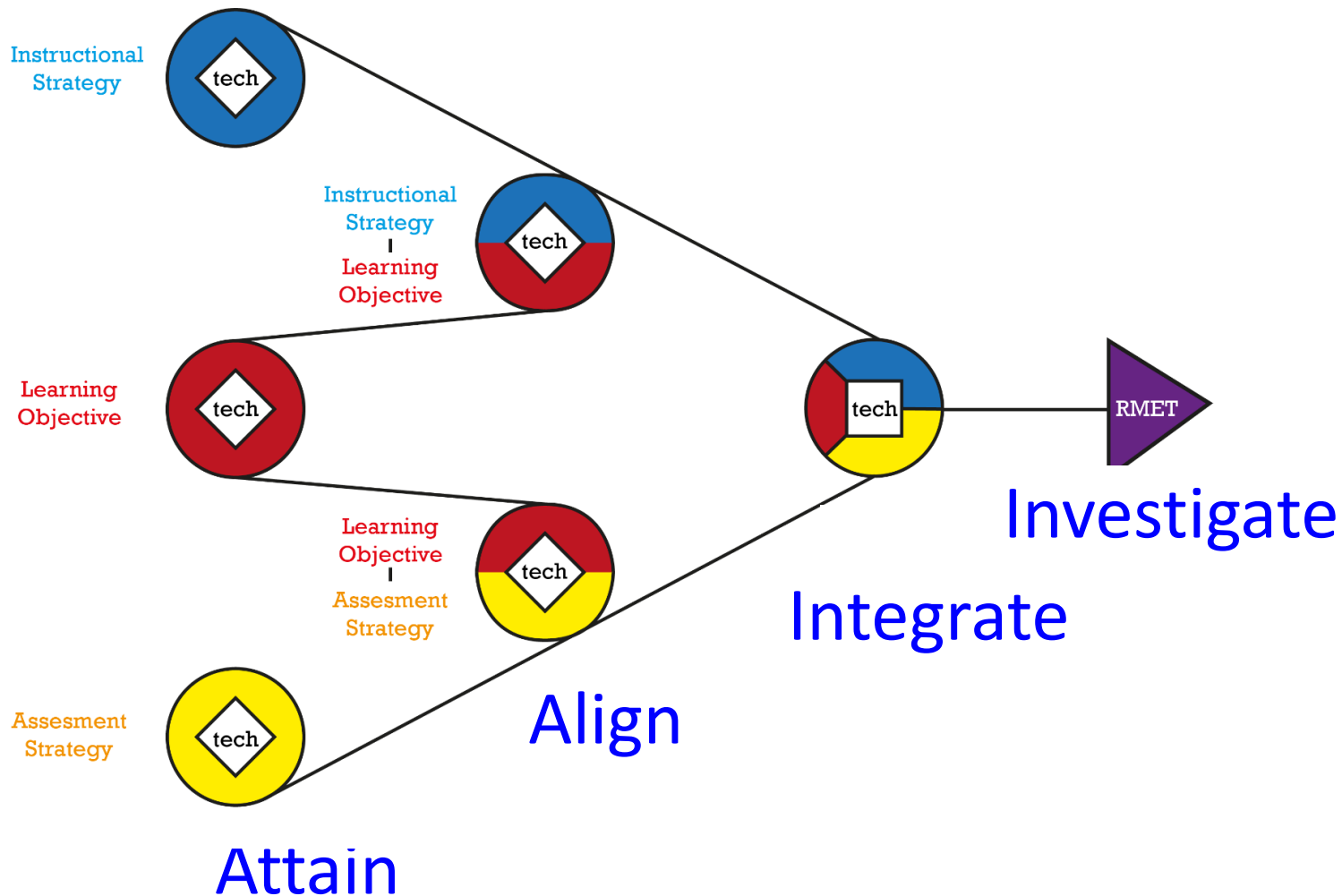Mode : Blended – synchronous via RC + asynchronous via Moodle

Duration: 2-week equivalent; 2014 & 2015

Participants: **5000+** engineering instructors, 250 Remote Centres

More than 1,00,000 teachers have been trained in 14 major ISTE workshops conducted by IITB and IIT KGP.

Supported by T10KT: Govt of India's National Mission in Education via ICT

Design of ET4ET program

A2I2 Model

- Informs overall design
- 4 phases
- Based on:
  - Constructive alignment
  - Spiral curriculum

(Biggs 1996; Harden & Stamper, 1999)

Design of activities in ET4ET program

Make teachers do..

- use the tool and do activity with tool
- participate in AL in the TPD

.. before they design learning activities for their students.

Immersivity Principle:

Experience as a learner first, then practice as a teacher <u>in order for teachers</u> to reflect on the activity itself before they incorporate it into their practice.

- Give examples tailored to teachers' domain
- Make teachers design activities they can use immediately in their class

Pertinency principle:

Relate to the teacher's context and immediate practice <u>in order for teachers</u> to attain fluency in practice.

Warriem, Murthy & Iyer, 2015

Results – ET4ET

- High <u>cognitive engagement</u> during ET4ET program
  - 4880 submissions of lesson design using Active Learning
  - 2958 participants registered in the Wiki
  - 19,501 pages created, with 118890 views and 10281 edits (in 2 days)

- High <u>intent to apply</u> learning after ET4ET program:
  - 83% intend to apply, 0.47 correlation between intent and perceived relevance
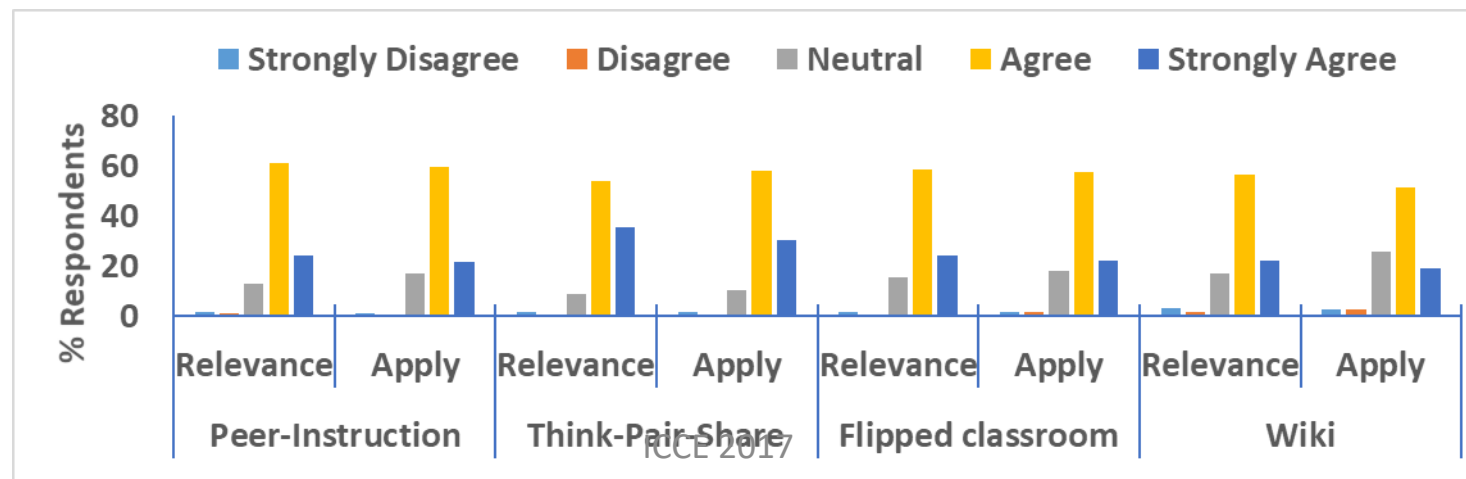
Results

- High <u>cognitive engagement</u> during ET4ET program

- High <u>intent to apply</u> learning after ET4ET program

- <u>Actual practice</u>, X months later:

"I was able to engage the backbenchers with the activities"

"We conducted a training program for about 120 faculty members [34%] in our college and shared the important topics learned this program"

Warriem, Murthy & Iyer, 2015

Case 2:
ET601Tx - MOOC version of ET4ET

Context of ET601Tx MOOC

Goal: constructive alignment practices for effective ICT integration

Mode : MOOC, IITBombayX platform

Duration: 8 weeks; 2016

Participants: **5000+** engg instructors

Supported by T10KT: Govt of India's National Mission in Education via ICT

Incorporating learner-centricity in MOOC

Active learning

Formative assessment

Customized response & feedback

Peer-learning

Learner diversity

Learner-Centric MOOC Model

ICCE 2017

Learner-Centric MOOC Model

- Focus question for discussion + Peer interaction + Reflection Quiz

Learner Experience Interaction

- Content + Reflection Spot

Learning Dialogues

Learning Extension

Learning by Doing

- Resources + Assimilation Quiz

- Activities + Customized Feedback

ICCE 2017
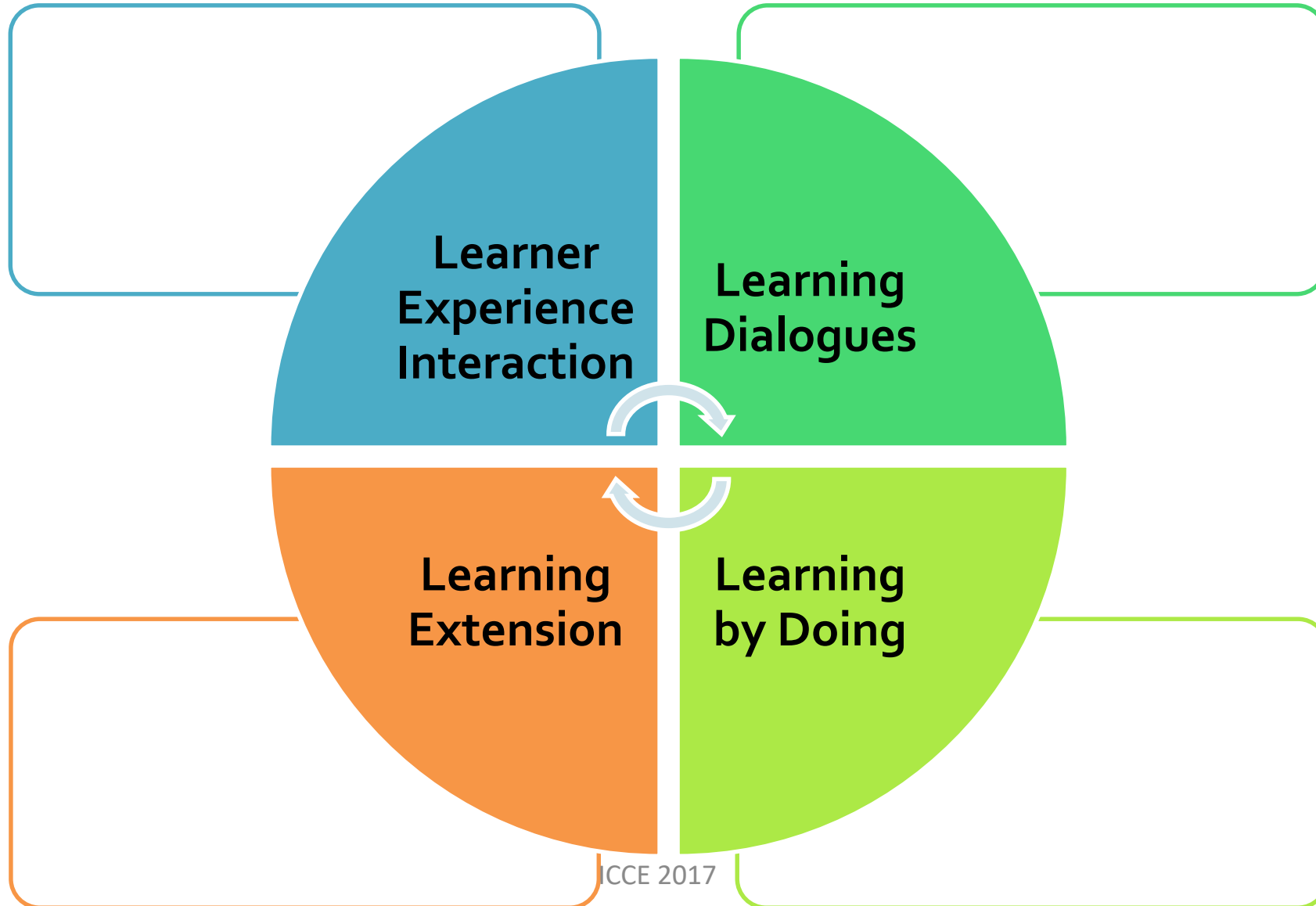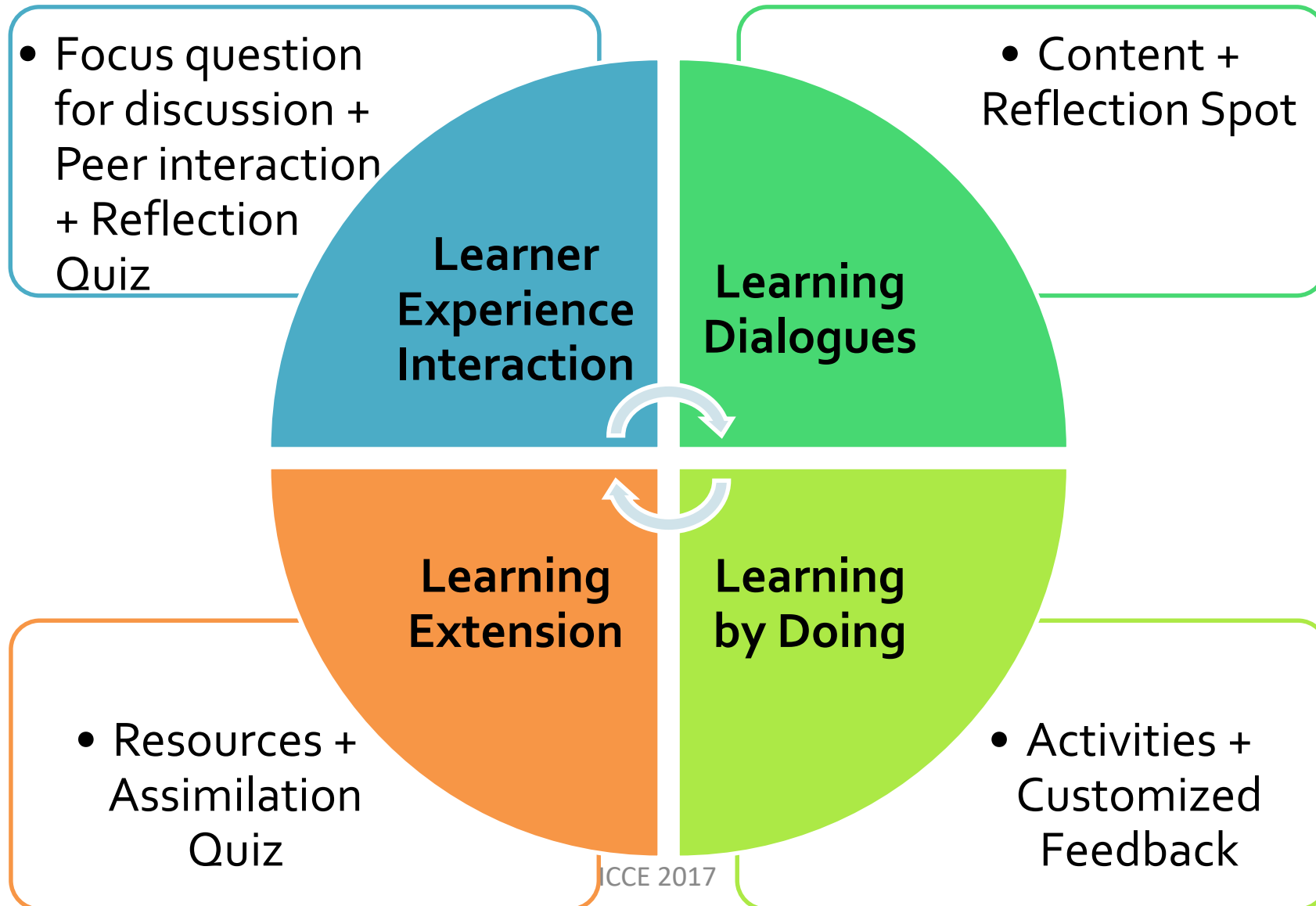
Results – ET601Tx MOOC

- Active participants: 67%, **Persistence rate: 37%,** Completion rate: 23%

- Average 399 participants accessed course daily

- 5023 Threads started and 9861 comments by participants

- Participant self-report, post survey – High relevance and usefulness

I found useful

- *Learning Dialogs* (learn active learning strategies, motivate constructive alignment)
- *Learning by Doing* (reinforce concept from LeD, design activities in my class)
- *Learning Experience Interactions* (to connect and get feedback with peers, see challenges faced by fellow instructors)

Warriem, Murthy & Iyer, 2016

Voices from the field

[Video] https://www.youtube.com/watch?v=nbJX4znpGa4 [17.34-18.27]

Voices from the field

Overall 22000 engineering college instructors trained over 4 years

How did we get here: Design-based Implementation Research

Peneul, 2011
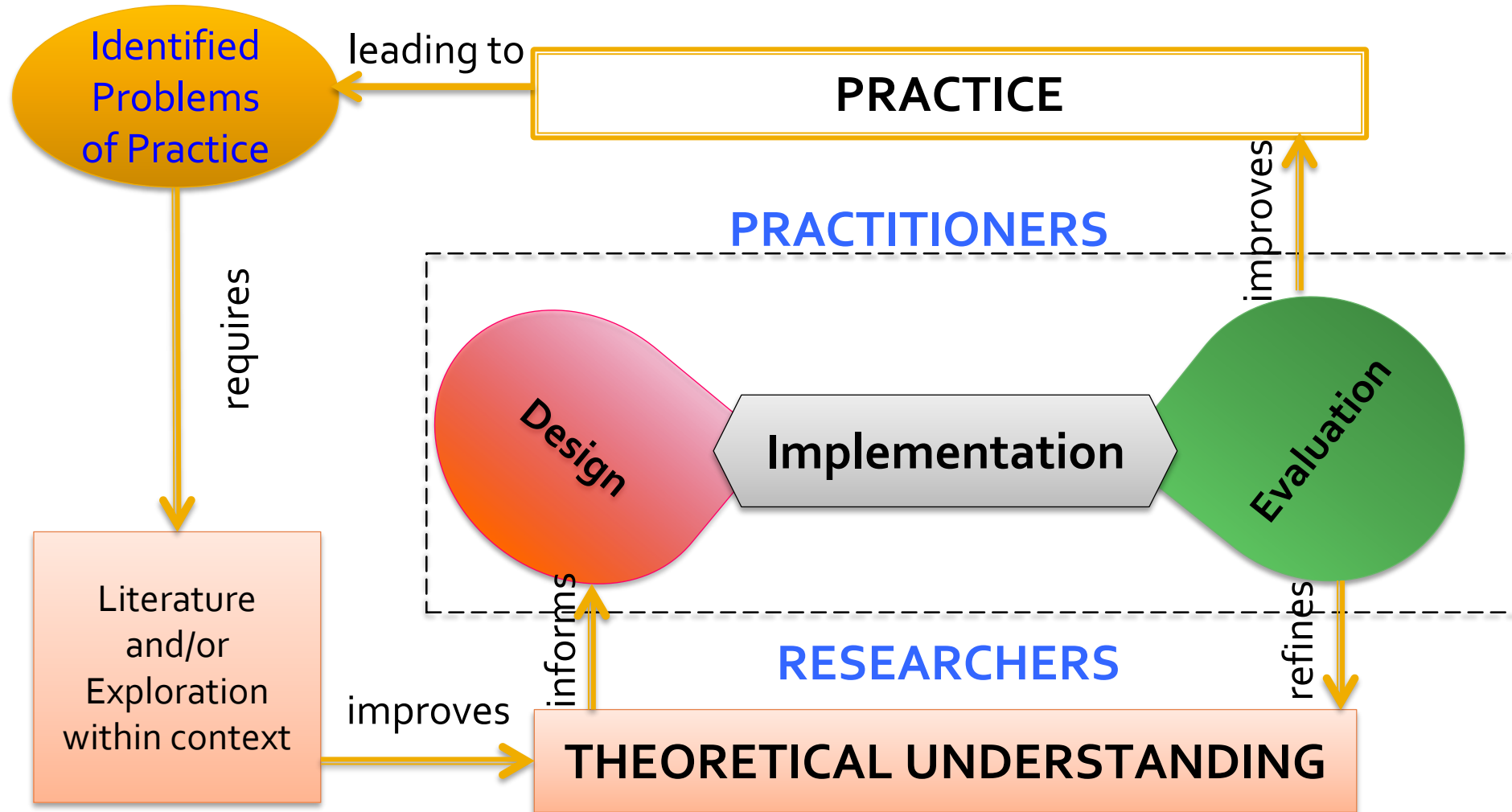
How did we get here: 5 DBIR iterations

SCALE OF IMPLEMENTATION

TECHNOLOGY INTEGRATION PRACTICE IN CLASSROOMS

FACE-TO-FACE TRAINING MODE

BLENDED ONLINE TRAINING MODE

MASSIVE OPEN ONLINE TRAINING MODE

A2I2 MODEL, LCM MODEL FOR MOOCs
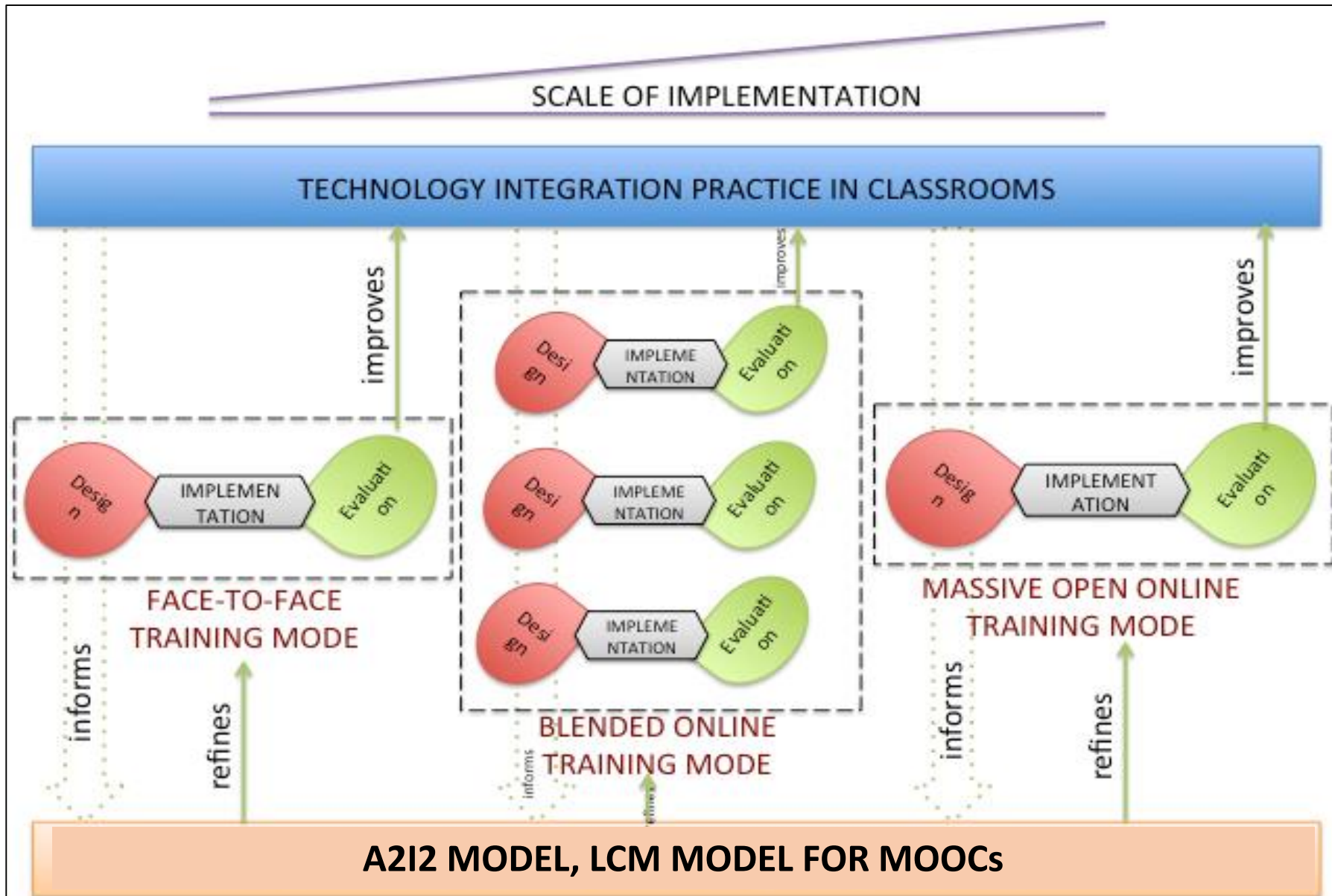
Going further:
MEET- Mentoring Educators beyond ET4ET

Goals

Engage with participants from ET4ET and ET601Tx beyond the programs

Participants to go beyond basic application of knowledge from programs

Ongoing efforts

1) Scaffold motivated participants towards SoLT, via Action Research

    a) MEET: Blended workshop on action research - asynchronous (4mos) + f2f (1week)

    b) Templates for planning, designing, conducting, reporting action research

    c) Mentor participants through various phases of their studies

SoLT: Shulman, 2004
MEET Workshop: Warriem, Murthy & Iyer, 2017

2) Identify top performers, include them as "associate faculty" in subsequent offerings of TPD programs in mentor role

Results

Transfer of ownership

- Indications of secondary implementations

- Classroom Action Research:

    52 studies designed, 19 implemented, 15 conference papers published

Communities of practice

- 20000+ Open Educational Resources created, some available at https://etrepository.wikispaces.com/

- 174 Associate Faculty identified, mentoring 7100 faculty across India

Towards sustainability ...

Takeaway-1: Design principles for TPD programs

Immersivity and pertinency are key design principles for teacher professional development programs targeting effective ICT integration.

Design TPD program to provide participants:

Experience as a learner first, then practice as a teacher

Relevant learning activities –
Domain-specific examples
Context-appropriate tools & strategies
Practice-oriented design

Challenge, and guideline

Takeaway-2: Guidelines for scaling

To scale,
use synchronous remote classrooms or MOOCs or some appropriate technology (f2f wont scale).

To be effective at scale,
maintain learner-centricity, in both design and implementation.

Takeaway-3: Recommendations for sustainability

Go beyond completion rates; focus on *learner persistence rate.*

Enhance communities of practice by using a mentor-mentee model.

Promote transfer of ownership by leveraging potential of classroom action research.

References

- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). Computers & education, 52(1), 154-168.
- Biggs, J. (1996). Enhancing Teaching through Constructive Alignment. Higher Education , 32, 347-364
- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. Educational Technology Research and Development, 47(4), 47-61.
- Harden, R., & Stamper, N. (1999). What is a Spiral Curriculum? Medical Teacher, 21 (2), 141-143.
- Hutchings, P., Huber, M. T., & Ciccone, A. (2011). The scholarship of teaching and learning reconsidered: Institutional integration and impact (Vol. 21). John Wiley & Sons.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers college record, 108(6), 1017.
- Murthy, S., Iyer S., & Warriem, J. ET4ET: A large-scale professional development program on effective integration of educational technology for engineering faculty. Educational Technology & Society, vol. 18(3), pp. 16-28, 2015.
- NMEICT. (2014) Homepage of the Government of India's National Mission on Education through ICT.
- Penuel, W. R., Fishman, B. J., Cheng, B. H., & Sabelli, N. (2011). Organizing research and development at the intersection of learning, implementation, and design. Educational Researcher, 40(7), 331-337.
- Shulman, L. S. (2004). Visions of the possible: Models for campus support of the scholarship of teaching and learning. In W. E. Becker & M. L. Andrews (Eds.), *The scholarship of teaching and learning: Contributions of research universities* (pp.9-23). Bloomington: University of Indiana Press.
- Train 10000 Teachers. http://www.it.iitb.ac.in/nmeict/About_T10kT.html
- Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. Computers & Education, 59(1), 134-144.
- Tsai, C. C., & Chai, C. S. (2012). The" third"-order barrier for technology-integration instruction: Implications for teacher education. Australasian Journal of Educational Technology, 28(6).
- Warriem, J. M., Murthy, S. & Iyer, S. (2015). Sustainability at scale: Evidence from a large scale teacher professional development program. Proceedings of the 23rd International Conference on Computers in Education, ICCE 2015, Hangzhou, China.
- Warriem, J. M., Murthy, S. & Iyer, S. (2016). Shifting the focus from learner completion to learner perseverance: Evidence from a teacher professional development MOOC. Proceedings of the 24th International Conference on Computers in Education, (ICCE 2016), Mumbai, India.
- Warriem, J. M., Murthy, S. & Iyer, S. (2017). Transfer of Ownership: Designing for Scholarship of Learning and Teaching. The Sixth International Workshop on ICT Trends in Emerging Economies (WICTTEE 2017). Proceedings of the 25th International Conference on Computers in Education, ICCE 2017, New Zealand.

Contributions

Faculty member ET-IITB
  Sridhar Iyer
  D. B. Phatak

PhD alumni, ET-IITB
  Gargi Banerjee
  Sameer Sahasrabudhe
  Madhuri Mavinkurve
  Yogendra Pal
  Mrinal Patwardhan
  Rekha Ramesh

PhD students, Project TUET
  Jayakrishnan M. Warriem
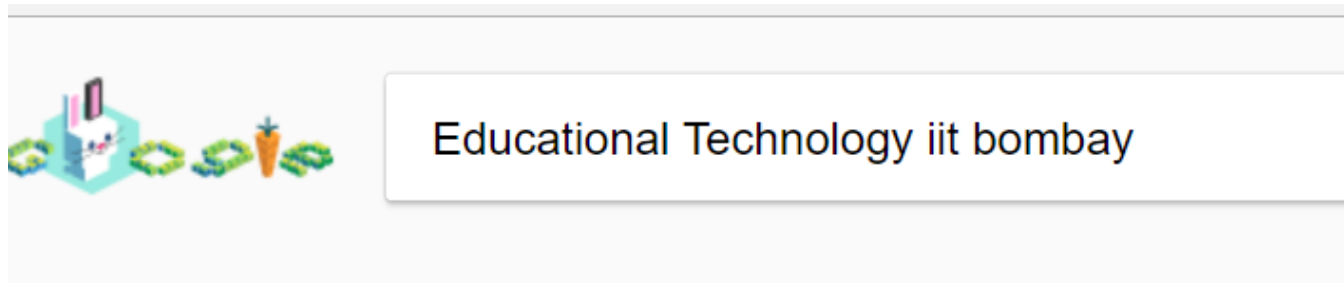 Rwitajit Majumdar
  Anita Diwakar

Supported by:
  Many PhD students as TAs

Thank you!

This presentation available at www.et.iitb.ac.in/~sahanamurthy

More resources http://www.et.iitb.ac.in/projects/tuet/

Educational Technology iit bombay