Large-scale teacher professional development for effective technology integration

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• 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?

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 km²)

Source: http://www.facilities.aicte-india.org/
Large-scale in India

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Students</th>
<th>Faculty</th>
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<tbody>
<tr>
<td>4090</td>
<td>1847595</td>
<td>473129</td>
</tr>
</tbody>
</table>

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

Geographical distribution (> 3,00,000 km²)

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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: Outreach

Remote Centers
- ET4ET
- RMET

MOOCs
- FDP101
- ET 601Tx
- ET 611Tx

f2f
1-2 day Workshops by faculty and PhD alumni
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)
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

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 in order for teachers to reflect on the activity itself before they incorporate it into their practice.

Pertinency principle:
Relate to the teacher’s context and immediate practice in order for teachers to attain fluency in practice.

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

Warriem, Murthy & Iyer, 2015
Results – ET4ET

• High cognitive engagement 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 intent to apply learning after ET4ET program:
  • 83% intend to apply, 0.47 correlation between intent and perceived relevance
Results

• High cognitive engagement during ET4ET program
• High intent to apply learning after ET4ET program

• Actual practice, 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

- Learner Experience Interaction
- Learning Dialogues
- Learning Extension
- Learning by Doing

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Learner-Centric MOOC Model

- Focus question for discussion + Peer interaction + Reflection Quiz
- Content + Reflection Spot
- Resources + Assimilation Quiz
- Activities + Customized Feedback

Learner Experience Interaction
Learning Dialogues
Learning Extension
Learning by Doing
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]
Overall 22000 engineering college instructors trained over 4 years
How did we get here: Design-based Implementation Research

- Identified Problems of Practice
- Literature and/or Exploration within context
- Requires
- Leading to

PRACTICE

PRACTITIONERS

Design
Implementation
Evaluation

RESEARCHERS

THEORETICAL UNDERSTANDING

Improves
Refines

Informs

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

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

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

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

- Train10000 Teachers. http://www.it.iitb.ac.in/nmeict/About_T10kT.html
Contributions

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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/

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