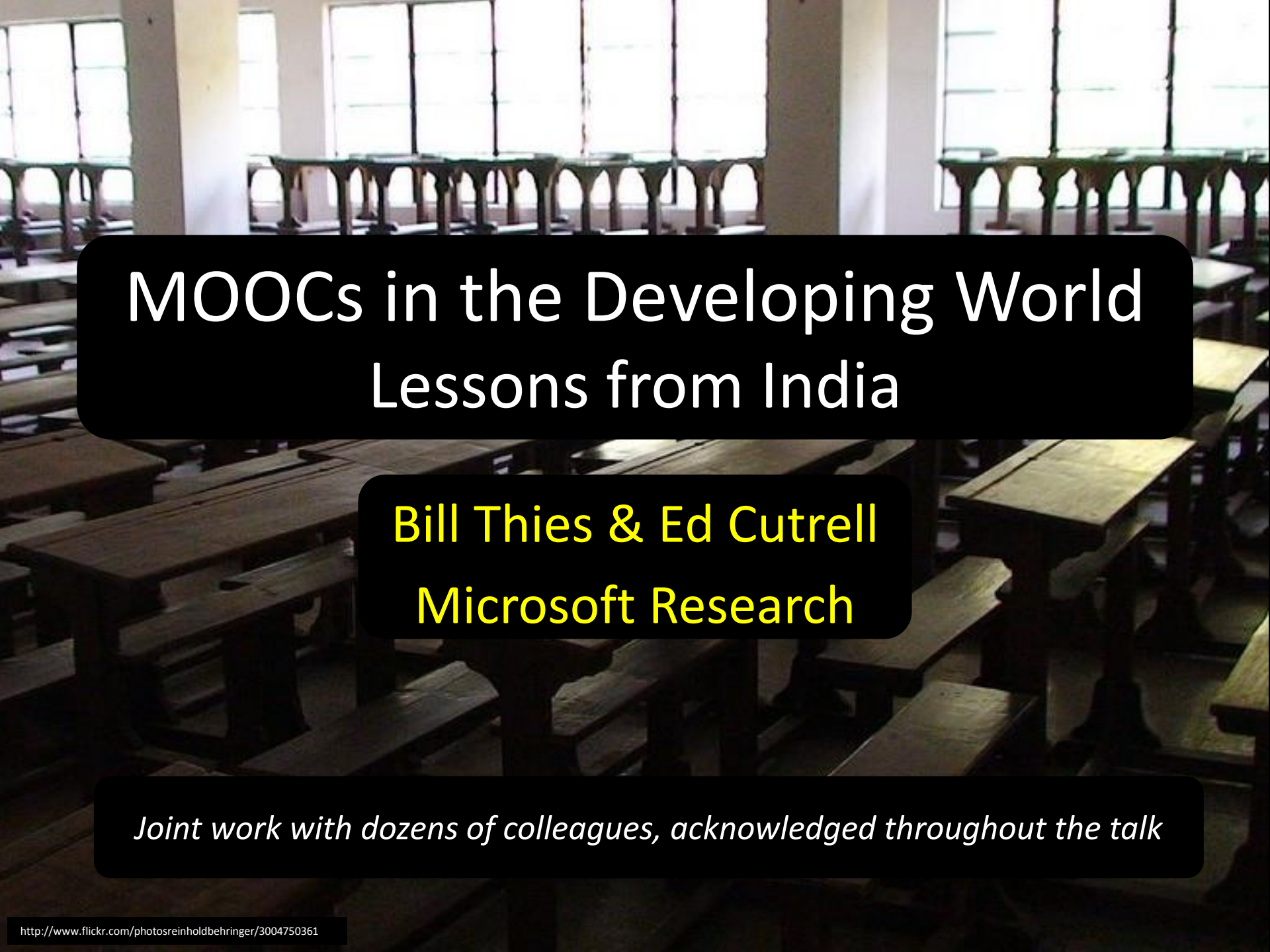
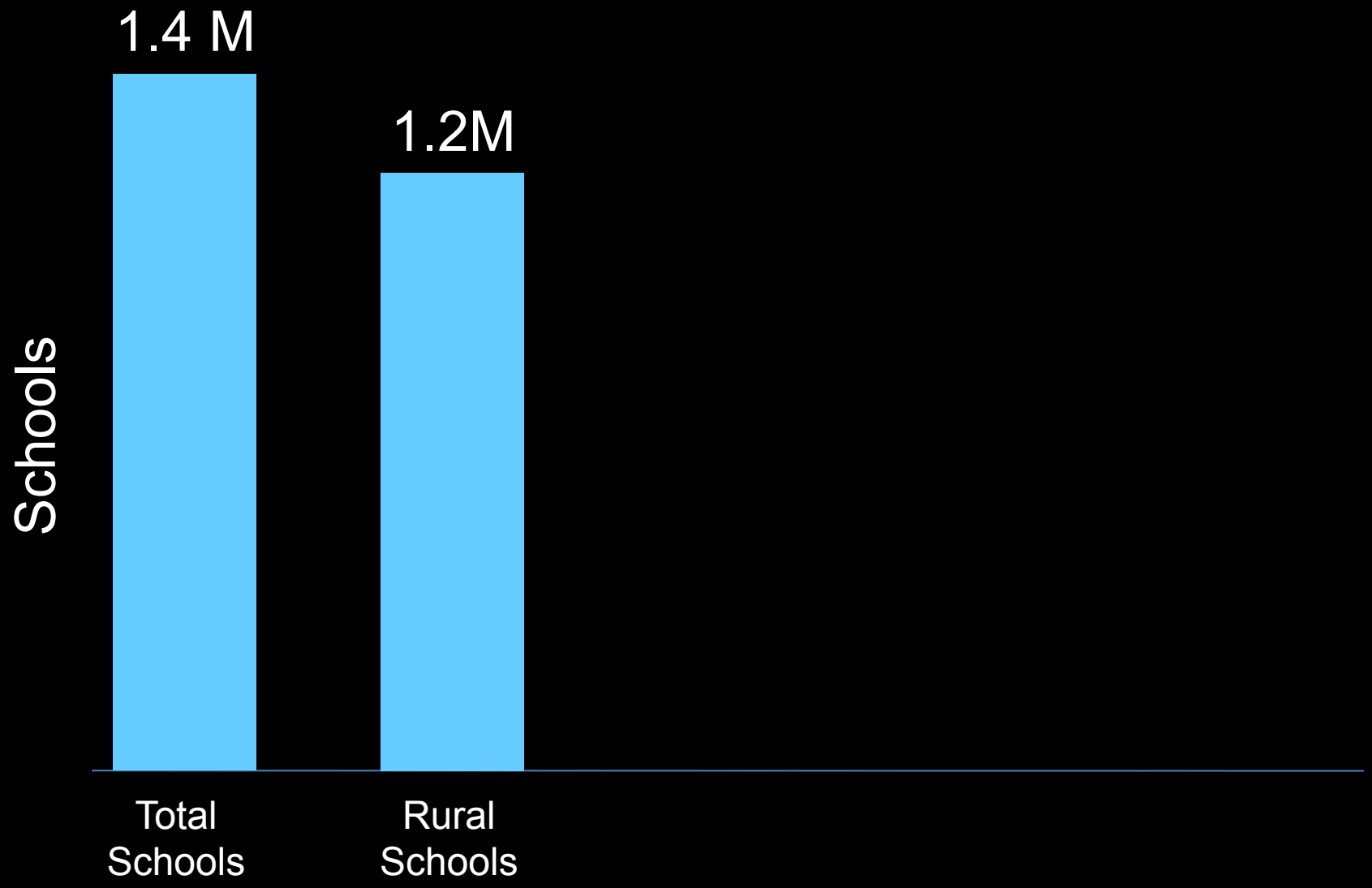


MOOCs in the Developing World
Lessons from India

Bill Thies & Ed Cutrell
Microsoft Research

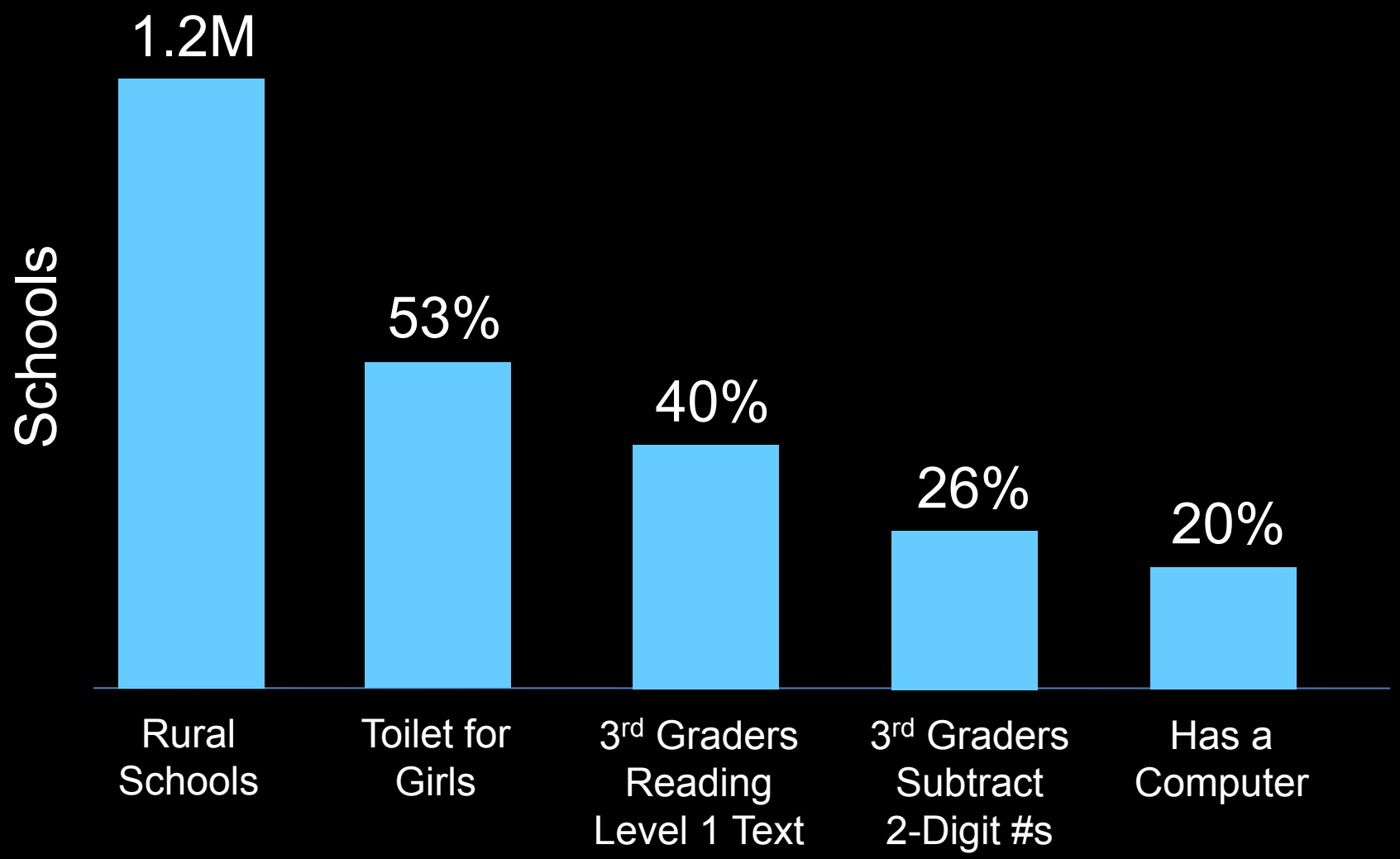
Joint work with dozens of colleagues, acknowledged throughout the talk

Classroom Environment in India



Source: DISE 2012-2013, ASER 2013

Classroom Environment in India



Source: DISE 2012-2013, ASER 2013





Chinhat, Uttar Pradesh

Slide: Kentaro Toyama

Negroponte: We'll Throw OLPCs Out of Helicopters to Teach Kids to Read

BY MARK HACHMAN NOVEMBER 2, 2011 01:10PM EST 7 COMMENTS

Nicholas Negroponte plans to airdrop OLPC tablets to remote villages to teach the children within them to read, he told the audience at the Open Mobile Summit on Wednesday.

Nicholas Negroponte plans to airdrop OLPC tablets to remote villages to teach the children within them to read, he told the audience at the Open Mobile Summit on Wednesday.

The tablets won't be accompanied by any adults or teaching resources; Negroponte said that he was convinced that they were designed for children, and that he wanted to see if the tablets could be used to teach them to read without additional instruction.

"We will literally take tablets and drop them out of helicopters," and return a year later to see if the effort was a success, Negroponte said. A new tablet design can withstand a 30-foot drop, and even be left out in the rain.

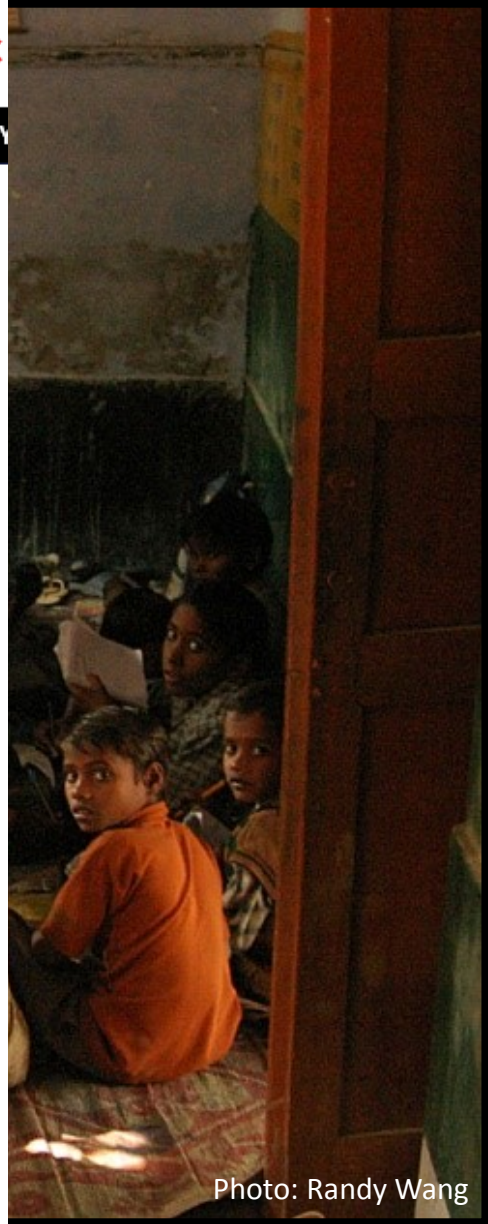


Photo: Randy Wang

Slide: Kentaro Toyama

Lesson:

Technology Amplifies Human Intent and Capacity; It Doesn't Substitute for Them

Kentaro Toyama

Boston Review 2010, iConference 2011

Leverage existing technologies

Some photos courtesy Nithya Sambasivan

Same Language Subtitling
(Brij Kothari et al.)

- 30 minutes per week: Children's ability to read a paragraph jumps from 25% to 56% [1]
- 90% prefer having subtitles on songs due to interest in lyrics
- Reaches over 200 million people in India

[1] Kothari et al., International Review of Education, 2008

How to deliver educational videos?

Use local mediators

Digital Green
(Rikin Gandhi et al.)

Record Farmer Best Practices

Mediated Screenings in Villages

In last few years:

3,000 videos | 260,000 viewers | 3,400 villages

Collections

MOST LIKED | MOST VIEWED | MOST ADOPTED

NPM Pest Managem...
Andhra Pradesh | Telugu
By: SERP
♥54.8k | 197.3k | 28k

NPM Growth Enhanc...
Andhra Pradesh | Telugu
By: SERP
♥36.7k | 145.8k | 17.4k

Sowing
Odisha | Oriya
By: VARRAT
♥34k | 84.1k | 6,954

Paddy
Bihar | Thethi
By: BRLPS
♥21.8k | 35.6k | 6,143

System of Rice Inten...
Bihar | Thethi
By: BRLPS
♥21k | 34k | 5,922

Paddy
Odisha | Oriya
By: VARRAT
♥20.7k | 54.4k | 4,723

Wheat
Bihar | Thethi
By: BRLPS
♥20.6k | 28.8k | 1,340

Maternal and Neonat...
Uttar Pradesh | Hindi
By: PATH
♥20.2k | 56.4k | 151

Brinjal (Baingan)
Bihar | Hindi
By: BRLPS
♥18.7k | 24.9k | 998

Paddy
Odisha | Oriya
By: PRAGATI
♥16.8k | 39.6k | 5,040

Curative
Karnataka | Kannada
By: BAIF
♥16.3k | 56.8k | 2,996

Compost and Manure
Odisha | Oriya
By: PRAGATI
♥14.9k | 45k | 1,279

Digital Study Hall

(Randy Wang et al.)

Record best teachers in cities

Mediated playback
by rural teachers

>2000 videos | 140 teachers | Hard to evaluate [Anderson, ICTD 2012]

DVD Player as a Programmable Device

- 16 general-purpose 16-bit registers
  - (No heap/stack)
- Virtual machine instructions
  - Arithmetic - Comparison - Branch/Jump - Timing
  - (No indirect jump)
- Display:
  - Pre-built MPEG-2 videos with mask and highlight layers

Children's Books on TV-DVD [ICTD 2010]

$0.50 for 1 book in print

$0.50 for 10,000 books on DVD

Wikipedia Subset on TV-DVD [CHI 2011]

A lot is possible without a computer

What if you do have a computer?

Slide credit: Kentaro Toyama

A Solution: Multipoint Mouse

(Pawar, Pal, Toyama and others, ICTD'06, CHI'07, CSCL'09)

Before MultiPoint

After MultiPoint

Slide credit: Kentaro Toyama

http://www.micros... Windows MultiPoint Mouse...

United States Change | All Microsoft Sites

Windows MultiPoint Mouse SDK

Search Microsoft.com bing Web

MultiPoint Mouse SDK Home Benefits Developer Showcase

One PC, Multiple Mice, Endless Possibilities

Watch a Video

Introducing Windows MultiPoint Mouse SDK 1.5

Windows MultiPoint Mouse Software Development Kit (SDK) gives education publishers the ability to build interactive applications that allow up to 25 students, each with their own mouse, to simultaneously engage on a single PC.

Download SDK

View Samples

Benefits to Schools and Partners

MultiPoint Mouse SDK offers a wide variety of benefits for Education ISVs, Schools and Teachers.

- **Learn more about the benefits**

Case Studies

Read how customers are successfully and creatively using applications built on the Multipoint Mouse SDK to drive positive learning outcomes.

Teachers fuel creativity and cooperation in Russian schools with Curriculum Curiosity from Noviy Disk.

Related links

- **MultiPoint Solutions**
- **Microsoft Mouse Mischief**

Design to engage a group of learners

How many students can you engage?

Clickers for Classroom Polling

+ Pedagogical benefits

– Very expensive

qCards: Low-Cost Audience Polling Using Computer Vision

(Andrew Cross et al.)

Polling an Audience of 300

[UIST 2012]

Polling an Audience of 300

[UIST 2012]

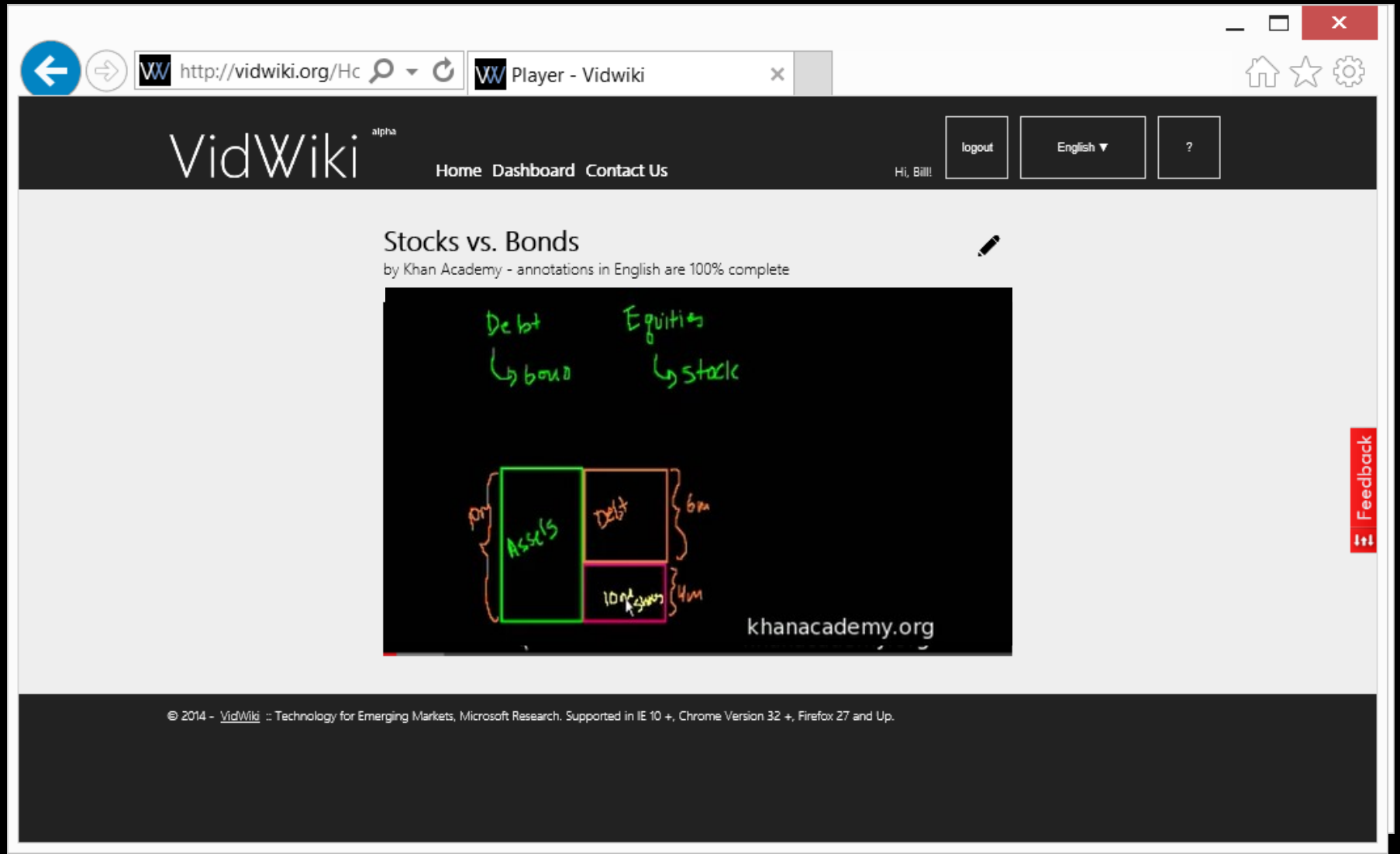
90% of people captured

98% of those captured accurately

Polling an Audience of 1,800

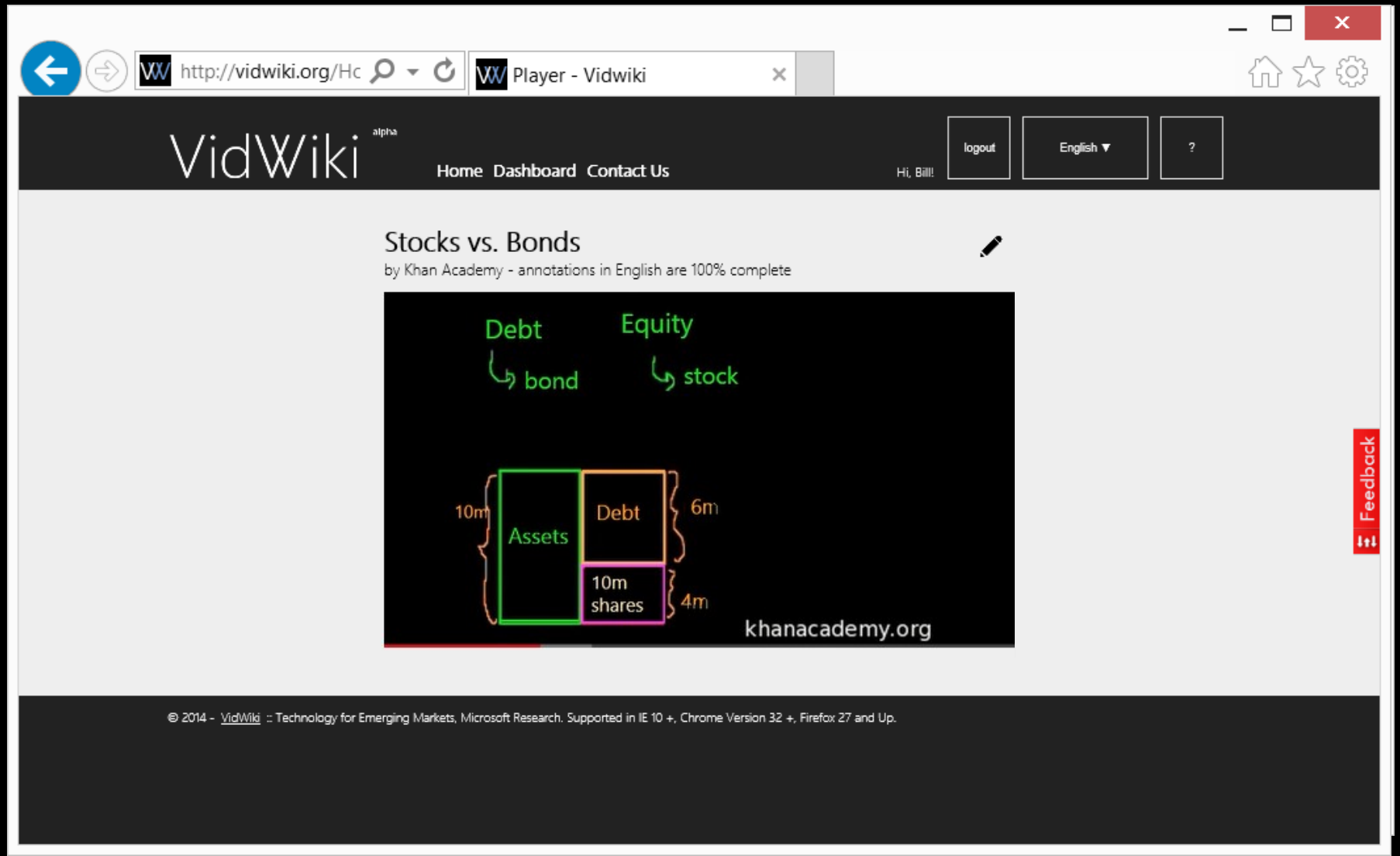
Enabling Local Production of Content

[Andrew Cross et al., CSCW 2014]



Enabling Local Production of Content

[Andrew Cross et al., CSCW 2014]



Enabling Local Production of Content

[Andrew Cross et al., CSCW 2014]

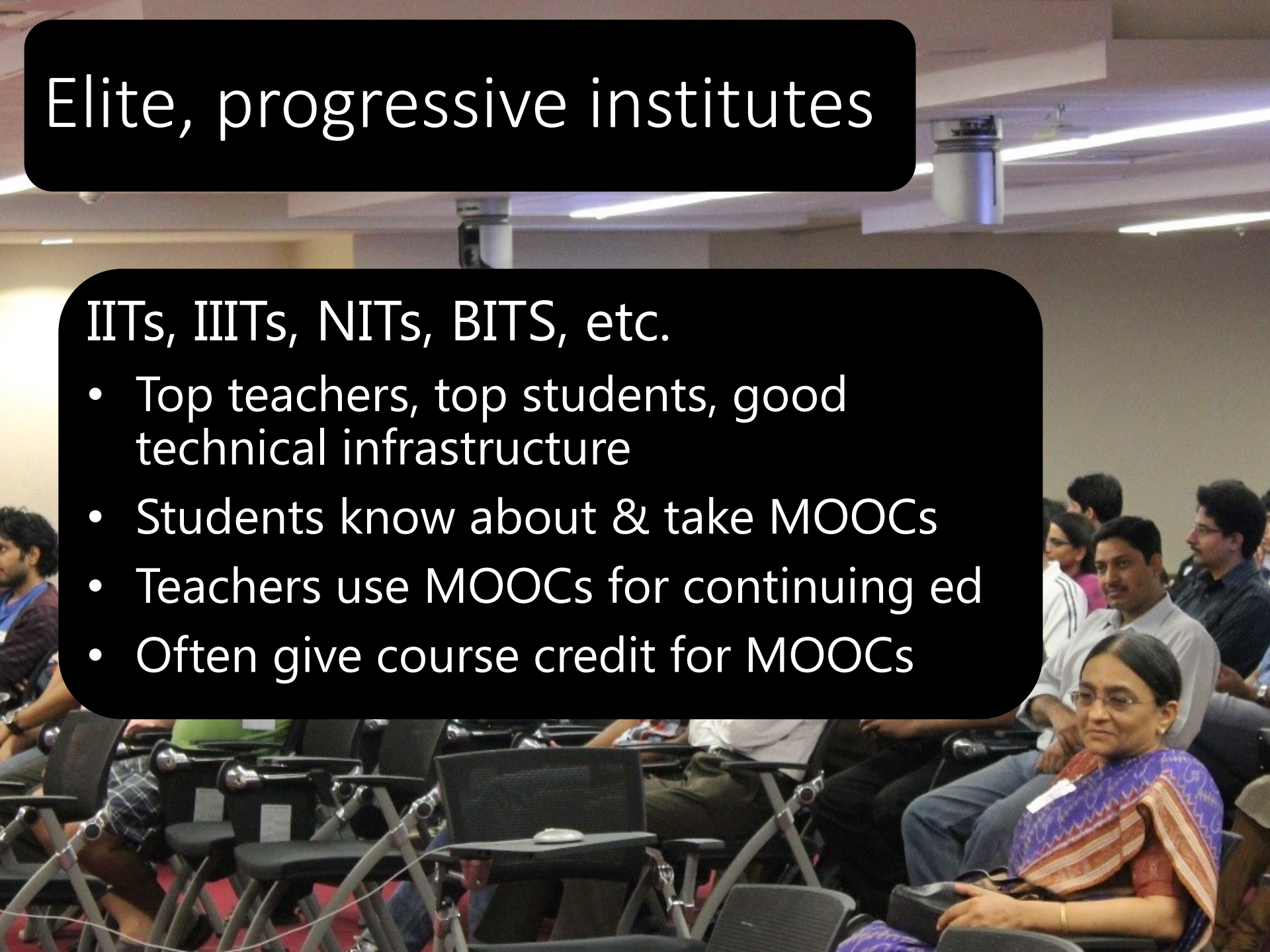
Lessons in Scaling Educational Technologies in India

- Technology amplifies humans, it does not substitute for them
- Leverage existing technologies
- Use local mediators
- Design for shared usage
- Enable contribution, not only consumption

So…

What about MOOCs?

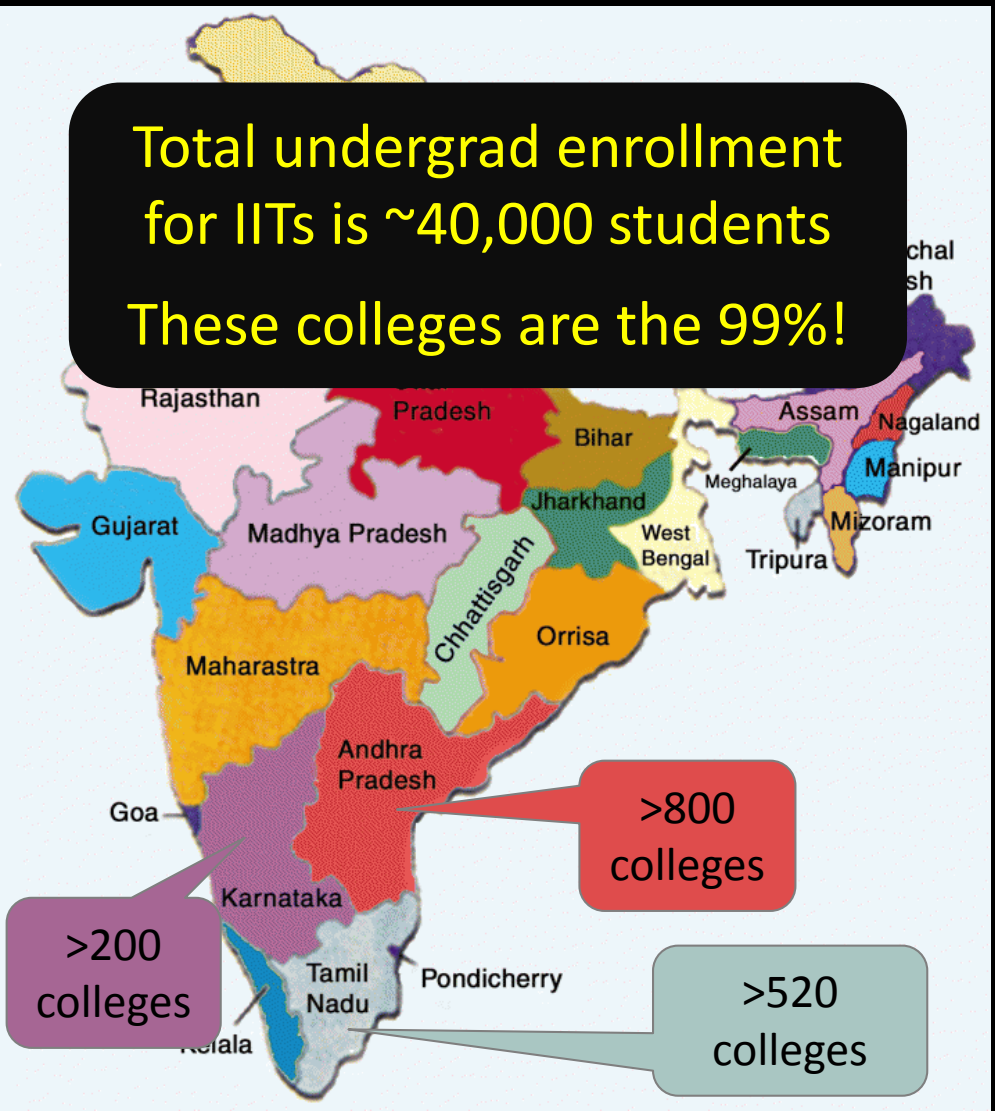
Elite, progressive institutes



IITs, IIITs, NITs, BITS, etc.

- Top teachers, top students, good technical infrastructure
- Students know about & take MOOCs
- Teachers use MOOCs for continuing ed
- Often give course credit for MOOCs

Most engineering students in large state technical universities



Large universities with many affiliated colleges

- Centralized curriculum
- Single shared exam
- A few high quality colleges, long tail

Technical universities:

Colleges: **~4700**

Faculty : **~50,000**

Students: **~3,800,000**

The *other* 4 million students

- Deep teacher constraint, lower quality
- Wide variability in students, driven by job acquisition over learning
- Relatively poor technical infrastructure
- MOOCs mostly unknown & unused by students or teachers

From our recent survey in Karnataka:

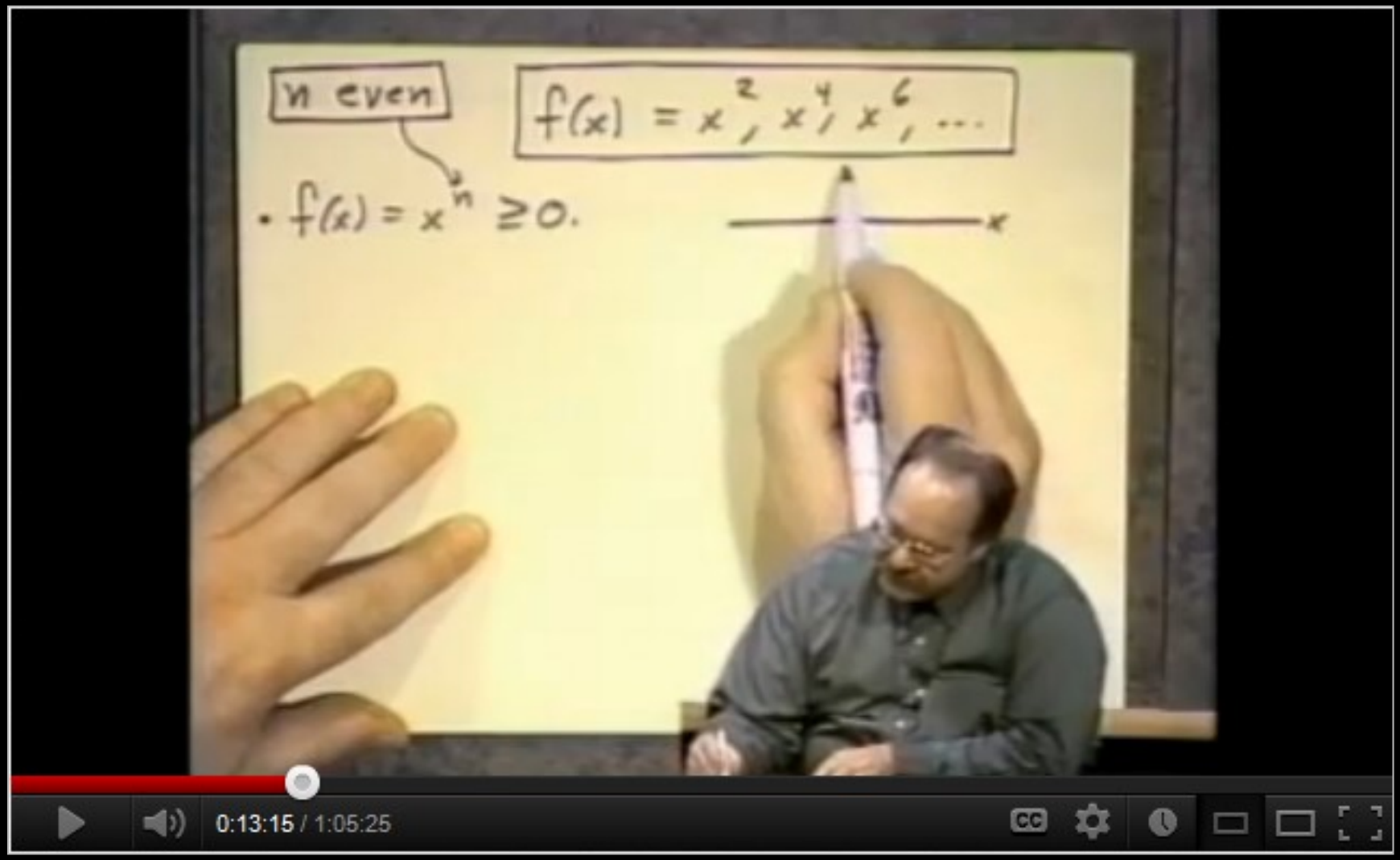
~80% of students *never heard* of edX, Coursera or Khan Academy

<3% had ever watched even one online educational video (from anywhere)

MOOCs reach the elites.

Why not the majority?

Should we blame awareness?

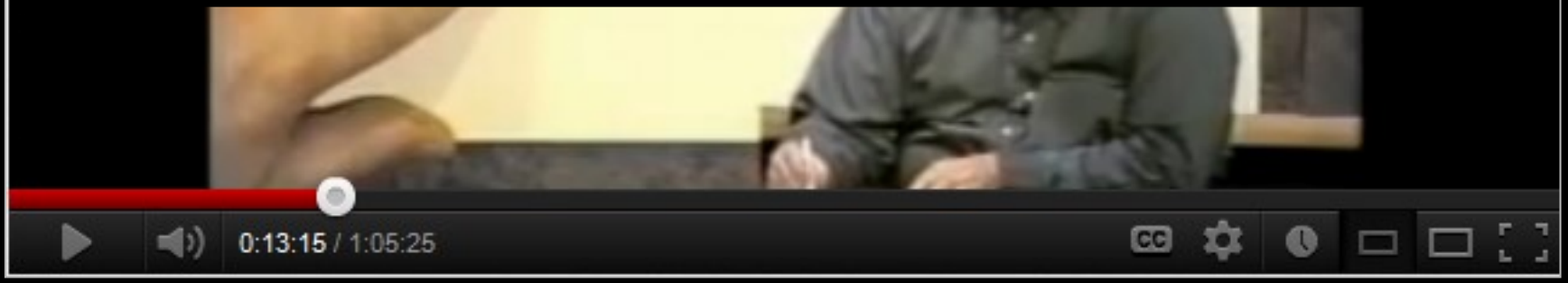


Should we blame awareness?

India's NPTEL initiative (started 2003)

- Highly resourced, professional recordings, wide distribution of 100s of IIT courses
- Broad awareness
  ~50% of surveyed students knew about it, almost all teachers aware

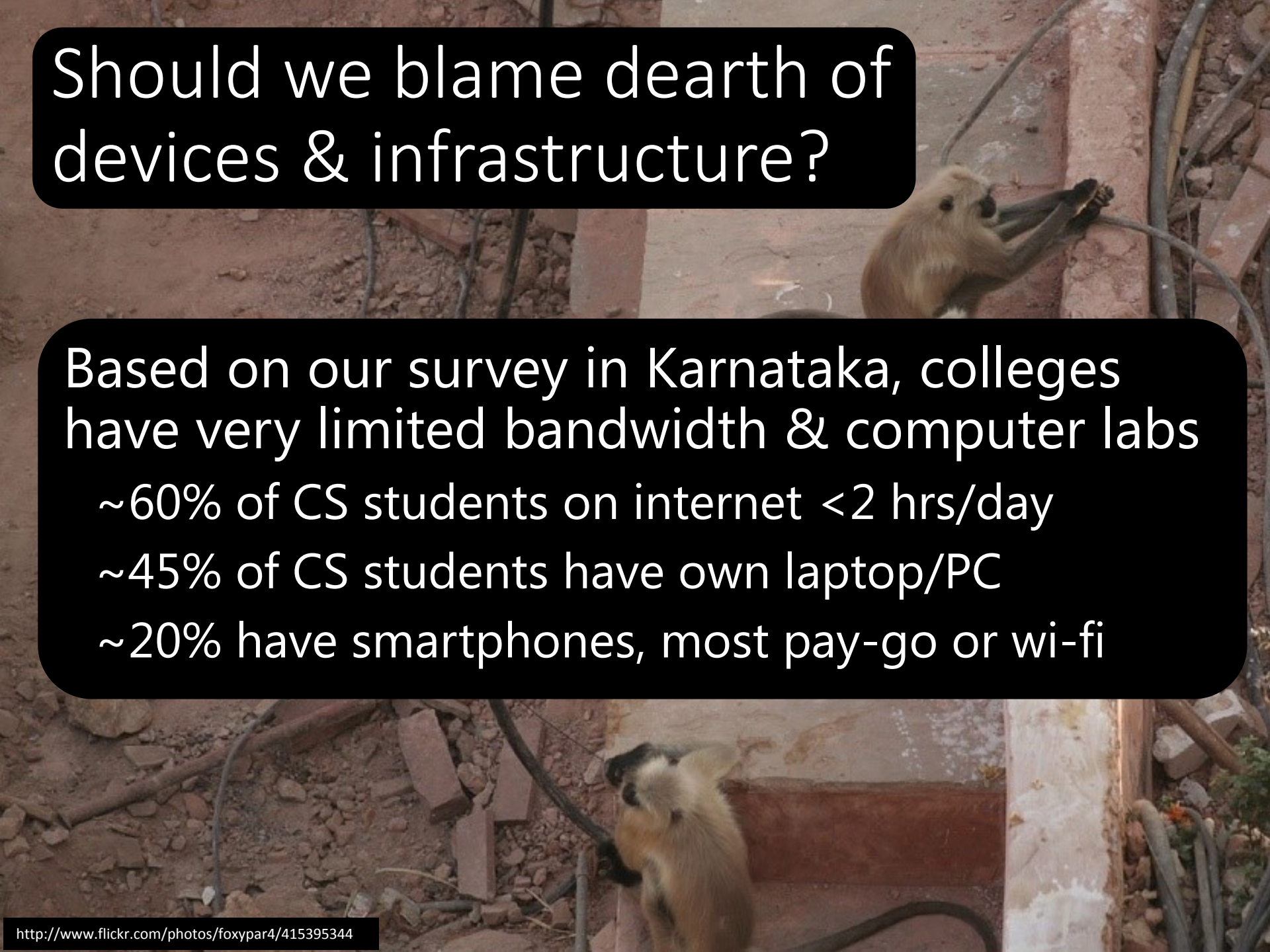
Little sustained use or systemic change



Should we blame dearth of devices & infrastructure?

Based on our survey in Karnataka, colleges have very limited bandwidth & computer labs

- ~60% of CS students on internet <2 hrs/day
- ~45% of CS students have own laptop/PC
- ~20% have smartphones, most pay-go or wi-fi

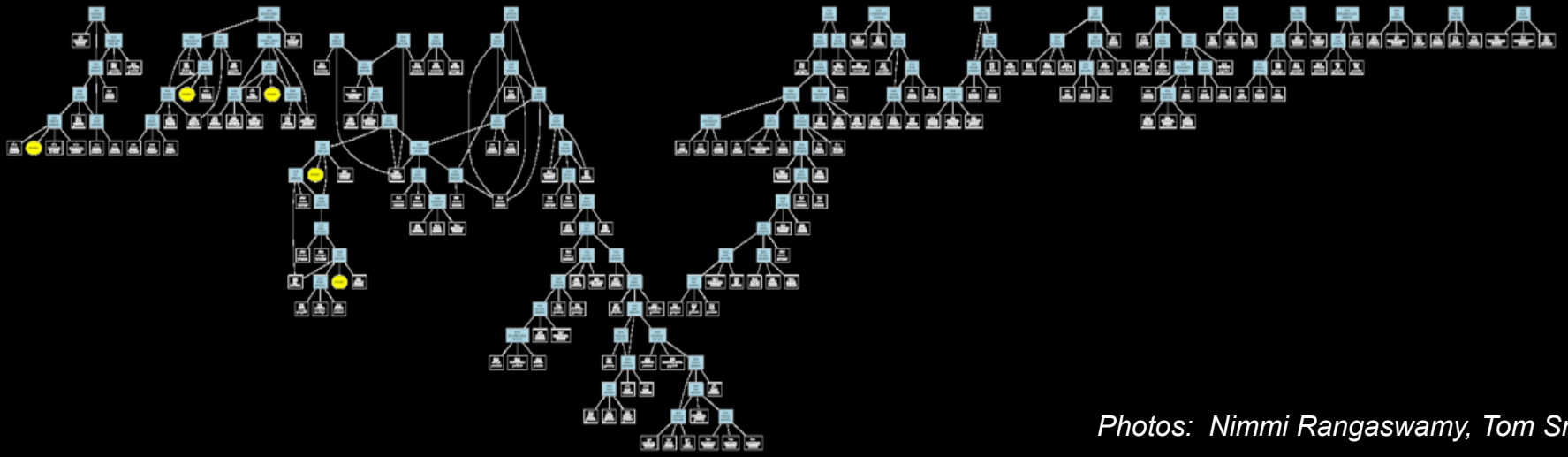


http://www.flickr.com/photos/foxypar4/415395344

Where There's a Will, There's a Way

[Smyth et al, CHI 2010]



Photos: Nimmi Rangaswamy, Tom Smyth

http://www.flickr.com/photos/scragz/91147636

Poll—Do you consistently:

a) Exercise
b) Floss
c) Wear a seatbelt

Slide adapted from Kentaro Toyama

People don’t do what’s “best” for them

Junk & high fat foods versus fruits & veggies

Spend today versus save for tomorrow

10% of curable blind don’t go to have surgery, even when cost-free

Many people don’t wear seatbelts or stop smoking, although they understand the implications.

Slide adapted from Kentaro Toyama. Photo Credit: Divya Ramachandran

MOOCs reinforce positive behaviors of top students and teachers

How can we get the rest of them to "buckle up" using online educational content?

Massively Empowered Classroom (MEC)

Platform built by MSR India

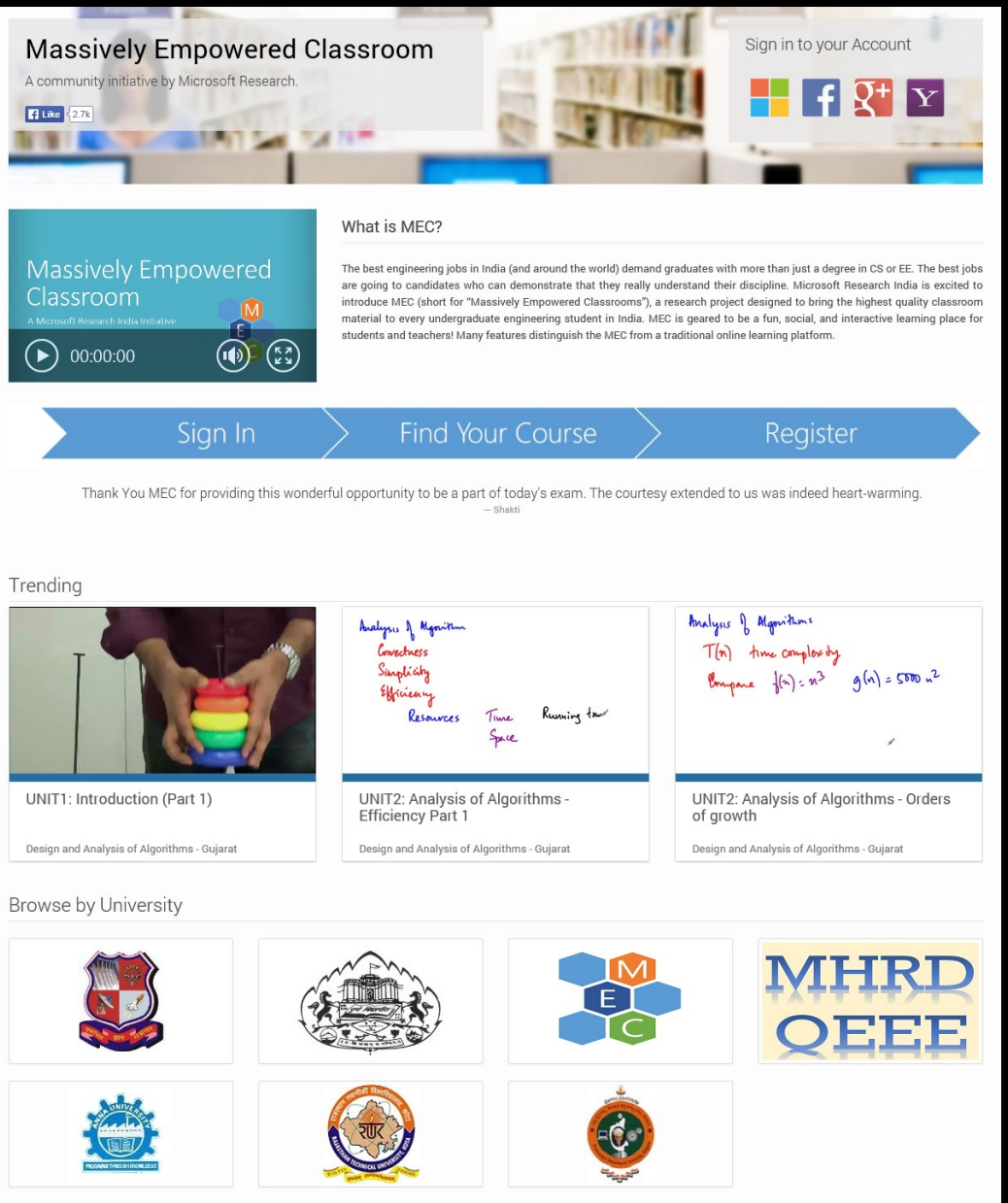
Classic MOOC framing

Replace classroom: Provide world-class teaching for students willing and able to do the work.

MEC re-framing

Embrace the classroom: How do we act as a bridge to empower the existing ecosystem of institutions, teachers, and students to take advantage of online educational technologies?

Massively Empowered Classroom (MEC)



Local control

- Synched curriculum
- Class-level analytics
- Local supplementation

MOOC-like content

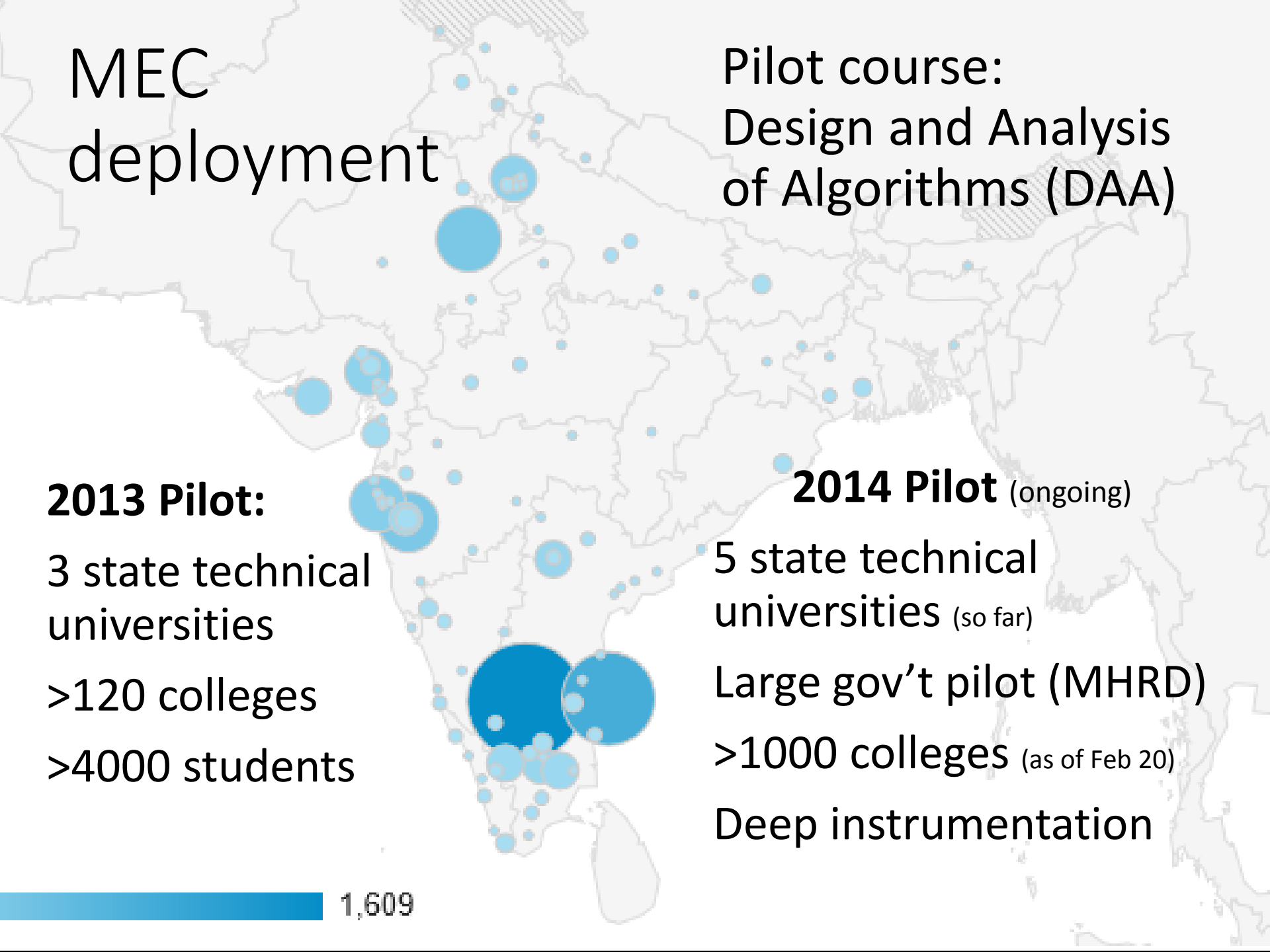
- Short, high-quality videos
- Periodic quizzes
- Forum & community

Course supplement

- Required classroom attendance
- 21st Century textbook

MEC deployment

Pilot course:
Design and Analysis of Algorithms (DAA)



2013 Pilot:

3 state technical universities

>120 colleges

>4000 students

2014 Pilot (ongoing)

5 state technical universities (so far)

Large gov't pilot (MHRD)

>1000 colleges (as of Feb 20)

Deep instrumentation

1,609

Blended Learning via Intermediated Video Lessons

Potential Benefits:

- Overcomes device / bandwidth constraints
- Retains role for teacher
- Increases student engagement

(Note: NOT flipped classroom)

Eliminate speedbumps… but focus on the road, car & driver

- Accent
  - High quality Indian instructors
- Content
  - Synched curriculum, short videos, interactivity
- Awareness
  - Facebook, systematic evangelism
- Bandwidth
  - Offline Windows app, mobile Android app

Larger context of students, teachers and institutions give the structure to improve behavior

massive + open + online ≠ inclusive

need to empower the *majority* of teachers, learners

How to Increase Social Inclusion?

Lessons learned from the school of hard knocks

- Technology amplifies humans, it does not substitute
- Leverage existing devices
- Use local mediators
- Design for shared usage, large audiences
- Enable contribution, not only consumption

Directions for MOOCs

- Use MOOC to strengthen existing classrooms
- Use classrooms to bring people to MOOCs
- Intermediated video instruction

Acknowledgments

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Sridhar Vedantham
Srinath Bala
Sriram Rajamani
Vidya Natampally
Viraj Kumar