

# Emerging Technologies for Effective Teaching & Learning

Continuing Education Program for Next Education India Pvt Ltd  
Conducted by Educational Technology, IIT Bombay  
September 19-21, 2019



IIT Bombay



**Next Education™**  
Transforming Education



IIT BOMBAY

# MOOCs: What, When, How? Adoption and Challenges

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Veenita Shah

What is MOOCs?

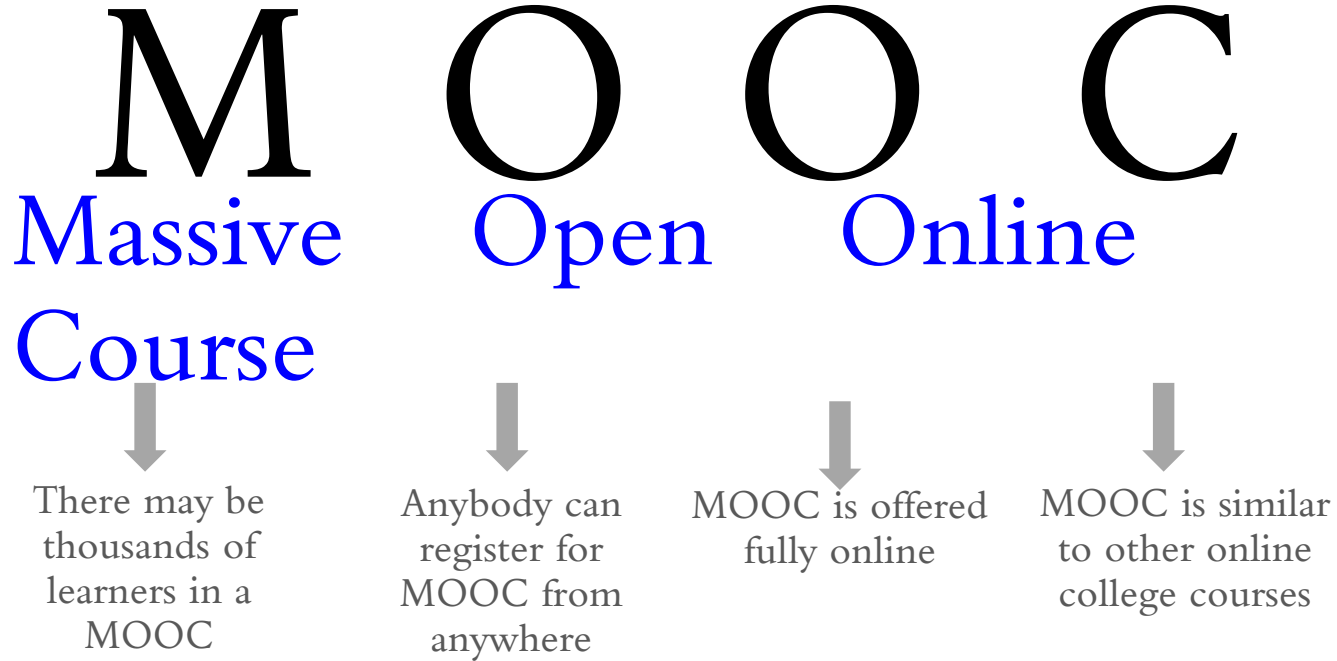
When did it start?

How does it work?

# What is MOOC?



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# Define MOOC



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It is an online course with free registration and resources designed for large number of learners who are geographically distant but learn by engaging with the content and with each other.

## Integrates

- Leading experts in the field
- Accessible resources online
- Social Networking – Peer learning

# Evolution of MOOCs



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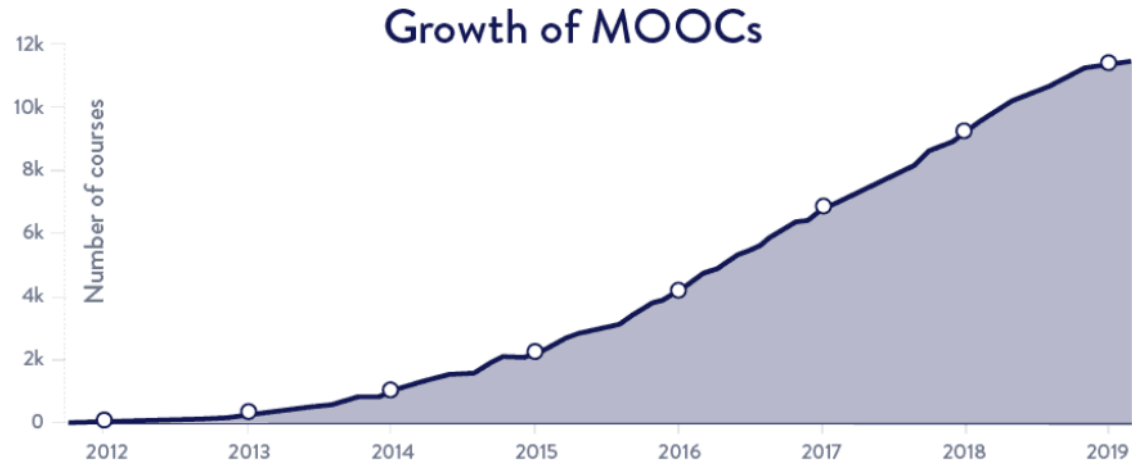
*Source: MOOC on Designing Learner-centric MOOC*

# Statistics and Trends in MOOC

Class-central: Reviews of statistics and trends in MOOCs every year.

- [Review of 2012](#)
- [Review of 2013](#)
- [Review of 2014](#)
- [Review of 2015](#)
- [Review of 2016](#)
- [Review of 2017](#)
- [Review of 2018](#)
- [Review of 2019](#)

CLASS CENTRAL



# MOOCs Providers



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Provider	Institutional partners
Coursera	<u>Stanford University</u> , <u>Princeton University</u> , <u>Arizona State University</u> , <u>University of Maryland College Park</u> , <u>Ohio State University</u> , <u>University of Illinois at Urbana-Champaign</u>
edX	<u>MIT</u> , <u>Harvard University</u> , <u>Brown University</u> , <u>Boston University</u> , <u>UC Berkeley</u> , <u>Kyoto University</u> , <u>Australian National University</u> , <u>University of Adelaide</u> , <u>University of Queensland</u> , <u>IIT Bombay</u> , <u>IIM Bangalore</u> , <u>Dartmouth College</u> , <u>Universidad Autonoma de Madrid</u> , <u>Curtin University</u> , <u>Cornell University</u> , <u>Columbia University</u> , <u>University of Pennsylvania</u> , <u>University System of Maryland</u>
Udacity	<u>Georgia Institute of Technology</u> , <u>San Jose State University</u> , <u>Google</u> , <u>Salesforce.com</u> , <u>Facebook</u> , <u>Cloudera</u> , <u>Nvidia</u> , <u>Autodesk</u> , <u>Cadence</u> , <u>HubSpot</u> , <u>Tableau</u>
Udemy	<u>Strayer University</u>
NPTEL	<u>IIT Bombay</u> , <u>IIT Delhi</u> , <u>IIT Guwahati</u> , <u>IIT Kanpur</u> , <u>IIT Kharagpur</u> , <u>IIT Madras</u> and <u>Roorkee</u> , <u>Indian Institute of Science</u>
IITBombayX	<u>IIT Bombay</u>



# How Does it Work?



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Browser address bar: <https://swayam.gov.in/explorer>

swayam logo: FREE ONLINE EDUCATION swayam

Navigation: About Swayam | All Courses | National Coordinators | Local Chapters

Search: COURSE CATALOG Search Catalog... veenita7shah@gmail.com

Home > Course Catalog

Course Catalog

Search [input] [magnifying glass]

Course Title [dropdown arrow]

## FILTERS

- National Coordinator: All
- Course Duration: All
- Course Exam Date: All
- Course Credits: [dropdown arrow]

Upcoming (Enrollment Open)

Ongoing (Enrollment Closed)

**A Practical Refresher In Computer Engineering**

**A Practical Refresher In Computer Science**  
Kameswari Chebrolu

**ANIMATIONs**  
Dr. Abhishek Kumar

# How Does it Work?



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itbombay.in/courses?f%5B0%5D=domain%3A421



ABOUT

COURSES

HOW IT WORKS

Search:



Veenitashah ▾

## Courses

IITBombayX offers numerous interactive courses listed below, including ongoing, upcoming and archived courses. Each of these courses are categorized under EduMOOCs, LifeMOOCs, SkillMOOCs and TeachMOOCs for various learning needs.

### Refine Your Search

Selected Filters: **Education & Teacher Training** ✕ **Reset All** ✕

#### Domain

- Animation (7)
- Communication (17)
- Computer Science (23)
- Design Education (6)
- Education & Teacher Training (18)**
- Engineering (34)
- Finance (3)
- Skill development (11)

#### Programme

Course Search:

APPLY



FDP201x

Pedagogy for Online and Blended Teaching-Learning Process

Archived



FDP101x

Foundation Program in ICT for Education

Archived



ET621Tx

Effective teaching-learning of CS in Schools

Archived

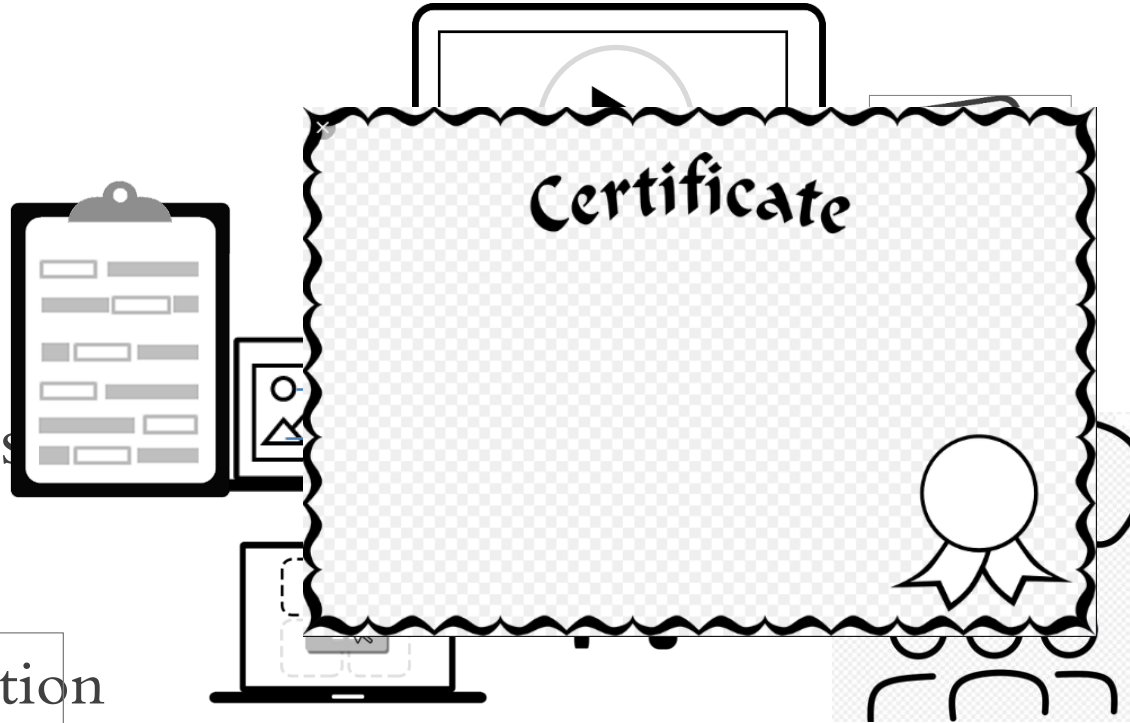
# Recap: Components in MOOCs

- Videos
- Assignments
- Discussion Forum
- Additional resources
- Interactive Sessions



# Recap: Components in MOOCs

- Videos
- Assignments
- Discussion Forum
- Additional resources
- Interactive Sessions
- Certificate on completion



# Instructional Goals of MOOCs

Having seen the features of MOOCs, list some of the key instructional goals of MOOCs based on the key attributes of MOOCs.

PLEASE OPEN THE PADLET LINK, AND SHARE YOUR RES  
[HTTPS://PADLET.COM/VEENITA7SHAH/AYHXKHHPDM49](https://padlet.com/veenita7shah/ayhxkhHPDM49)

1. CLICK ON “+” TO WRITE YOUR RESPONSES INSIDE THE BOX
2. YOU MAY WRITE YOUR SCHOOL’S NAME BEFORE YOU WRITE YOUR RESPONSE
3. YOU MAY GIVE A THUMBS UP IF YOU LIKE ANOTHER PERSON’S RESPONSE OR ADD A COMMENT TO OTHERS’ RESPONSE



# Discussion: Instructional Goals



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- Education at scale
- Structured online learning
- Free education and resources to anyone anywhere across the world
- Addressing learner needs with different backgrounds and learning styles
- Learners connect from remote areas to leading experts in the field
- Self-learning for students for personal development
- Resources to teachers and other professionals with latest research findings, updates and applications in the field
- Catering to diverse skill sets not accounted by standard educational curriculum
- Promoting social networking and peer learning

# Adoption of MOOCs

## Existing Challenges

## Proposed Solution



# Instructional Goals at K-12

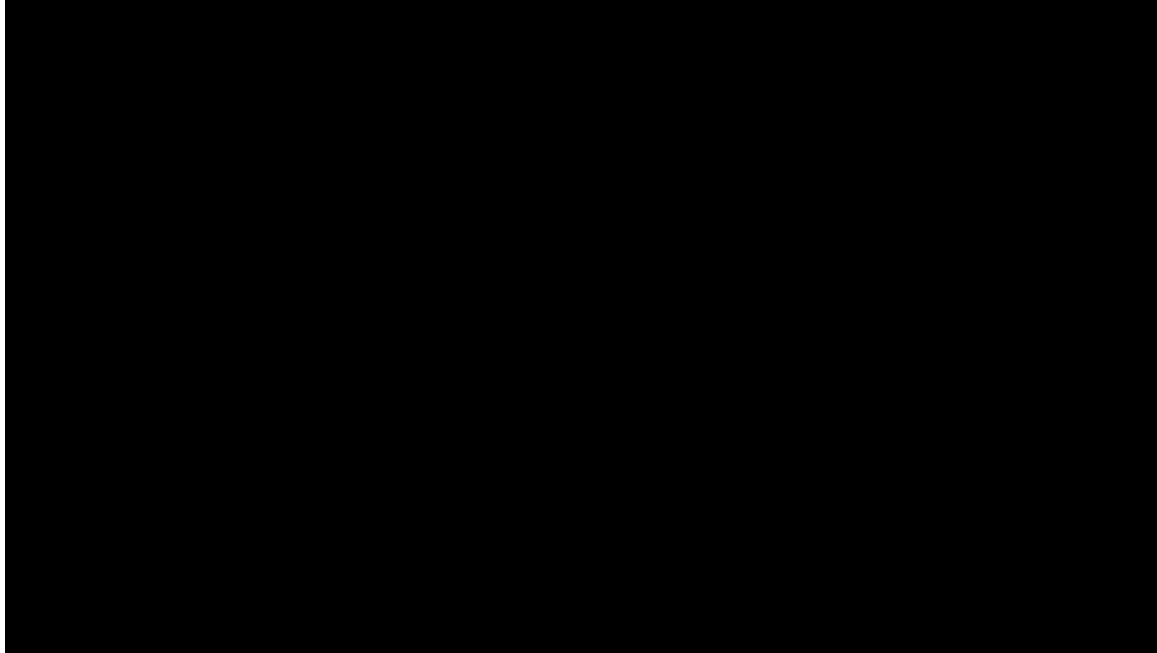
- Education at scale
- ✓ Structured online learning
- ✓ Free education and resources to anyone anywhere across the world
- ✓ Addressing learner needs with different backgrounds and learning styles
- Learners connect from remote areas to leading experts in the field
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- ✓ Catering to diverse skill sets not accounted by standard educational curriculum
- ✓ Promoting social networking and peer learning



# K-12 Interaction with MOOCs



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**Dr. Scott Garrigan**, Professor Emeritus of Teaching, Learning & Technology at Lehigh University College of Education

<https://www.youtube.com/watch?v=XG7pf5wePCs>

# Think



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In response to Dr. Scott Garrigan question “*Can MOOC have a relationship with K12 students*”, think of one teaching-learning strategy by which MOOC can be integrated in classroom teaching?

# Pair



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In response to Dr. Scott Garrigan question “*Can MOOC have a relationship with K12 students*”, think of one teaching-learning strategy by which MOOC can be integrated in classroom teaching?

# Share

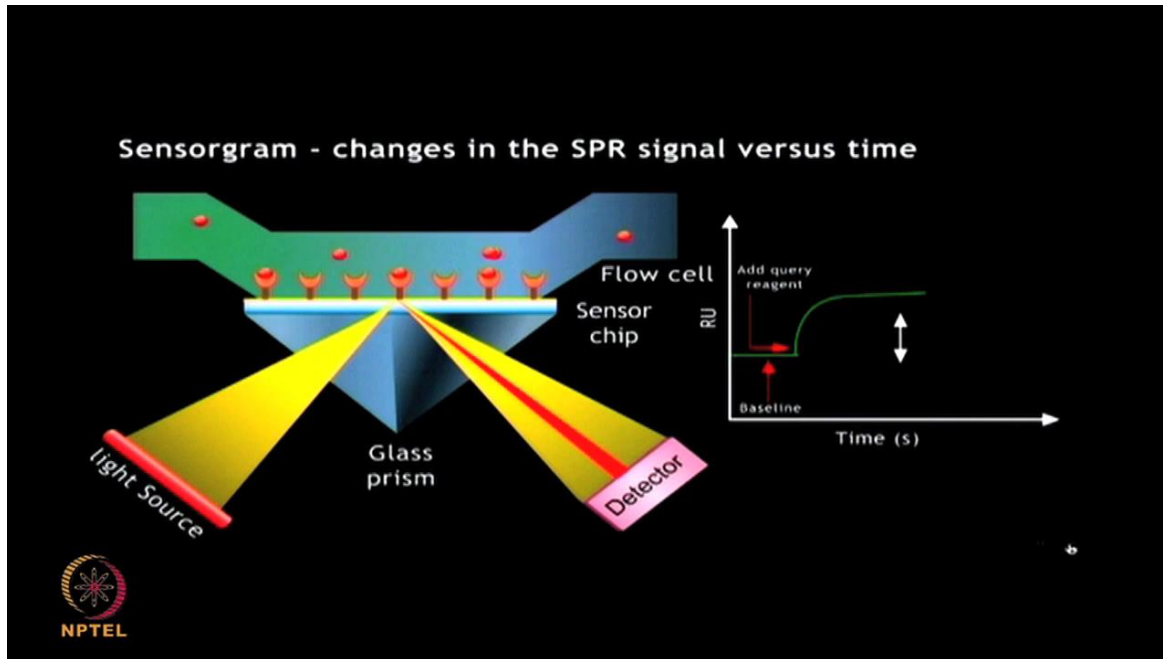


IIT BOMBAY

In response to Dr. Scott Garrigan question “*Can MOOC have a relationship with K12 students*”, think of one teaching-learning strategy by which MOOC can be integrated in classroom teaching?

# Teaching-learning Strategies with MOOCs

## A. As a resource for abstract concepts in classroom



- Show part of visualization
- Pause the visualization
- Perform an activity
- Resume visualization, and show the rest
- Discuss

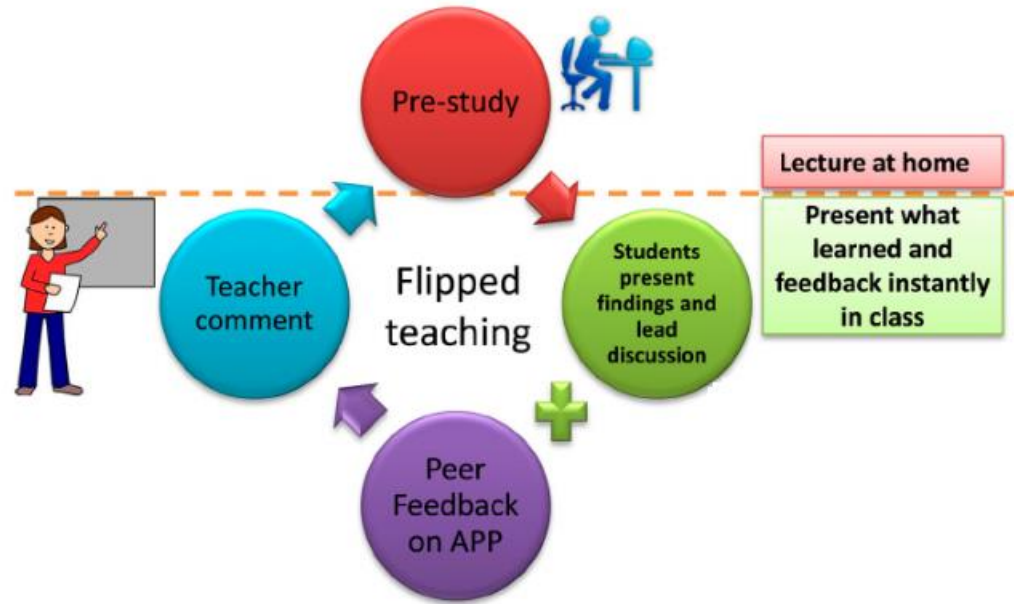
Observe, Explain, Discuss

## B. Assigning collaborative projects



# Teaching-learning Strategies with MOOCs

## C. Use as a flipped classroom approach



Hsu, Ting. (2017). Interactive Learning Environments. 26. 1-15. 10.1080/10494820.2017.1283332.

# Teaching-learning Strategies with MOOCs

## C. Use as a flipped classroom approach

### Flipping the Classroom to Improve Learning with MOOCs Technology

Article (PDF Available) in [Computer Applications in Engineering Education](#) · November 2016 with 364 Reads

DOI: 10.1002/cae.21774

[↓ Cite this publication](#)



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# Teaching-learning Strategies with MOOCs



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## D. Use discussion forums to promote stimulated discussions in class

[Discussion forum for Designing learner-centric e-learning](#) ›

Concern about developing effective learner centric e-learning content creation

LxI for Week 1



**Dr. Arpan Laskar**

7 Aug



The approach of e-learning content creation is very good. My concern is that, up to what extent we can rely on this e-learning approach over traditional lecture. If we fail to create learner engagement towards the course it may not work to develop knowledge among them and may become one of the source of information like any other source in internet.  
Thank you.



**Yashika Kapoor**

12 Aug



I agree with you. Creating engaging content is very important to ensure fulfillment of learner goals as well.

On Wednesday, August 7, 2019 at 11:02:01 PM UTC+5:30, Dr. Arpan Laskar wrote:

The approach of e-learning content creation is very good. My concern is that, up to what extent we can rely on this e-learning approach over traditional lecture. If we fail to create learner engagement towards the course it may not work to develop knowledge among them and may become one of the source of information like any other source in internet.  
Thank you

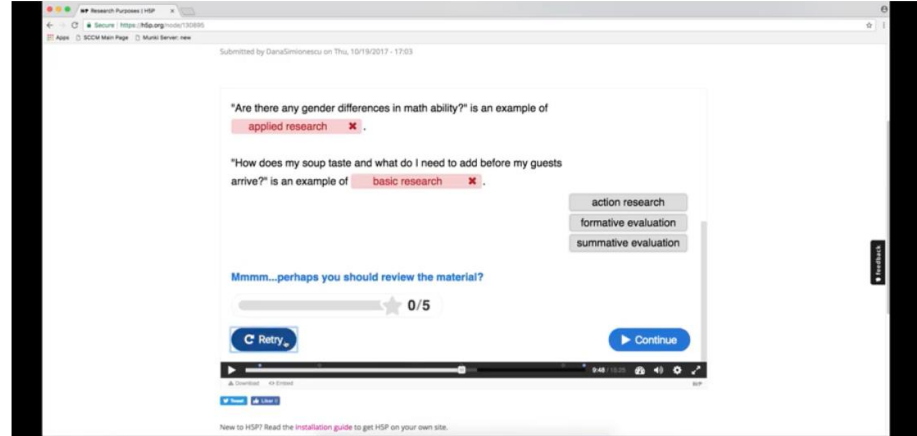
## E. Additional learning resources to diverse learners

### Digital Bloom's Taxonomy

Digital tools are useful for students in and outside classrooms in facilitating content creation. In the revised Bloom's Taxonomy, Andrew Churches in 2008 developed Bloom's Digital Taxonomy in a digital environment.

For deeper understanding on Bloom's digital taxonomy, we have provided two resources:

- **Video link:** The link provided below is a lecture on Bloom's Digital Taxonomy, as a part of the workshop on Digital Taxonomy, organized by IIT Bombay. Dr. Jayakrishnan M is addressing to all the workshop participants connected from all over the world.
- **PDF:** Another relevant resource is the document on Bloom's Digital Taxonomy developed by Andrew Churches. This document can be downloaded from this link. This document has been licensed under CC BY-NC-SA.



The screenshot shows a video player interface. The video content displays a quiz question: "Are there any gender differences in math ability?" is an example of **applied research**. Below it, another question asks: "How does my soup taste and what do I need to add before my guests arrive?" is an example of **basic research**. On the right side of the video, there are three buttons: "action research", "formative evaluation", and "summative evaluation". At the bottom of the video frame, there is a "Retry" button and a "Continue" button. The video player has a progress bar at the bottom showing 0/5 stars and a timestamp of 0:48. Below the video player, the URL <https://youtu.be/SR6tVWSIXU4> is visible. At the very bottom of the slide, there is a navigation bar with the text "How to create interactive video?" and a page indicator "6 / 7".



## Twelve tips for integrating massive open online course content into classroom teaching

Peter G. M. de Jong  , James D. Pickering , Renée A. Hendriks , Bronwen J. Swinnerton , Fereshte Goshtasbpour  & Marlies E. J. Reinders 

Published online: 12 Mar 2019

- Clearly define what content you want to include in your course
- Determine the availability of the specific MOOC and its contents
- Gauge the credibility of the MOOC before deciding to integrate
- Ensure the MOOC content is freely available to your students
- Determine the way you like to use the online materials
- Provide clear instructions to students on how to utilize the MOOC and its resources
- Make sure you align the goals, the teaching activities, and the assessments
- Determine the success of MOOC integration

# Activity



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The average completion rate of MOOCs is \_\_\_\_\_

# Vote



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The average completion rate of MOOCs is 10-12%. Why do you think it is so?

- A. Lack of learner motivation to complete the course
- B. Learners do not feel engaged since they are not able to express themselves
- C. Learners miss the physical presence of the teacher
- D. Learners get a feeling of isolation while taking a MOOC

- 1. A, B, C
- 2. B, C, D
- 3. B, C
- 4. A, B, C, D

# MOOC Challenges. Evidences from Research



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*Source: MOOC on Designing Learner-centric MOOC*



# Funnel of Participation

- Low learner engagement
- Low learner connect
- Feeling of isolation
- Poor assessment strategies
- Lack of feedback
- Scattered discussions with peers on forum

## Pedagogical Design Challenges



Established theories of *How People Learn* have not been considered in the pedagogical design

# Addressing Pedagogical Design Challenges



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## Learner-centric MOOC using the principles of

- ✓ Active learning
- ✓ Formative assessment
- ✓ Customized response & feedback
- ✓ Peer-learning
- ✓ Learner diversity



# Learner-centric MOOC (LCM) model



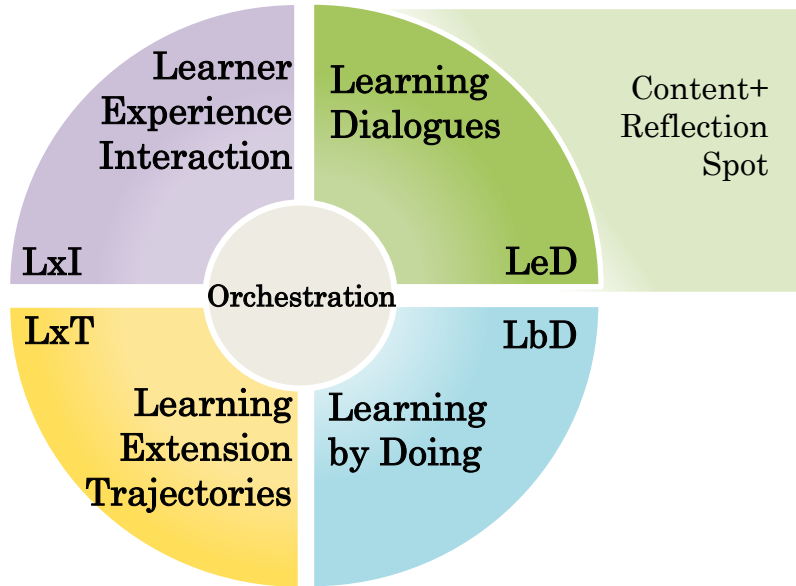
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## TRADITIONAL MOOC

Videos: Poor engagement with long videos. Lack of active participation

## LCM MOOC

LeDs : Short interactive videos with in-video activities



LCM MOOC Model



# Learner-centric MOOC (LCM) model

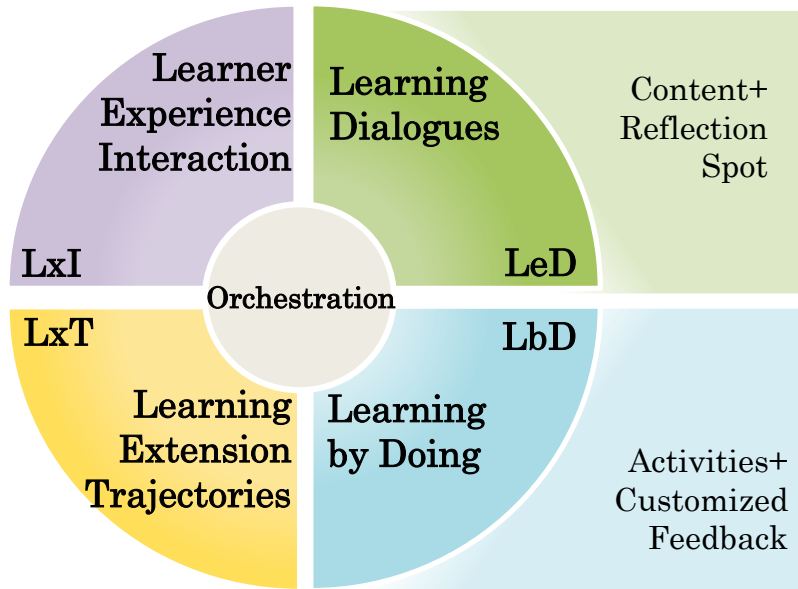
## TRADITIONAL MOOC

Activities: Lack of formative assessment. Poor feedback mechanism

## LCM MOOC

**LeDs** : Short interactive videos with in-video activities

**LbDs**: Formative assessment activities for micro-practice after each concept with constructive/customized feedback



LCM MOOC Model



# Learner-centric MOOC (LCM) model

## TRADITIONAL MOOC

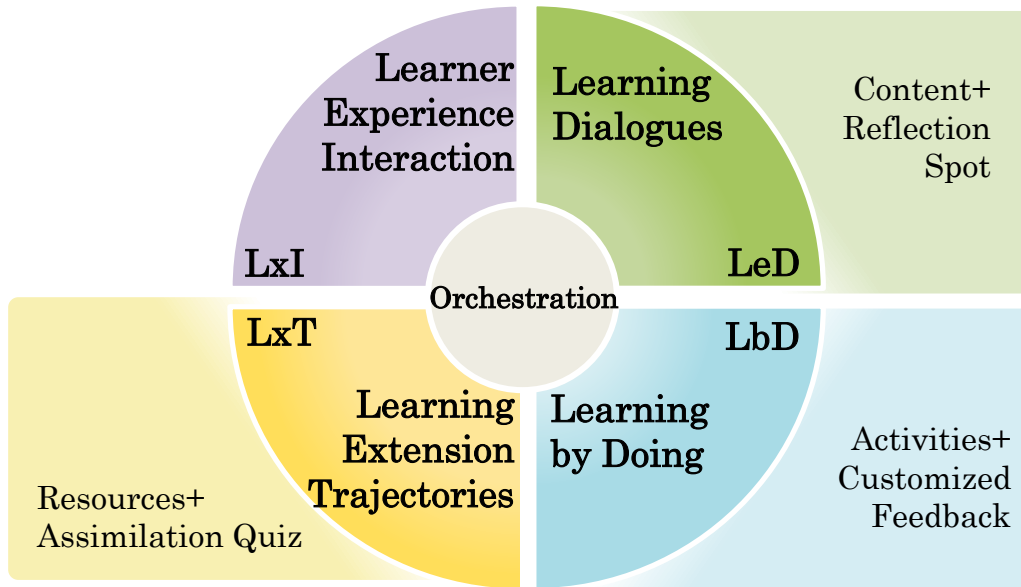
Additional Resources: Did not cater to diverse learners.  
No motivation to learn from these resources

## LCM MOOC

LeDs : Short interactive videos with in-video activities

LbDs: Formative assessment activities for micro-practice after each concept with constructive/customized feedback

LxTs: Varied learning resources to address diversity followed by a graded quiz



LCM MOOC Model

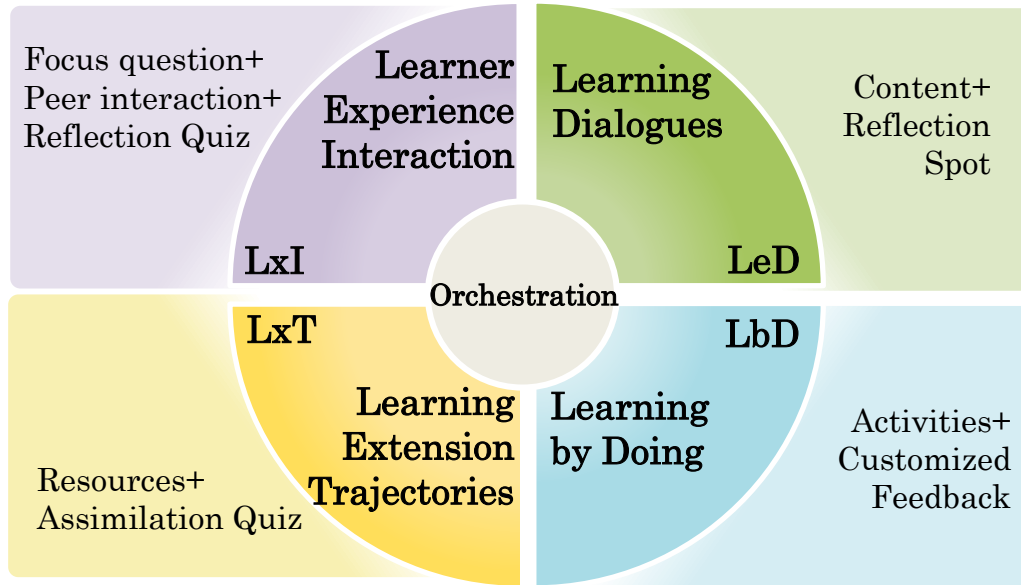
# Learner-centric MOOC (LCM) model



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## TRADITIONAL MOOC

**Peer Interaction:** Poor participation. Non-focused discussions leading to disengagement



LCM MOOC Model

## LCM MOOC

**LeDs :** Short interactive videos with in-video activities


**LbDs:** Formative assessment activities for micro-practice after each concept with constructive/customized feedback

**LxTs:** Varied learning resources to address diversity followed by a graded quiz

**LxIs:** Explicit activities with focus questions to foster peer-learning followed by a graded quiz


# ET MOOCs: Catering to Diverse Skill Sets

Effective Design of MOOCs (IIT BombayX + NPTEL)  
Learner-centric Design of E-content (NPTEL)



**ET701x**  
Elements of Learner-Centric MOOCs

Archived  
Starts : May 03, 2018



**Designing Learner-Centric MOOCs**  
Prof. Sridhar Iyer, Prof. Sahana Murthy, Dr. Jayakrishnan...

IIT Bombay



**NPTEL**  
4 Weeks (Starts: 29-07-2019)  
Exam Date: 29 Sept, 2019

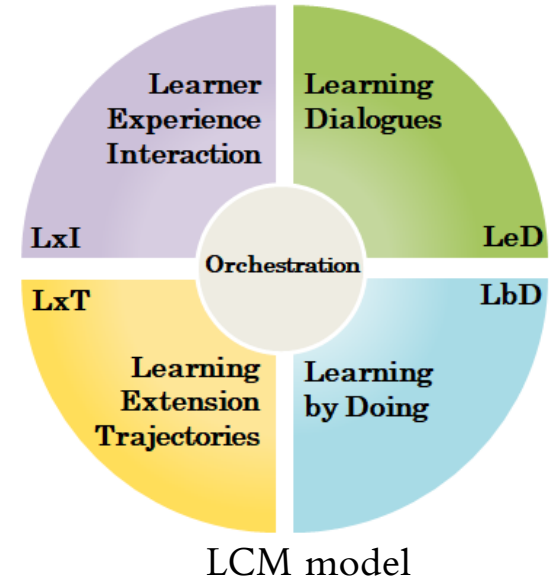


**Designing learner-centric e-learning in STEM...**  
Prof. Sahana Murthy

IIT Bombay



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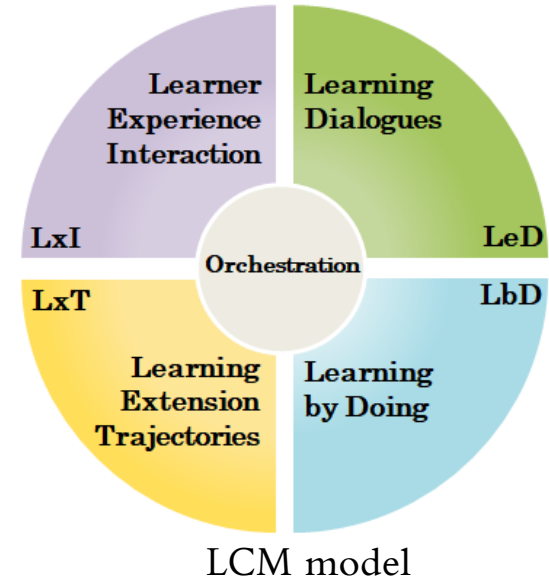


Providers: IIT BombayX & NPTEL

# ET MOOCs: Catering to Diverse Skill Sets

Effective use of ICT in classroom (IIT BombayX)  
Effective classroom teaching strategies (IIT BombayX)

 <p><b>ET611Tx</b> Pedagogy for effective use of ICT for school teachers</p> <p>Archived Starts : Jul 12, 2018</p> 	 <p><b>ET601Tx</b> Educational Technology for Engineering Teachers</p> <p>Archived Starts : Jan 05, 2016</p> 	 <p><b>ET621Tx</b> Effective teaching-learning of CS in Schools</p> <p>Archived Starts : Sep 06, 2018</p> 
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Providers: IIT BombayX & NPTEL



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# Thank you

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[www.et.iitb.ac.in](http://www.et.iitb.ac.in)