Massive Open Online Courses (MOOCs)

Both HarvardX and MITx have ~ 1M registrants each.

Roughly 50K unique resource identifiers (needs to be updated)

None of this possible without the dedication of course teams.
Insights: Interactive Visualizations

HarvardX Insights is a collection of interactive visualizations of data on all HarvardX offerings which dynamically update at frequent, regular intervals.

For questions or feedback, please contact
Sergiy Nesterko sergiy_nesterko@harvard.edu (HarvardX Research Fellow).

1. World map of enrollment

MITx Insights:  http://odl.mit.edu/insights/

HarvardX Insights:  http://harvardx.harvard.edu/harvardx-insights
Course Reports / Working Papers

MITx Working Papers
#’s 2 through 12

3.091x Introduction to Solid-State Chemistry – Fall 2012 MITx Course Report
(MITx Working Paper #2)
6.00x Introduction to Computer Science and Programming – Fall 2012 MITx Course Report
(MITx Working Paper #3)
6.002x: Circuits and Electronics – Fall 2012 MITx Course Report
(MITx Working Paper #4)
2.01x Elements of Structures – Spring 2013 MITx Course Report
(MITx Working Paper #5)
3.091x Introduction to Solid-State Chemistry – Spring 2013 MITx course report
(MITx Working Paper #6)
6.00x Introduction to Computer Science and Programming – Spring 2013 MITx Course Report
(MITx Working Paper #7)
6.002x: Circuits and Electronics – Spring 2013 MITx Course Report
(MITx Working Paper #8)
7.00x Introduction to Biology: The Secret of Life – Spring 2013 MITx Course Report
(MITx Working Paper #9)
8.02x Electricity and Magnetism – Spring 2013 MITx Course Report
(MITx Working Paper #10)
14.73x: The Challenges of Global Poverty - Spring 2013 MITx Course Report
(MITx Working Paper #11)
8.MReV: Mechanics ReView – Summer 2013 MITx Course Report
(MITx Working Paper #12)

HarvardX Working Papers
#’s 2 through 6

- HarvardX Working Papers
  1. HarvardX and MITx: The First Year of Open Online Courses
  2. PH207x: Health in Numbers and PH278x: Human Health and Global Environmental Change
  3. CB22x: HeroesX
  4. ER22x: JusticeX
  5. HLS1X: CopyrightX

http://odl.mit.edu/mitx-working-papers/
HarvardX and MITx: The First Year of Open Online Courses
Fall 2012-Summer 2013

Cross-Course Synthesis

- HarvardX and MITx Working Paper #1
- Collaboration between HarvardX Research Committee and the Office of Digital Learning at MIT
- Research findings challenge common misconceptions, offer surprising insights about how students engage with MOOCs

Key Takeaways:

1. Courses are very different.
2. Registrant diversity is immense compared to residential.
3. Equal diversity in terms of participation.

Outline

• Introduction

• Key points from MITx and HarvardX course reports
  - Variation in Courses.
  - Registrant Diversity.
  - All MOOC registrants should “not” be labeled as traditional students

• Participant Behavior

• Do demographics impact behavior?
positive charge, \( q \), and it has a velocity, \( v \), in this direction, and the magnetic field would be uniform and coming out of the blackboard, there's going to be a force on this charge, according to this relationship, and the force is then like so, perpendicular to \( v \), perpendicular to \( B \). In this case, the charged particle is going to go around in a circle. The Lorentz force cannot change the speed, cannot change the kinetic energy because the force is always perpendicular to the velocity, but it can change the direction of the velocity.
positive charge, +q, and it has a velocity, v, in this direction, and the magnetic field would be uniform and coming out of the blackboard, there's going to be a force on this charge, according to this relationship, and the force is then like so, perpendicular to v, perpendicular to B. In this case, the charged particle is going to go around in a circle. The Lorentz force cannot change the speed, cannot change the kinetic energy because the force is always perpendicular to the velocity, but it can change the direction of the velocity.
Participant Behavior

6.00x

Certified

Viewed

Explored

Chapters Viewed
Nearly all possible use cases in MITx and HarvardX

Only Registered 292,852

Certified 43,196

Viewed 469,702

Explored 35,937
Global Reach

- All registrants from MITx and HarvardX
- Over 70% of registrants are international
- 20 thousand participants from countries on UN’s Least Developed Country List
Diverse Backgrounds

- Typical student has a college degree
- **Note**, Small percentages are not small numbers
  - Less than Secondary: 4% ~ 31K
Level of Education

8.02x Case Study

- Enrolled: 43758
- Active: 7285
- Midterm 1: 3479
- Midterm 2: 2370
- Midterm 3: 2068
- Final: 1878

Participation and Performance in 8.02x: the first physics MOOC from edX
Rayyan, Seaton, Belcher, Pritchard, Chuang (In Press - Physics Ed. Research Conference)
How will diverse educational backgrounds impact courses?
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• Do demographics predict behavior?
Participant Behavior in Inaugural 6.002x: Total-Time Spent

Alternative Title: What can clickstream data do for you?

Studying Learning in the Worldwide Classroom: Research into edX’s First MOOC
Breslow, Pritchard, DeBoer, Stump, Ho, Seaton (Research & Practice in Assessment - 2013)

Who does what in a Massive Open Online Course?
Seaton, Bergner, Mitros, Chuang, Pritchard (To Appear April 2014 - CACM)
Participant Behavior in Inaugural 6.002x: Total-Time Spent

(A) Number of participants spending log(t) time

(B) 60%

(C) Total time (hrs) / N (group)

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Transitions between course components

...during problem solving sessions

(A) Homework

- Discussion
- Lab
- Lecture Video
- Lecture Problem
- Book
- Tutorial
- Wiki

(B) Midterm Exam

- Homework
- Discussion
- Lab
- Book
- Lecture Video
- Lecture Problem
- Wiki
- Tutorial

(C) Final Exam

- Homework
- Lab
- Discussion
- Lecture Video
- Book
- Lecture Problem
- Wiki
- Tutorial

Nodes are resources (size ~ time spent)

Edges are transitions (size ~ weight)
Resource Consumption

%N - Certificate earners accessing > %R - Resources

%R - Percentage of Resources Accessed

%N - Certificate earners

%N Certificate earners

%R Resources

Lecture Video

Homework

Lab

Book

Lecture Question

%R Resources

Lecture Video

Lecture Question

HHMI Ed. Group: March 2014
dseaton@mit.edu
Why complicate histograms?

Raw

CCDF

Beta Dist.

a=0.5, b=0.5
-- a=3.0, b=0.5
-- a=4.0, b=1.5
- - a=0.3, b=3.0
- - a=4.0, b=4.0

Fraction Video Accesses - V

Fraction Video Accesses - V

b

a

Low

Unimodal

Bimodal

High

HHMI Ed. Group: March 2014
Lecture video use in MITx MOOCs

• 6.002x distinctly bimodal
  - Does pattern persist in re-runs?

Characterizing video use in the catalogue of MITx MOOCs
Seaton, Nesterko, Reich, Mullaney, Ho, Chuang (Accepted - 2014 European MOOC Summit)
Lecture video use in MITx MOOCs

- 6.002x distinctly bimodal
  - Does pattern persist in re-runs?
  - Does pattern exist in other courses?
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• Participant Behavior

• Do demographics impact behavior?
Do demographics explain this behavior?

- Is it a question of access?
  - Country code as a proxy for access.
Do demographics predict this behavior?

- Are all courses impacted?
  - US and IN only
What might correlate with this behavior?

- Natural step to analyze course structure.
- As well as “in-video” interactions (content itself).

_Understanding in Video Dropouts and Interaction Peaks in Online Videos_
Kim, Guo, Seaton, Mitros, Gajos, Miller
_Proceeding of the Learning @ Scale Conference_
Conclusions and future/current efforts

• Much progress in analyzing MITx and HarvardX data sets.
• Hope I imparted the scale and diversity of these courses, and the need to account for diversity in measuring behavior.
• Will expand these analyses in the upcoming year.
• Thank you for your time!


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