Curated Courses in Mathematics

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Curated Courses

Abstract: Curated Courses in Mathematics is a project to create, gather, curate, tag, review, organize and make available high quality online open educational mathematics resources. The project aims to coordinate work being done at multiple institutions on similar courses, enabling faculty to share resources they create or curate from other sources. By creating a system for curating and tagging resources our hope is that faculty can more easily find high quality materials to utilize in their classes and more broadly disseminate good resources they create.

We will describe the project itself, describe resources we have created for faculty about how to design and produce online mathematics content, describe our tagging system for content submitted to our site as well as present our future goals for the project.

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Introduction to the CuratedCourses Project

Curated Courses in Mathematics (**C**)

Project to:

- *Create* and
- *Curate* (gather, tag, organize, review, make available)

high quality online open educational mathematics resources.

Motivation?

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Active Learning

- Rather than passively listening to information being transmitted: students learn through activities and/or discussions.

- Large body of scientific evidence asserts:
  - Retention improves significantly if learning is active.
  - Active learning leads to significantly lower failure rates in STEM classes.

Sample Activities

- Small group discussion
- Peer instruction
- Clickers
- Problem-based learning
- Group tests
- Concept mapping
- ...
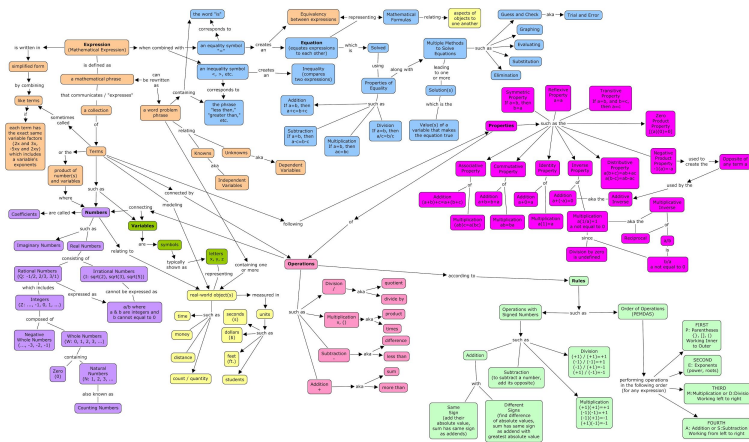
Difficulty

- Creating educational mathematics resources is time-consuming.
  - Videos
  - Online quizzes
  - In-class activities
  - Simulations
  - …
- Additional time has to be spent to decide on
  - best tools
  - best practices
- Sharing such resources is currently not the norm.
- Many great resources are "stuck" in LMS's or other password-protected sites.

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Solution: CuratedCourses in Mathematics!

- Current focus: Linear Algebra

- Types of resources we curate:
    - Video
    - Worksheets
    - Quizzes
    - Lesson plans
    - Clicker questions
    - Etc.

- Website: https://curatedcourses.org/

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CuratedCourses Website

Demonstration

Supplementary material in the margin

(demonstrate how a resource shows up in
the margin of a textbook automatically)
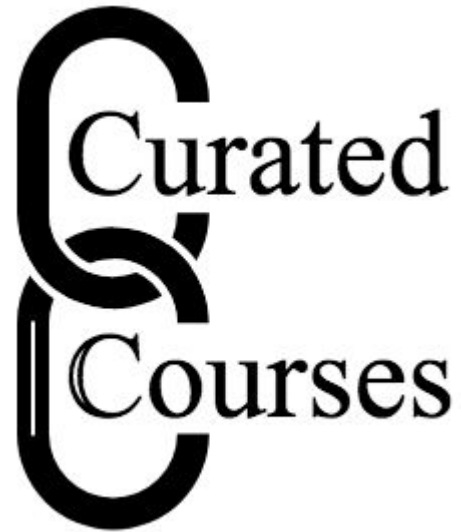
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Resources for Creating and Using Content

Activity: *What challenges do you see in creating online mathematics content?*

Resources: How to Design and Produce Content *(for students to view outside class)*

Guidelines and details for:

- Audio/video recording
- Screencasting
- Green screening
- Lightboard videos
- Accessibility *(coming soon!)*

Making Videos
Some tutorials suggesting various techniques for making high-quality educational videos

If you can not find an already existing resource, then it may be time to make your own. But how to get started? Below are some tutorials outlining various techniques for creating videos.

Green Screen
Shaunt Kouyoumdjian
Media Services Manager at the University of California, Irvine

Paper and Pen
Jim Fowler
Assistant Professor at The Ohio State University

Microsoft Surface Tablet
Joy Zhou
Assistant Professor at Lafayette College

Voiceover Beamer
Petra Bonfert-Taylor
Professor and Instructional Designer at Dartmouth College

Lightboard
Tom Roby
Associate Professor at the University of Connecticut

Recording Audio
- Use a good quality microphone.
  - CuratedCourses workshop used CAD Audio U3...
- Use a p-filter/pop screen.
  - CuratedCourses workshop used CAD EPF15A
- Get a good pair of headphone to be able to listen...
  - CuratedCourses workshop used Sennheiser...
- Try to stay away from background noises.
  - This may include but is not limited to:
    - air conditioner/fridge/etc. kicking on
    - dog barking
    - shared office space
    - etc.
  - If you do have background noise, a cor...
- Drink lots of water.
- Make sure you've selected the microphon...
- Record a small test recording (in your normal recording vo...
- If you make a mistake, stop talking for a bit, back up to the beginning of... out your mista...
  - Note: the break you take from talking will help you to be able to cut out your mista... pillows, blankets, and other soft materials around you ...
- If you are finding the recording sounds echo-y, pillows, blankets, and other soft materials around you ...
- Audacity is a good free tool for editing audio.

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Resources: Making Videos with Paper and Pen

Jim Fowler
The Ohio State University

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Resources: Making Screencasts I

Petra Bonfert-Taylor
Dartmouth College

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Resources: Making Screencasts II

Joy Zhou
Lafayette College

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Resources: Making Lightboard Videos

Tom Roby
University of Connecticut

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Resources: Green Screening
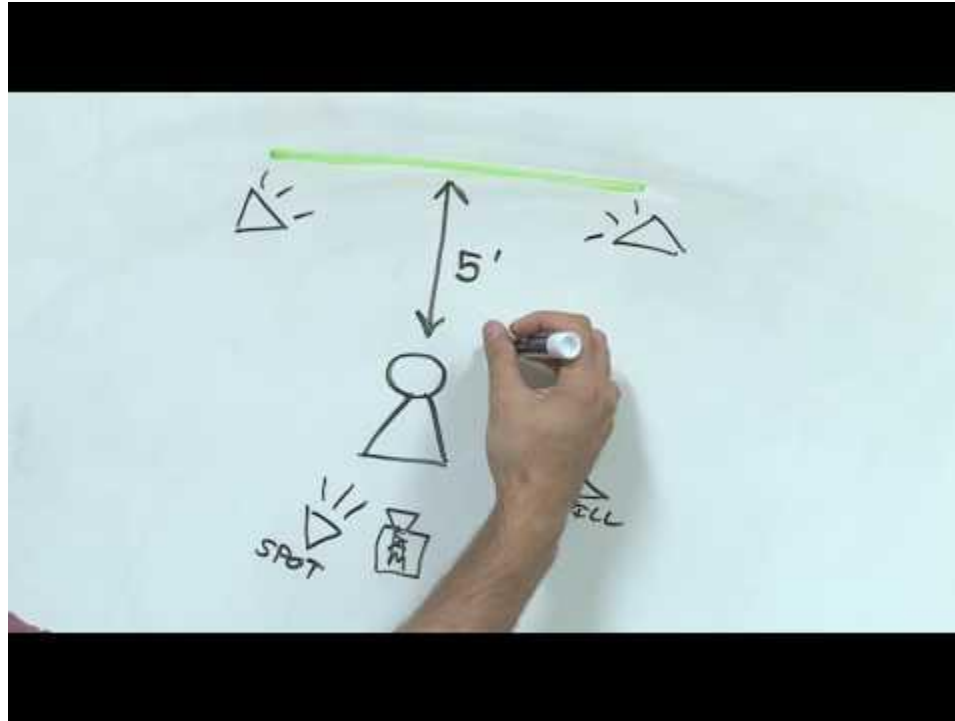
Shaunt Kouyoumdjian
University of California, Irvine

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Resources: How to Utilize Open Educational Resources (OERs) to Support Evidence-Based Instructional Practices

JMM 2018 Minicourse:

"Flipping your Mathematics Course using

Open Educational Resources"
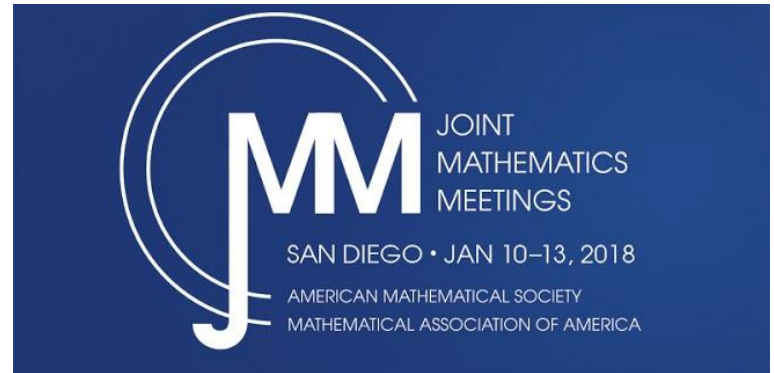
*Minicourse presentation slides and handouts to be available on Curated Courses website

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The CuratedCourses Tagging System

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Future Goals

CuratedCourses beyond linear algebra (and mathematics)

There are already repositories outside of mathematics,
    such as [MERLOT](#) and [Currwiki](#) and Unizin's [Course Development Suite](#).

Often these systems only digest coarse-grained content, i.e.,
    content tagged as "linear algebra"
    instead of say the more specific "Linear systems have zero, one, or infinitely many solutions."

For math courses besides linear algebra,
    a challenge is the design of the tags.

    For instance, is there a useful collections of "calculus tags" available?
    That calculus courses are mostly built from examples is a barrier to creating "concept tags"
        (but consider the approach of [SIMIODE](#)).

Resources which aren't presented as "source" is another challenge,
    and a challenge we're already experiencing with video.

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"As We May ~~Think~~ Teach"
A vision of the future of online education resources

The most personalized part of the internet is... online shopping (!)

There are structures in the e-commerce ecosystem that can be transported to online education,
    but haven't yet been brought over.

"Advertising" is key to discovering new content.
    Advertisers have already realized the goals of "adaptive learning."
    For CuratedCourses, "advertising" means related content we add to the margin.
    We provide JavaScript that can be used on any page to highlight related resources.

"Analytics" is key to iterating on design.
    Google Analytics tracks conversions for sales.
    Imagine a similar product for education which would
        track learners across multiple platforms and
        record learning events for later analysis.

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Academic Credit

How can we incentivize the creation of high-quality materials?
    If CuratedCourses were a "journal"
        then curation might be akin to refereeing,
    and "published resources" may receive academic credit.

A similar shift is arguably happening in research: projects like
    Harvard's Dataverse and
    the R Journal
are examples where data and code receive citations (cf. Elsevier's list).

Data repositories face many of the same challenges as education object repositories:
- Managing metadata
- Archiving content in formats that useful in the long-term
- Making content accessible to researchers/learners
- Handling multiple versions of content
- Revealing the license and ownership clearly

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CuratedCourse's goal is to be glue, not a garden.

Business works on the internet because of "technologies" like EDI (Electronic data interchange)
  for presenting invoices, orders, shipping notices, etc.

Edtech mostly doesn't have good enough glue between different technologies,
  with perhaps LTI being the closest analogue to EDI,
    (and frankly LTI doesn't work that well.)
  Does your edtech tool expose a web-accessible API?

The vision for CuratedCourses is to relate resources between different (walled) gardens,
  which permits the sharing of content (advertising) and
  understanding what content is effective (analytics).

Manage metadata with parsimonious extensions to open formats like OpenGraph, Dublin Core.
Store content in source formats (just as the arXiv prefers TeX over PDF).
Make content accessible by providing content-addressible blob storage.
Handle multiple versions of content by training instructional staff and students to use version control.

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Questions?