The Electronic Seminar on Mathematics Education: Creating an online community of educators

Haynes Miller, MIT

Canadian Math Society Annual Meeting
Toronto, December 7, 2019
The problem:

Thoughts from spring 2017 (with Grace Lyo, Stanford):

There is a lot of ferment in mathematics education at the university level, but very few venues for letting the world know.

Many math departments have a number of regular disciplinary seminars, with invited speakers. We’re used to talking about what we’ve done in research. We belong to research communities.

Why not in education? The interest group is (presently!) too scattered.
The solution:

Create an online seminar, following the example of Dan Isaksen’s Electronic Computational Homotopy Theory Seminar.

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eCHT

The electronic Computational Homotopy Theory Seminar is an international research seminar on the topic of computational homotopy theory. Topics include any part of homotopy theory that has a computational flavor, including but not limited to stable homotopy theory, unstable homotopy theory, chromatic homotopy theory, equivariant homotopy theory, motivic homotopy theory, and K-theory.

The seminar meets on Thursdays at 11:30am in Detroit (Eastern Time). In the 2019-2020 academic year, the meeting link is [zoom.us/j/612660457](https://zoom.us/j/612660457).

In the 2019-2020 academic year, the organizers are Dan Isaksen (Wayne State University), J.D. Quigley (Cornell University), and Hana Kong (University of Chicago). Contact any of us for more information, or to be added to the seminar mailing list. Guchuan Li (Northwestern University) was an organizer in 2018-2019.

The [eCHT calendar](https://echt.caltech.edu/program/calendar) lists all scheduled talks. Some of the previous talks are available on the [eCHT Youtube channel](https://www.youtube.com/channel/UC6jZ86GhA28DZc9E2oA6T-A).
The result: http://math.mit.edu/seminars/esme

Electronic Seminar on Mathematics Education

This is an online seminar centered on mathematics education at the university level. Talks will cover curriculum, pedagogy, inclusiveness, professional development, blended and flipped classrooms, and other topics of interest.

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<tr>
<th>Upcoming Talks</th>
<th>Past Talks</th>
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Past Talks

Click on the title of a talk to show the abstract and references (you should see a next to the title if the talk has a folder).

FALL 2019

Nov 19 2019

Incorporating Service-Learning into Math Courses

Sara Billey, University of Washington

Nov 05 2019

Integrating Sustainability into the Mathematics Curriculum

Bree Ettinger, Emory University
The story so far

• Noon Eastern Time, every other Tuesday.

• Started September, 2017.

• 35 presentations so far, featuring 45 speakers from 36 institutions.

• Typical session might be moderated from England, with participants from California, Canada, and Lebanon or Netherlands. Between 15 and 40 logins.

• Often groups gather locally and participate together.

• Joined this fall by Tara Holm (Cornell), supported by TPSE Math.
A lasting resource: Here’s a typical page

Student-Centered Assessment of Mathematical Proficiency

Benjamin Braun, Univ of Kentucky

Presentation:
- Video
- Slides

Other Resources:
- MAA Assessment practices in undergraduate mathematics (1999)
- ASA Guidelines for assessment and instruction in statistics (2016)
- SIAM Guidelines for assessment and instruction in mathematical modeling (2016)
- MAA CUPM curriculum guide to majors in the mathematical sciences (2015)
- CBMS Mathematical education of teachers II (2012)
- NCTM Principles to actions (2014)

Substantial changes have occurred over the past decade in undergraduate mathematics education, with particular emphasis on the classroom practices used by instructors and faculty. These student-centered pedagogies should be complemented by the implementation of student-centered assessment practices. We will describe the characteristics of "student-centered assessment practices," and share basic frameworks and methods to guide faculty and instructors seeking to implement these.
Electronic Seminar on Mathematics Education

Student-Centered Assessment of Mathematical Proficiency

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Benjamin Braun
Univ of Kentucky

Noon ET, October 8, 2019

To join the seminar, go to  https://cornell.zoom.us/j/169462410

For more information on ESME:  http://math.mit.edu/seminars/esme/
The Topics: By subject

Calculus

David Bressoud, “A radical approach to calculus”

Angie Hodge, “Inquiry-based learning calculus”

Matt Boelkins, “Active Calculus”

Steve Bennoun and Tara Holm, “Active learning in calculus at Cornell”
Good questions

Which graph show the surface parametrized by

\[ G(u, v) = \left( \sqrt{1 + u^2} \cos(v), \sqrt{1 + u^2} \sin(v), u \right) \]

for \(-1 \leq u \leq 1\) and \(0 \leq u \leq 2\pi\) ?
Differential equations and linear algebra

Chris Rasmussen, “The Inquiry Oriented Differential Equations Project”

Philipp Hieronymi, “Redesigning a large linear algebra course - a travel report”

Jen French and Haynes Miller, “Mathematical manipulatives: the MIT Mathlets”
AMPLITUDE AND PHASE: SECOND ORDER II

\[ x'' + bx' + kx = b'y, \quad y = \cos(\omega t) \]

\[ P = \frac{2\pi}{\omega} = 3.14 \]

\[ t_0 = \left( \frac{\Phi}{2\pi} \right) P = \Phi/\omega = 0.39 \]
Probability, statistics, discrete math

Jon Bloom and Jerry Orloff, “Rolling the dice: flipping an introductory probability and statistics class”

Sanjoy Mahajan, “Teaching probability and statistics from a purely Bayesian point of view”

Sara Billey, “Incorporating service-learning into math courses”
Improving free tax service offered by United Way

Team: Melissa Stadt, Irena Chen, and Jessica Fay

How can we most efficiently serve low income and elderly people coming to the library for tax preparation service given a two phase system including an initial preparation and a quality review? Answer: Queueing Theory and Simulations!
The Topics: Active learning:

David Pengelley, “From lecture to active learning: Rewards for all, and is it really so difficult?”

Annalisa Crannell, “Inquiry and engagement in an interactive classroom”

Ralf Spatzier, “Inquiry based learning at Michigan”

Beth Burroughs, “MAA’s Instructional Practice Guide: Introduction to a new resource”

Alfonso Gracia-Saz, “Ask. Don’t tell.”
Warm up

Take 45 seconds to look over the following list of pairs of words, but do not write anything down.

<table>
<thead>
<tr>
<th>bread/butter</th>
<th>ocean/breeze</th>
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<tr>
<td>leaf/tree</td>
<td>music/lyrics</td>
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<td>sweet/sour</td>
<td>sh_e/sock</td>
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<td>fruit/vegetable</td>
<td>be_r/wine</td>
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<td>computer/chip</td>
<td>television/радио</td>
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<tr>
<td>l_nch/dinner</td>
<td>chair/couch</td>
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The topics: Inclusivity

Darryl Yong, “Active learning 2.0: Making it inclusive”

Ron Buckmire, “Who Does The Math?: Diversity and Demographics in the Mathematics Community”

Alissa Crans and Dave Kung, “Rising to the challenge of diversifying the mathematics community”
Use of the chat window

Challenging Scenario:

Scenario #1

Your calculus students work in groups of 3. Tori’s an outgoing – and very good – student, but one day she’s in a group with two guys. You notice that she isn’t as active as usual. After class, she tells you they kept interrupting her and ignoring her ideas – so she just worked by herself.

What do you do? (Type, Wait, Enter, Read)
The Topics: Programmatic reform

Robin Pemantle, “Active learning at Penn: 2013—2017”

Annoeskja Cabo, “Co-creating interactive online exercises”

Teena Gerhardt, “Transforming the gateway: Redesigning large introductory-level courses”
Student Impressions:

“[The class] really drove home the application problems and allowed us to work together to solve these detailed, yet conceptual problems, and helped build a solid foundation of knowledge as I move further on in my education.”
The Topics: Teacher Training

Emily Braley and Robin Gottlieb, “Supporting graduate students for successful teaching experiences”

Catherine Snyder, Peter Turner, Seema Rivera, “Educating the future professoriate: Summer institute for graduate teaching assistants”

Jack Bookman and Natasha Speer, “The college mathematics instructor development source: CoMlnDS”
Community-building: Modes of communication

The Webpage collects many relevant links.

The chat window offers many ways to communicate:
It allows

• … private discussions without disrupting the presentation,
• … participants to ask questions of the speaker,
• … or engage in public discussion.
Other modes:

- Polleverywhere (Matt Boelkins)
- Googledoc “think pair share” (Stan Yoshinobu)
- Text messages (Steve Bennoun and Tara Holm)
- After the seminar participants often continue the discussion
A facebook question:

“What are some ways to start off the semester with some real two-way communication that can lead to better learning and better teaching? I don't have great answers.”

Answer:

A Focus on Student Buy-In: Why It Matters and What To Do About It
MIT Electronic Seminar in Math Education

Stan Yoshinobu, Cal Poly SLO
Math Department, Director of AIBL
Want to start a departmental seminar on inclusive teaching?

A Mathematics Learning Community on Inclusive Teaching

P. Gavin LaRose

Department of Mathematics
University of Michigan
glarose@umich.edu

11 December, 2018
The seminar continues!

Please visit

http://math.mit.edu/seminars/esme

We look forward to seeing you in the spring!

I’ll be happy to add you to our mailing list.

… and we welcome your suggestions for topics or speakers

Thank you!