New Instructor Training at UMich: Promoting Engaged Learning

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Where we are, and where we are going.

The University of Michigan Math Department has had some sort of new instructor training for about 35 years.

...for about 25 years of those this may have been reasonably good. So we will try and see what there is to be said about it.

Outline

- History of our training,
- and the courses we teach,
- what our current training looks like,
- and some other things on which we are working.
a book and a room number.

UM math teaching, c.1980.

Context:

- **Pre-graduate student union:** the department has a lot of graduate students, some of whom finish, who teach.
- **Calculus class-sizes 30–40** (cap at about 30 for graduate students).
- **Prehistory ⇒ caricature.**
  - ... *some of it correct*
Early Training (c.1985)

“The most reviled course on campus.”

- Quality of instruction starts to be an issue.
- Training program started: for international students...
- and then expanded to support for all graduate students.
Reform (c. 1992)

The regents come calling.

- “The chair was called to speak with the regents”
  - (Some) faculty step up
- Reform: “some idiot gave Mort a graphing calculator.”
  - Reform is a slippery slope.
  - Adopted the Hughes-Hallett textbook.
  - And revised the pedagogy in the course.
A New Pedagogy

New Wave Calculus

- Class sizes of 24 (perhaps).
- Collaborative rooms
- Team Homework
- Student presentation
A New Training

 Heck—*this is hard.*

- Training extended by 2 days
  - So: 1 week + 2 days!
  - *This did not not continue.*
- Emphasis on *calculators, and logistics* . . . *and pedagogy?*
- This program then *evolved to the current training program.*
Michigan’s Introductory Program

91 sections of calculus?

Math courses we offer:

- Course before (“pre”) calculus, calculus I, calculus II.
- Number of students (this fall): “pre” calculus, 530; calculus I, 1600; calculus II, 770.
- . . . in sections of 18 (as of fall 2016). (Thus: 35 of “pre” calculus, 91 of calculus, 44 of calculus II.)
- very, very, very uniform.
Other Tracks

…but wait, there’s more

- Honors track
- Honors seminar
- Inquiry Based Learning center courses
13% of math postdocs in the US?

- Most **Introductory Program courses** are taught by
  - Graduate students
    (~120, teaching 1/1)
  - Post-docs
    (~70, teaching 1/1, 2/1, or 2/2)
  - Plus 7 lecturers
    (teaching 3/3).

- Implication: we have **50–65 new instructors each fall**.
And this is what we do

Introductory Program Courses

- Classrooms with tables seating four
- Mini-lectures only.
- 50%–70% group work in class.
- Group work on worksheets or problems, with
- Presentations by students.

- Support for instructors includes lesson plans, weekly meetings...
Training Philosophy

we think, therefore you teach this way

- This type of teaching works.
  - Laursen, Freeman, CBMS

- Though it isn’t easy
  - Bressoud: is poor use worse than non-use? (2016)
We’ll have your course assignment... on Thursday

- **Instructors** in our training program almost exclusively teach “pre” calculus and calculus I.
- This fall we trained \( \approx 55 \) new instructors (about half graduate students, about half post-docs).
- And is run by 6–10 faculty and graduate student coordinators.
- Training runs the week before classes (Labor day).
The Trainers

“Ask your coordinator.”

- Paul Kessenich, Angela Kubena, and Fernando Carreon
- ... and Hanna Bennet, Scott Schneider, and me
- ... and Stephen DeBacker, graduate student co-coordinators
<table>
<thead>
<tr>
<th>Time</th>
<th>Monday, August 29</th>
<th>Tuesday, August 30</th>
<th>Wednesday, August 31</th>
<th>Thursday, September 1</th>
<th>Friday, September 2</th>
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</thead>
<tbody>
<tr>
<td>9:00</td>
<td>All NEW graduate students</td>
<td>Video Lecturing (7 minutes each, Groups A-H)</td>
<td>Extended Individual Practice Lecturing (10 minutes each, graduate students only)</td>
<td>Running an Interactive Classroom (10 minutes each) MH</td>
<td>CRLT Presentation: 7 into 15 and Inclusivity in the Classroom CCL 1528</td>
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<tr>
<td>9:30</td>
<td>Math Dept Orientation (9:00 - noon)</td>
<td>Asking Questions (Groups AA-HH)</td>
<td>[Note: 9:30 start time]</td>
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<td>9:00</td>
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<td>10:00</td>
<td>Faculty Capsule Research Talks (20 minutes each, 9:00 - noon)</td>
<td>Video Lecturing (7 minutes each, Groups AA-HH)</td>
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<td>10:30</td>
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<td>Asking Questions (Groups A-H)</td>
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<td>11:00</td>
<td>Lunch provided (for all--EH Atrium)</td>
<td>Lunch (on own)</td>
<td>Hitting Questions (Umang, Salman, Bob) MH</td>
<td>Course Administrivia &amp; Course Meetings CCL 1528</td>
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<td>1:00</td>
<td>Faculty Introductions and Department Overview</td>
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<td>1:30</td>
<td>EH 1560</td>
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<td>2:00</td>
<td>Faculty Capsule Research Talks (20 minutes each, 2:00 - 3:00)</td>
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<td>4:00</td>
<td>GEO Meeting (grad students)</td>
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<td>4:30</td>
<td>LEO Meeting (lecturers)</td>
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<td>6:00</td>
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<td>Fon: All shaded sessions are required. [Updated 8/25/16]</td>
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[Note: Fake It 'til You Make It (grad students only)]
“Feign a medical emergency”

Goals

- Address immediate needs
  - Lecturing
  - “Problem students”
  - Teaching logistics
- And prepare (and convince) instructors to use active learning
  - Introduction
  - Groupwork Fractal
  - Day in the Life
  - Running an Interactive Classroom
Next year’s program would be perfect for this group

- **Changes** are largely incremental:
  - Michigan Math in Action
    This year: intro
    Before that: first day presentation
  - The Groupwork Fractal
    IBL Workshop
  - Most things...
  - Instructors as students
  - Running interactive... vs. homework problems

- **Move toward Increased focus on active learning** and the big problems in teaching.
After Training Week

*It never ends*

- Lesson plans
- Instructor meetings
- Class visits
- Midterm evaluation surveys

![Survey results for Math 115 Midterm Evaluation](image-url)

... ask your coordinator
Summary

Almost done

- This is a pretty big operation
  - With a pretty big footprint
- Most instructors buy in
  - Most are pretty good
- Some are outstanding

Assessment

And we think it works...
Outcomes

“Never mistake activity for achievement” – J. Wooden

Evidence that it works:

- “M” and the teaching seminar
- CCI Results
  - ... et. al
- David’s calculus project
- I’m here
Never too much of a good thing

- IBL Center and training
  - (not only) the shadow knows
  - sustainability and generalization
- “Fishbowl” course
  - Work with the School of Education
  - Target instructors: IBL instructors, more advanced introductory program instructors, graduate students teaching calculus III and differential equations labs
Questions?

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