A Mathematics Learning Community on Inclusive Teaching

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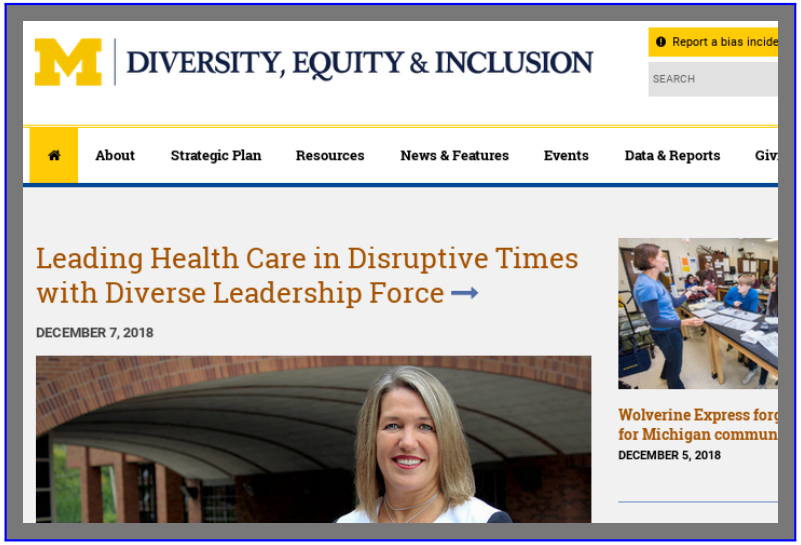
11 December, 2018

National Context

- In higher education as a whole there is increasing awareness of, and sensitivity to, issues of Diversity, Equity, and Inclusion.
- This is manifest in their increased visibility institutionally, and in national forums, as well as initiatives at different scales.

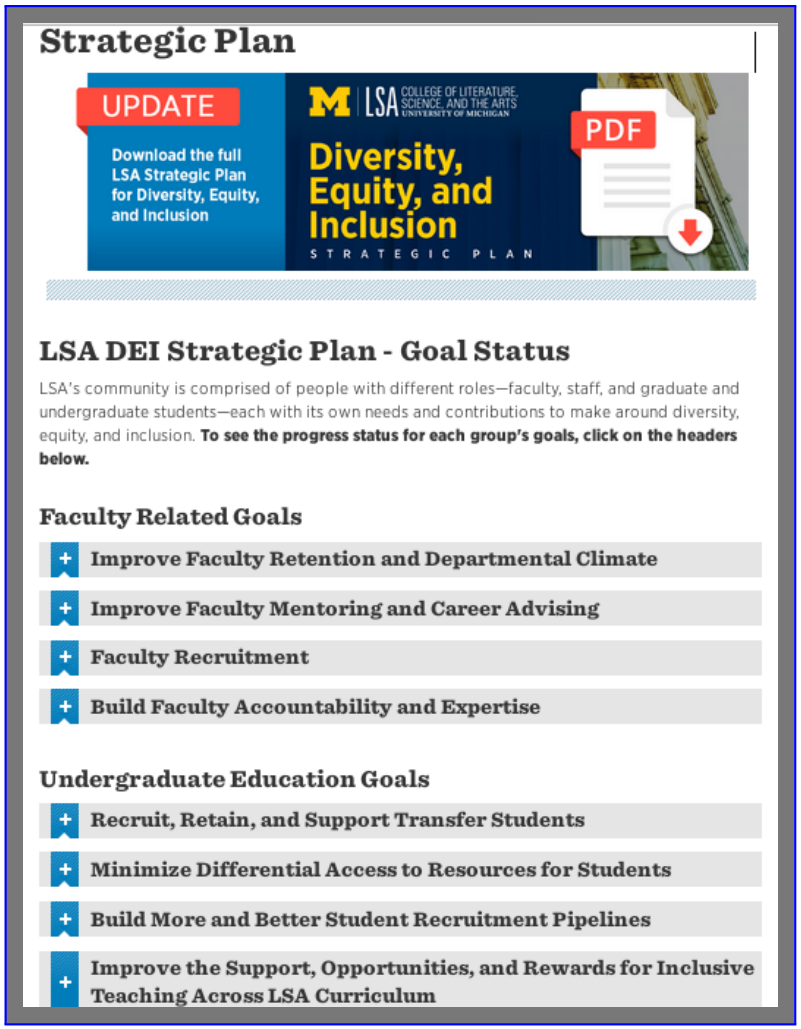


- It is therefore an opportune time to consider these issues, perhaps not least because work can be done at multiple levels, from personal to institutional.

. . . statements about trends in higher ed are rigorously supported by anecdotal evidence.

Institutional Context

- The University of Michigan is part of this national fabric. We have a *Campuswide Strategic Plan*
  1. Create an Inclusive and Equitable Campus Climate
  2. Recruit, Retain and Develop a Diverse Community
  3. Support Innovative and Inclusive Scholarship and Teaching
- . . . and *College initiatives*
- And (some) Institutional support.
  - FCIT Grants (up to $1000)
  - DEI Innovation Grants (up to $5000)



Departmental Context

- Our Department of Mathematics is fairly big
  - About 60–65 T/TT faculty, 65–75 postdocs, 15 lecturers, and 130 graduate students.
  - Teaching 250–370 undergraduate class sections/semester
  - With a highly structured Introductory Program (our course before calculus, calculus I, and calculus II).

- And has done some work on education and reform:
  - Calculus reform (1992–present)
  - IBL center (2004–present)
  - Seminar on Teaching Mathematics (2003–present)

A Learning Community on Inclusive Teaching

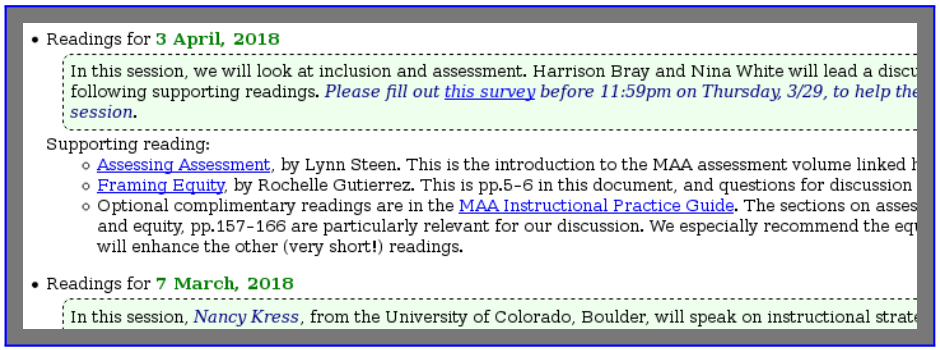
- A FCIT grant ($1000) from our CRLT; work with Nina White, to whom most of the credit should go.

  "... inclusive classroom practices can help address [attraction and retention of minorities]... We will create a community of instructors who will discuss these issues... [to attain] the knowledge and resources to better support [these students]... Our new group—Inclusive Teaching in Mathematics—will build on existing communities in the Department of Mathematics with deep interests in effective teaching... [meeting] through the winter semester to discuss readings and research, and will bring in outside speakers, to accomplish its goals."

- Premise: *Prerequisite to meaningful Departmental change are*
  - Exploration and background, and
  - Building a core of instructors with knowledge and appropriate skills.

LCIT: Structure and Set-Up

- Invitation to all faculty and graduate students in mathematics, and members of the School of Education.
- Four discussion sessions, one outside speaker, one concluding discussion. *. . . plus a number of follow-up and subsequent sessions*
- Discussion sessions met over lunch (provided by grant funding)
  - For each: specific readings, with discussion leaders.
  - Synopsis, questions, discussion.
  - *Partial model: IBL lunches in Department.*
- Supplemental funding from within the Department covering speaker travel



LCIT: Scheduling and Other Considerations

- *When to meet?*
  - Math Teaching Seminar (Mondays, 5:15–6:30pm), or
  - Overlap other seminars (Most days, 3pm–), or
  - Lunch (conflicting with teaching schedules).
- *Finding appropriate readings*
  - Rely on local experts.

LSA MATHEMATICS
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Weekly Seminar & Events Bulletin

December 9th, 2018 - December 15th, 2018

Monday, December 10, 2018	
12:00pm-12:50pm	**Mathematical Biology** -- Jeff Dunworth (University of Michigan) *Disruption of excitation/inhibition balance in cortical neuronal networks* -- 335 West Hall
3:00pm-4:00pm	**Student Dynamics** -- Yueqiao Wu (University of Michigan) *The Earthquake Flow* -- 1060 East Hall
3:00pm-5:30pm	**Special Events** -- Andrew Melfi (UM) *Dissertation Defense: Theoretical and Numerical Analyses of Deviations between Kingman's Coalescent and the Wright-Fisher Model* -- 2104 Modern Languages Building
4:00pm-5:00pm	**Complex Analysis, Dynamics and Geometry** -- Wenjuan Peng (UM visitor) *On the cycles of components of disconnected Julia sets* -- 3088 East Hall
4:00pm-5:20pm	**Group, Lie and Number Theory** -- Yuan Liu (Univ of Wisconsin) *A non-abelian version of Cohen-Lenstra heuristics* -- 4088 East Hall
4:00pm-5:00pm	**Student Combinatorics** -- Trevor Hyde (University of Michigan) *Categorifying Numbers* -- 3866 East Hall
4:00pm-6:00pm	**Geometry & Physics** -- Nathan Priddis (BYU) *BHK Mirror symmetry and variants* -- 4096 East Hall
Tuesday, December 11, 2018	
2:30pm-5:00pm	**Special Events** -- Robert Walker (UM) *Dissertation Defense: Uniform Symbolic Topologies in Non-Regular Rings* -- 3205 Modern Languages Building
3:00pm-4:00pm	**Student Geometry/Topology** -- Daniel Stoll (University of Michigan) *Triangulating Rotations (and Rotating Triangulations)* -- 1866 East Hall
Wednesday, December 12, 2018	
3:00pm-4:00pm	**Financial/Actuarial Mathematics** -- Gaoyue Guo (UM) *Robust hedging with local time and Skorokhod embedding* -- 1360 East Hall
Thursday, December 13, 2018	
1:00pm-2:30pm	**Student Homotopy Theory** -- Montek Gill (University of Michigan) *Introduction to the Goodwillie calculus* -- 1360 East Hall
5:00pm-5:30pm	**Special Events** -- Jingchuan Xiao (UM) *Math 631 Student Presentations: Elliptic Curves* -- 4088 East Hall
5:30pm-6:00pm	**Special Events** -- Jack Carlisle (UM) *Math 631 Student Presentations: Sheaves* -- 4088 East Hall
6:00pm-6:30pm	**Special Events** -- Yuping Ruan (UM) *Math 631 Student Presentations: Riemann Surfaces from an Analytic Perspective* -- 4088 East Hall
6:30pm-7:00pm	**Special Events** -- Khoa Dang Nguyen (UM) *Math 631 Student Presentations: ADE Singularities* -- 4088 East Hall

Outcomes: Meetings

- Schedule

Date	Event	Topic
2/6/2018	Discussion 1	Context & background
2/20/2018	Discussion 2	Inclusivity & strategies
3/7/2018	External Speaker	Instructional strategies
4/3/2018	Discussion 3	Inclusivity & assessment
4/17/2018	Discussion 4	Implicit bias & synthesis
5/30/2018	Concluding Discussion	Closure & questions

- Sample Readings: Discussions 1, 2
  1. Position on Access and Equity in Mathematics Education (NCTM)
     Teaching with Women in Mind (AMS Notices)

     6 Ways Math Instructors Can Support Diversity and Inclusion (AMS teaching blog)
  2. Toward Inclusive STEM Classrooms: What Personal Role Do Faculty Play? (CBE–Life Sciences Education)
     How a Detracked Mathematics Approach Promoted Respect, Responsibility, and High Achievement. (Theory Into Practice)

     CRLT exercises

Outcomes: Community Numbers

- Attendance was generally good.
  - Winter 2018 events averaged 16 attendees, 37 in total, with 15 attending at least three sessions.
  - Attendees were approximately evenly split between T/TT faculty, lecturers, post-docs, and graduate students (though graduate students were the least-well represented).
- Collegial and open discussions were the norm.
  - . . . which may reflect Departmental culture.
  - But: note graduate student attendance.

. . . and self-selection

Outcomes: Community Work

- Goal: “[to attain] the knowledge and resources to better support [these students]. . . ”
  - Inclusivity in teaching *is a big issue*.
  - We definitely increased awareness, and knowledge, and
  - increased individuals’ resources.

- Implied Goal: facilitate change in instructors’ teaching.
  - This is *harder to measure*.

Outcomes: Instructional Impact

- While it is difficult to measure impact in the classroom, we came to a number of key insights:
  - Avoid a deficit perspective: *Look for and emphasize students' understanding and competence, not errors*.
  - Assign competence: *Recognize students' success and contributions publicly*.

  - Manage groupwork: *Take an active role during groupwork to support inclusive group dynamics*.
  - Create classroom community: *Focus on increasing students' sense of belonging in class, and in mathematics*.
  - Be self aware: *Of implicit biases, habits and language*.

Outcomes: New Questions

- And these raised a number of new questions:
  - How do we create community?
  - How do we better recognize what we need to be aware of and change?
  - How do we make all of these things natural parts of our teaching?

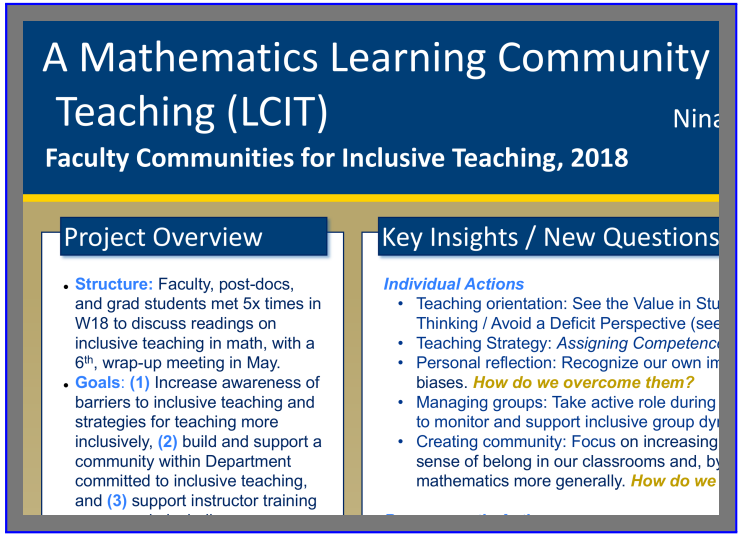
Outcomes: Artifacts and Discernable Impact

- This talk.
- (Forthcoming. . .) post for the AMS inclusion/exclusion blog about our work.

- Work on our new instructor training program.
  - Week-long program, for all new graduate students and post-docs.
  - Increased focus on inclusive teaching, with a CRLT workshop at the start of the week and some interleaving of topics throughout.

Conclusions and Reflections

- Our Community did arrive at some key insights,
- And an underlying framework to think about issues of inclusivity:
  - Levels of Action
    Individual, *Programmatic*, and *Departmental*
- Programmatic actions:
  - Think critically about assessment structures in large, coordinated courses.
  - Highlight contributions of mathematicians in underrepresented groups.
- Departmental actions:
  - Work with our instructor training programs:
    Clearly note that our teaching is not de facto inclusive, and
    Provide instructors with strategies



Conclusions and Questions

- . . . and these led naturally to more questions
  - How to balance uniformity and resistence to academic dishonesty with promotion of a growth mindset and sense of belonging?
  - How to show underrepresented mathematicians and implement strategies meaningfully and authentically?

A Continuing LCIT

- Two meetings in Fall 2018
  With residual funding—due to Departmental support, and cheap lunches.
- Application for renewed funding for Winter 2019
  - Increase graduate student engagement
    Graduate students teach many of our introductory courses, are a substantial part of our department, and may be teaching for years to come.
  - Improve inclusivity of our Community
    Survey attendees who came only once.
  - Improve application of instructional strategies
    Focus discussions, follow-up surveys.
  - Continue engagement with Department and Introductory Program
    Work on new instructor training, larger programmatic issue.

Complementary Activities

- Exam analysis project
  - Internally funded (CRLT grant of $10,000, plus $5,000 of Department funding).
  - Goal: Analyze Introductory Program exams, to determine characteristics and changes over time, and how these may speak be more (or less) inclusive of underrepresented groups.
  - Initial analysis in summer 2018, continuing in summer 2019.
- Increased mastery assessment in our large enrollment courses
  - Pilot test in differential equations
  - Proposal for Introductory Program

Concluding Thoughts

- Our departmental environment facilitated the LCIT
  - Departmental culture
  - Departmental engagement
- We benefit tremendously from University resources
- . . . *But neither of these are necessary for this work*
  - Individual classrooms can be inclusive, and this has always been the case.
- Our scale and uniformity is a challenge and an opportunity
  - My course, this fall: 3 copied lab reports, 60 students with a common homework solution.
  - But: we have an administrative structure and authority to affect change.

Resources and Links

- Gavin LaRose: glarose@umich.edu
- LCIT page: http://www.math.lsa.umich.edu/~glarose/dept/teaching/lcit.html