CoMInDS:

College Mathematics Instructor Development Source

Supporting faculty who provide professional development to the next generation of college mathematics instructors

MAA
MATHEMATICAL ASSOCIATION OF AMERICA

NSF

DUE Award # 1432381

Your hosts

- Natasha Speer, The University of Maine
- Jack Bookman, Duke University

Question:

What preparation for teaching college mathematics did you participate in? (E.g., 1-semester seminar, pre-semester orientation, nothing)

Type your response in the chat window.

Today

- Why do we need graduate student preparation for teaching?
- What is the current state of graduate student preparation for teaching in the U.S.?
- What are we (CoMInDS) doing about it?
- Q&A

Why do we need graduate student preparation for teaching?

What are some common reasons students give for leaving STEM majors?

Type your ideas in the chat window.

What are some common reasons students give for leaving STEM majors?

"Turned off of" science

Non-STEM major seems more interesting

Lifestyle of STEM career unappealing

Inadequate advising or help with academic problems

Poor teaching by STEM faculty

Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

??%: "Turned off of" science
??%: Non-STEM major seems more interesting
??%: Lifestyle of STEM career unappealing
??%: Inadequate advising or help with academic problems
??%: Poor teaching by STEM faculty
??%: Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

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What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science

Non-STEM major seems more interesting

Lifestyle of STEM career unappealing

Inadequate advising or help with academic problems

Poor teaching by STEM faculty

Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science

57%: Non-STEM major seems more interesting

Lifestyle of STEM career unappealing

Inadequate advising or help with academic problems

Poor teaching by STEM faculty

Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science

57%: Non-STEM major seems more interesting

43%: Lifestyle of STEM career unappealing

Inadequate advising or help with academic problems

Poor teaching by STEM faculty

Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science
57%: Non-STEM major seems more interesting
43%: Lifestyle of STEM career unappealing
75%: Inadequate advising or help with academic problems
Poor teaching by STEM faculty
Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science
57%: Non-STEM major seems more interesting
43%: Lifestyle of STEM career unappealing
75%: Inadequate advising or help with academic problems
90%: Poor teaching by STEM faculty
Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

What are some common reasons students give for leaving STEM majors?

Guess the percentages:

60%: "Turned off of" science
57%: Non-STEM major seems more interesting
43%: Lifestyle of STEM career unappealing
75%: Inadequate advising or help with academic problems
90%: Poor teaching by STEM faculty
27%: Conceptual difficulties with STEM subjects

(Seymour & Hewitt, 1997)

Graduate school programs

- Graduate school programs are largely focused on preparing people to be researchers.
- But what are PhD mathematicians' careers like?

A small study

- Michael Jacobson, et al., have been gathering data about the research productivity of mathematics graduate students.
- They gathered information from the Math Geneology Project.
- They looked at data about the number of dissertations supervised by all people who received their PhDs in math from 1980-1990.
- Using a random sample of about 25% of those people, they also gathered data about publications.

Math PhD research productivity

Number of math PhDs 1980-1990	13,373
% who directed 0 dissertations	
% who directed <= 2 dissertations	
# sampled (about 25% each year)	9,300
% of the sample who published 0 papers	
% of the sample who published <= 2 papers	

Math PhD research productivity

Number of math PhDs 1980-1990	13,373
% who directed 0 dissertations	**?**
% who directed <= 2 dissertations	**?**
# sampled (about 25% each year)	9,300
% of the sample who published 0 papers	**?**
% of the sample who published <= 2 papers	**?**

Math PhD research productivity

Number of math PhDs 1980-1990	13,373
% who directed 0 dissertations	**70**
% who directed <= 2 dissertations	**83**
# sampled (about 25% each year)	9,300
% of the sample who published 0 papers	**?**
% of the sample who published <= 2 papers	**?**

Math PhD research productivity

Number of math PhDs 1980-1990	13,373
% who directed 0 dissertations	**70**
% who directed <= 2 dissertations	**83**
# sampled (about 25% each year)	9,300
% of the sample who published 0 papers	**48**
% of the sample who published <= 2 papers	**84**

What is the current state of graduate student preparation for teaching in the U.S.?

National survey*

- Survey sent to **all** (n=341) department chairs of US mathematics departments with a Masters or PhD in mathematics
- Questions about many aspects of the precalculus – calculus II sequence (PtC)
- Section on GTAs
- Response rate was 68% (n=223) of all institutions, 75% (n=134) of PhD-granting and 59% (n=89) of Master's-granting institutions

*Done in collaboration with the Progress Through Calculus project (PtC)

Existence of TA PD programs

	Institutions in the US	Responded to survey	Have a TA PD program in mathematics department
PhD	178	134 (75%)	
Masters	152	89 (59%)	
Total	330	223 (68%)	

Existence of TA PD programs

	Institutions in the US	Responded to survey	Have a TA PD program in mathematics department
PhD	178	134 (75%)	111 (83%)
Masters	152	89 (59%)	44 (49%)
Total	330	223 (68%)	155 (70%)

Who?

	Total (n=155)	PhD (n=111)	Masters (n=44)
Primary Audience			
Recitation leaders			
Primary Instructors			
Who facilitates			
One or more individuals for whom this is part of their official responsibilities for multiple years			
Experienced graduate students			
Department committee			
One or more individuals for whom this is part of their official responsibilities for a single year (e.g., rotating committee assignment)			

Who?

	Total (n=155)	PhD (n=111)	Masters (n=44)
Primary Audience			
Recitation leaders	**66%**	79%	34%
Primary Instructors	**77%**	77%	80%
Who facilitates			
One or more individuals for whom this is part of their official responsibilities for multiple years	**79%**	79%	80%
Experienced graduate students	**17%**	23%	2%
Department committee	**15%**	16%	14%
One or more individuals for whom this is part of their official responsibilities for a single year (e.g., rotating committee assignment)	**14%**	18%	5%

When?

	Total (n=155)	PhD (n=111)	Masters (n=44)
When			
Before teaching for the first time			
During their first term of teaching			
Format			
Term-long course or seminar			
Multi-day workshop			
Short workshop or orientation (1-4 hours)			
Occasional seminars or workshops			
One-day workshop			

When?

	Total (n=155)	PhD (n=111)	Masters (n=44)
When			
Before teaching for the first time	**83%**	86%	77%
During their first term of teaching	**50%**	51%	48%
Format			
Term-long course or seminar	**54%**	60%	39%
Multi-day workshop	**31%**	34%	23%
Short workshop or orientation (1-4 hours)	**26%**	24%	32%
Occasional seminars or workshops	**15%**	16%	11%
One-day workshop	**14%**	13%	18%

Where do instructional materials come from?

	Total (n=155)	PhD (n=111)	Masters (n=44)
Source of materials used in program			
Created by the people who provide the teaching preparation			
Published materials			
Materials adopted from another institution's program			

Where do instructional materials come from?

	Total (n=155)	PhD (n=111)	Masters (n=44)
Source of materials used in program			
Created by the people who provide the teaching preparation	**83%**	87%	73%
Published materials	**38%**	41%	32%
Materials adopted from another institution's program	**10%**	9%	11%

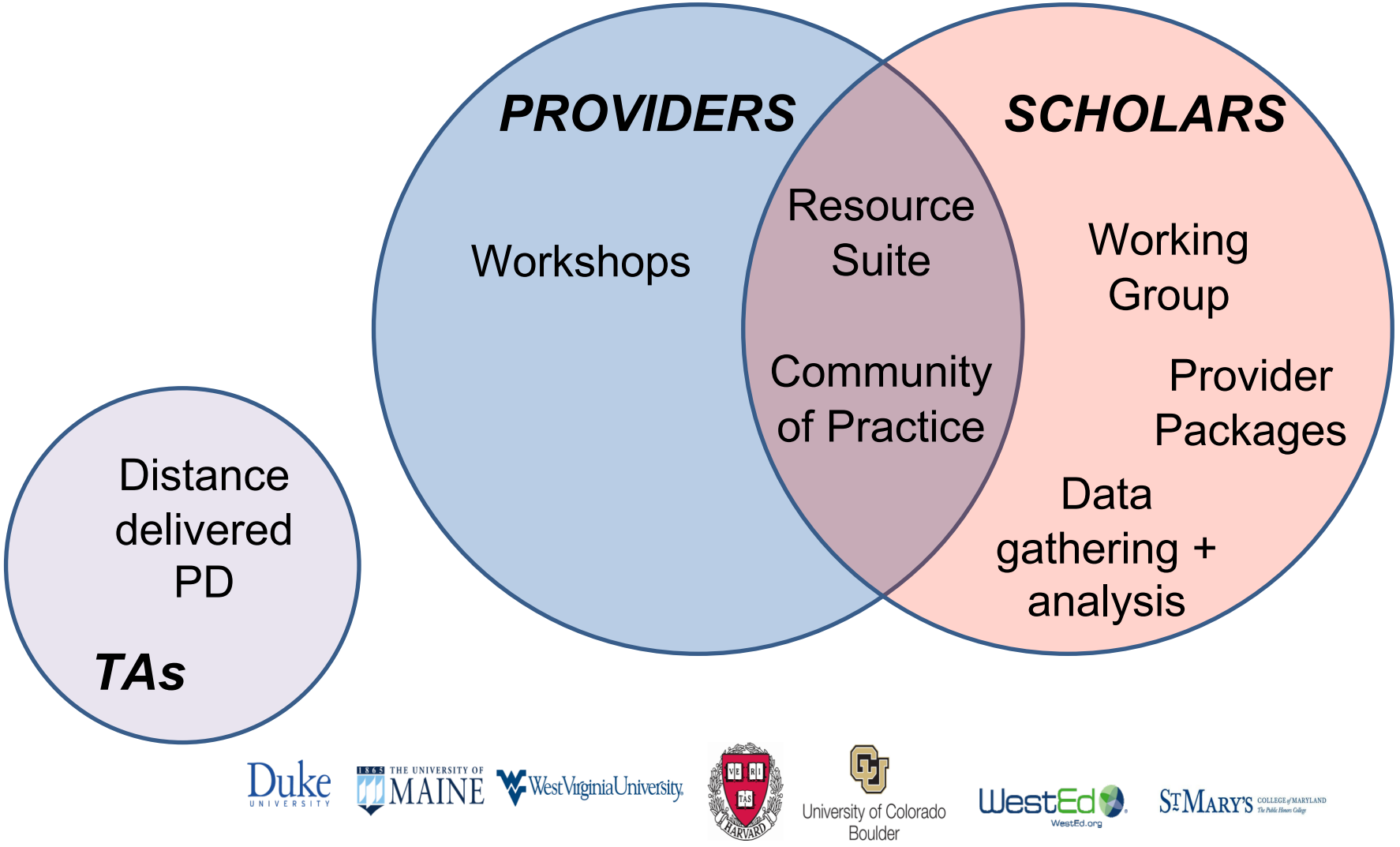
Resources needed to improve program

	Total (n=155)	PhD (n=111)	Masters (n=44)
Research-based information about best practices in TA teaching preparation			
Tools for evaluating effectiveness of TA teaching preparation			
Collegial conversations or mentoring for TA teaching preparation staff with colleagues at similar institutions			
Professional development for TA teaching preparation staff			
Online library of tested resources			

Resources needed to improve program

	Total (n=155)	PhD (n=111)	Masters (n=44)
Research-based information about best practices in TA teaching preparation	**60%**	60%	59%
Tools for evaluating effectiveness of TA teaching preparation	**50%**	55%	36%
Collegial conversations or mentoring for TA teaching preparation staff with colleagues at similar institutions	**48%**	50%	45%
Professional development for TA teaching preparation staff	**43%**	41%	45%
Online library of tested resources	**37%**	40%	32%

What are we (CoMInDS) doing about all of this?


PROVIDERS
SCHOLARS
Workshops
Resource Suite
Community of Practice
Working Group
Provider Packages
Data gathering + analysis
Distance delivered PD
TAs
Duke UNIVERSITY
THE UNIVERSITY OF MAINE
WestVirginiaUniversity.
VE RI TAS HARVARD
University of Colorado Boulder
WestEd
WestEd.org
St Mary's College of Maryland

Workshop goals

- National context and need for TA PD.
- Research evidence for designing TA PD.
- Experience TA PD activities that support active learning in the classroom.
- Illustrate different program designs.
- Design, plan, and assess a TA PD program.
- Explore existing instructional resources.
- Help build (or strengthen) a professional network.

Workshop goals + schedule

	THURSDAY July 12	FRIDAY July 13	SATURDAY July 14
8:00		Breakfast (Memorial Union)	Breakfast (130 Estabrooke Hall) Community activity
9:00	Registration / Breakfast (130 Estabrooke Hall)	Introduction to CoMInDS Resources Suite	Assessing your program
10:00	Welcome, overview of workshop & activity #1		Work time
11:00	Activity #2: Nature of TA's work & goal setting	Work time	Poster session of program plans
12:00	Lunch (130 Estabrooke Hall)	Lunch (Memorial Union)	Lunch (130 Estabrooke Hall)
1:00	Activity #3: Sample TA PD	Community activity	
2:00		Activity #5: Sample TA PD	
3:00			
4:00	programs	Activity #6: Challenging scenario cases	
5:00	Work time	Wrap-Up	
6:00		Dinner (at area restaurants)	
7:00	Dinner (Buchanan Alumni House)		
8:00			

Goal: National context and need for TA PD

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1:00		Community activity	
2:00	Activity #3: Sample TA PD PD for on-the-job learning	Activity #5: Sample TA PD	
3:00	Break	Work time	
4:00	Activity #4: Survey data presentation & sample programs	Activity #6: Challenging scenario cases	
5:00	Work time	Wrap-Up	
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Goal: Research evidence for designing TA PD

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Goal: Experience some TA PD activities

Sample TA PD activities

- Text-based case studies:
  - Friedberg et al. (2001). *Teaching Mathematics in Colleges and Universities: Case Studies for Today's Classroom: Faculty Edition*. Providence, RI: American Mathematical Society.
- Videocases: collegemathvideocases.org
- Resources Suite

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Goal: Illustrate different program designs

Workshop goals + schedule

Goal: Design, plan, and assess your TA PD program

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Goal: Explore existing instructional resources

Resource Suite

- No central clearinghouse that made resources broadly visible and easily accessible
- No mechanisms in place to allow the community to “vet” resources in useful ways
- Many instructional materials used for TA PD are self-made, used only at one institutions, and thus not accessible to the broader community

The Resource Suite contains:

- Instructional materials for providers:
  - e.g., sample syllabi for seminars and courses designed to prepare TAs, lesson plans, activities with instructor guides, video- and text-based case study materials.
- Products from Scholarly Activity:
  - e.g., key research papers, books and other relevant scholarship accompanied by annotations.

Resource Suite

- Beta site, used for development, can be found at http://cominds.maa.org/
- Currently revising the submission protocol and migrating materials to the MAA's new website
- Updated resource suite on MAA site should be available early in 2019

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Goal: Help build (or strengthen) your professional network.

Workshop goals + schedule

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Goal: Help build (or strengthen) your professional network.

Communities of Practice:

"Connect people who might not otherwise have the opportunity to interact, either as frequently or at all. Enable dialogue…Capture and diffuse existing knowledge to help people improve their practice…Introduce collaborative processes to groups…Generate new knowledge" (Cambridge, Kaplan, & Suter, 2005, p. 1).

Our Community of Practice

- Built on relationships started at CoMInDS summer workshops and events at JMM
- Maintained through the listserve, regional meetings, events at JMM
- Ongoing exchange of information and resources
- Way to locate colleagues with mutual interests and to find TA PD materials.
- Offer novice Providers connections to more experienced Providers

Ways to learn more

- Talks at JMM
  - Using Research about Teaching and Learning to Inform the Preparation of Graduate Students to Teach, Wednesday 2:15 p.m.-5:35 p.m.
  - Research on Improving Undergraduate Mathematical Sciences Education, Thursday 9:00 a.m.-9:25 a.m.
- CoMInDS website: maa.org/cominds
- Join the listserv
  - Type your email address into the chat box

Thanks!

Questions?
Comments?

Raise hand or type in chat box

cominds@maa.org, bookman@math.duke.edu, speer@math.umaine.edu