

SUMMARY

Medium-Term Outcomes from the CoMInDS Intensive Workshops: Results from the Follow-up Survey

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Overview of the Project

CoMInDS is the College Mathematics Instructor Development Source, a suite of resources and activities that seek to enhance mathematics departments' capacity to provide high-quality, research-based, teaching-related professional development to graduate students serving as teaching assistants. It seeks to support both department-based Providers of TAPD and Researchers who study TAPD, and thus to serve TAs who in turn teach undergraduate students. The project interacts with these groups through a variety of short and long, virtual and face-to-face workshops and meetings, and is building an online resource suite of instructional materials and scholarly products on TAPD. The project is supported with funds from the National Science Foundation and practical support from the Mathematical Association of America.

Overview of the Report

This report describes summative evaluation results from a follow-up survey of TAPD Providers who participated in one of CoMInDS' multi-day intensive, residential workshops, held in the summer. We sought to learn what, if anything, they took away from their participation in the workshop, and how they used the workshop resources at their home institutions.

This sample is large enough that we can generalize about workshop participants' outcomes from the survey results. The results show that the summer intensive workshops reached a very suitable audience of TAPD Providers who took away useful knowledge and made valued connections. The extent to which they applied this new knowledge in making desired changes in their local TAPD programs is impressive. Additional needs are identified that suggest areas for future work by the CoMInDS team.

Elsewhere we have reported outcomes for people who experienced a "lighter" and more variable touch from the project, through a variety of activities that involve less time on task (Laursen & Lynds, 2018). We will separately compare the findings for the two broad groups.

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Medium-Term Outcomes from the CoMInDS Intensive Workshops: Results from the Follow-up Survey

This report describes results from a follow-up survey of participants in the CoMInDS intensive summer workshops, “Improving the Preparation of Graduate Students to Teach Undergraduate Mathematics.” The three-day workshops were held in summers 2016 and 2017. Formative evaluation was conducted with pre-workshop and immediate post-workshop surveys, and has been separately reported. This report focuses on longer-term outcomes for participants in their home institutions.

This stand-alone report provides responses to a follow-up survey conducted in winter 2017-18, about 1.5 years after the 2016 cohort participated in the workshop, and about 0.5 years later for the 2017 cohort. Comparison with results for participants in CoMInDS’ other activities (Laursen & Lynds, 2018) is forthcoming and will place these results in context and enable a richer interpretation.

1. Study Methods

The survey items were developed by Laursen, drawing on items used previously for the pre- and post-workshop surveys and on two focus group conversations with nine CoMInDS team members. The focus groups shared observations and generated ideas for longer-term outcomes of the different project activities—whether observed, potential or hoped-for—and these ideas strongly informed the gains items that were developed for this survey. Items about active teaching practices, and about local cultural norms around teaching, were adapted from Hora and Anderson (2012). Classification of department size was based on the AMS surveys, where large departments award 8 or more PhDs per year, medium departments award 4-8 PhDs per year, and small ones award fewer than 4 PhDs per year. Since TAs are usually near the start of a graduate program, these values were doubled to account for PhD completion rates near 50%, based on data from the Council of Graduate Schools (Sowell, 2008).

The survey sample included 67 individuals who participated in one of the three-day summer intensive workshops. We used the same identifiers used in the pre-workshop and immediate post-workshop surveys so that we could compare responses over time; that comparison will be made following the summer 2018 workshop.

The online survey was launched in November 2017 and sent to 67 email contacts provided by the CoMInDS team. Reminders were sent in early December and early January 2018; the survey was closed in February. Of all invitations, 57 were opened (85%); one bounced and 8 went unopened. In all, 31 people provided a full or partial response that was extensive enough to include in the analysis, for a net 46% response rate (54% of those who opened the email). We know from informal communication that some people did not realize that this survey was different from the post-workshop survey. Nonetheless, this sample response rate is sufficient to make claims about the workshop outcomes.

For this survey, we defined the terms for respondents and use them in the same way here:

- TA for all graduate teaching assistants, recognizing that different institutions may use different titles
- TAPD for professional development focused on teaching that is offered to graduate TAs in math at the respondent’s institution
- Providers for people who deliver or help deliver TAPD at their institution
- Researchers for people who study TAPD or closely related topics

CoMInDS uses the terms Providers and Researchers in a formal way to describe the important target groups of their activities, so we use those terms in this report. Here we assume all respondents are Providers by definition, because they attended a summer workshop. Some also identified as Researchers.

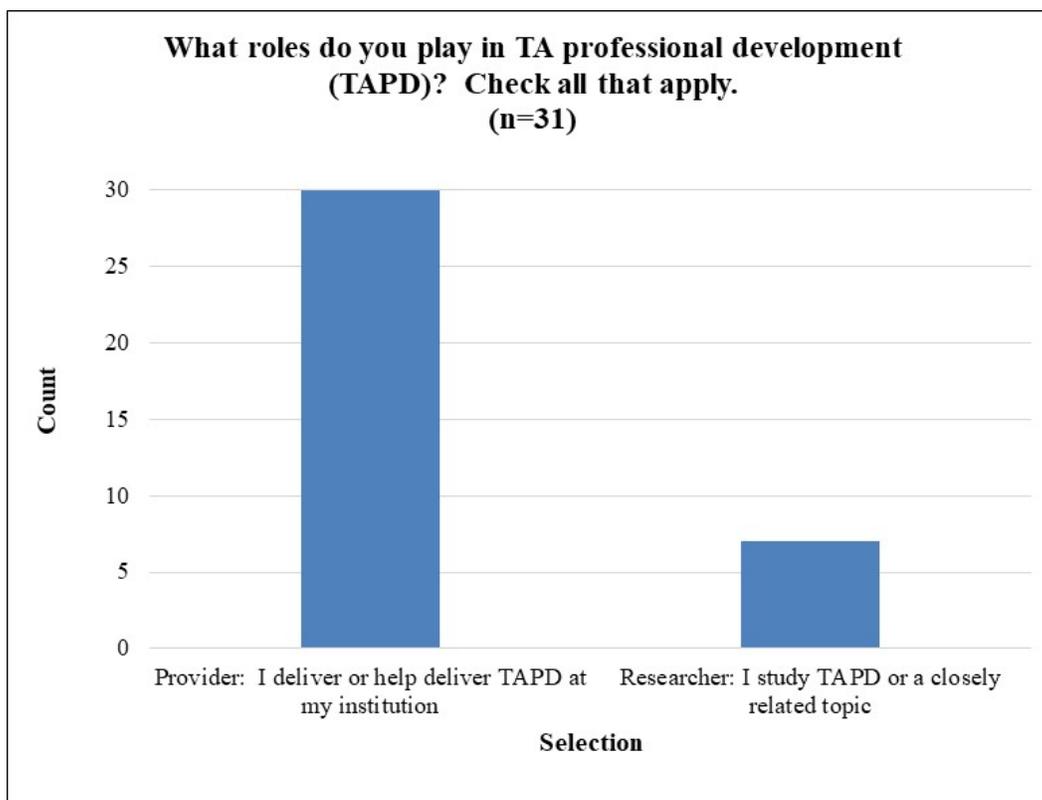
From project-provided records, we could count the number of activities in which each individual had participated, and compare this to the activities that survey respondents self-reported. For the Providers, these lists are exactly comparable: the survey listed the same activities as the project tracked. For the Researchers, the survey included more answer choices than did the project participant list, including some informal activities such as contributing a resource to the Resource Suite.

The survey instrument is included in the Appendix. It includes the same survey items as the All-Comers survey, but has added identifiers for matching to the surveys administered at the time of the workshops.

2. Who Participated?

We asked respondents to self-identify as a TAPD Provider, Researcher, or both. Twenty-four respondents identified as Providers, six identified as both Providers and Researchers, and one identified only as a Researcher.

Figure 2.1: Most respondents held Provider roles; a few were also Researchers



Across the total respondent group the respondents were predominantly women, White, not Hispanic or Latino/a, from PhD-granting institutions. Respondents reported their demographics as:

Gender: 21 women, 9 men, 1 declined to report (31 responses).

Citizenship: 31 US citizens, US nationals or permanent residents (31 responses)

Ethnicity: 26 not Hispanic or Latino/a, 0 Hispanic or Latino/a, 3 declined to state (29 responses)

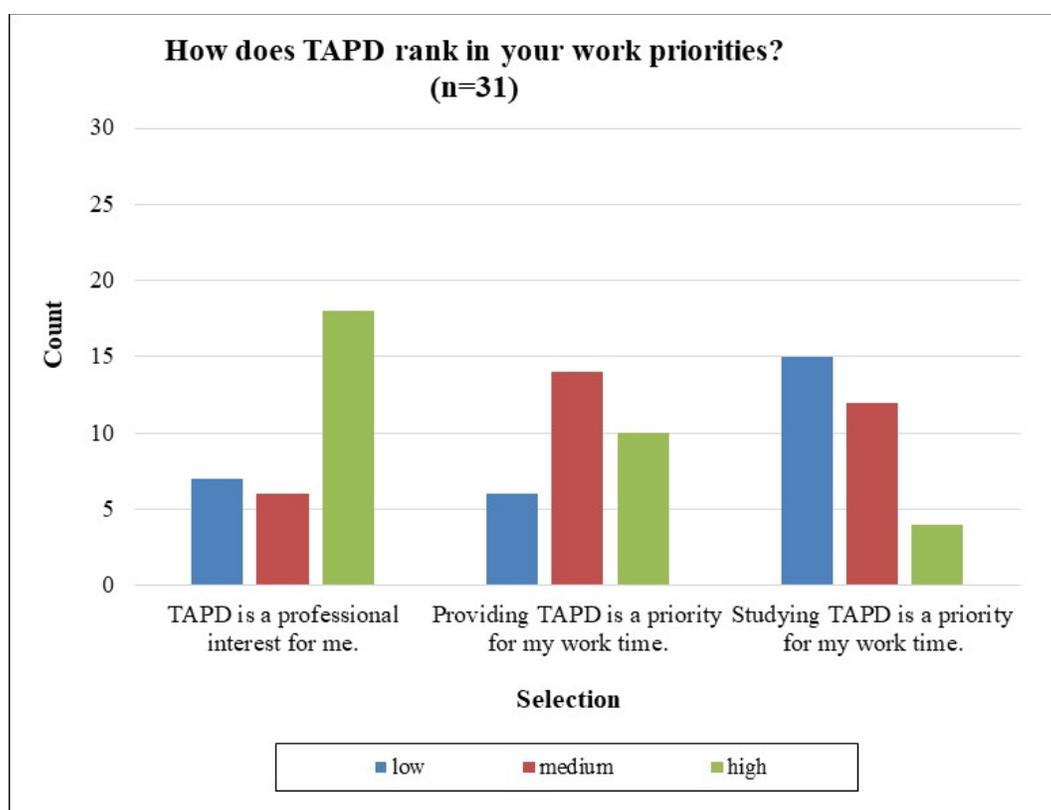
Race (using Census categories; participants could mark all that apply): 27 White, 0 Asian, 0 Black or African American, 0 American Indian/Alaska Native, 0 Native Hawaiian/Pacific Islander, 3 declined to state (30 responses)

Institutional type: 29 from PhD-granting institutions, 1 from masters-granting institution, 1 from BS/BA institution (31 responses).

Because of the uniformity on most variables, and the small size of the sample overall, we do not analyze any of the questionnaire responses by any of the demographic variables.

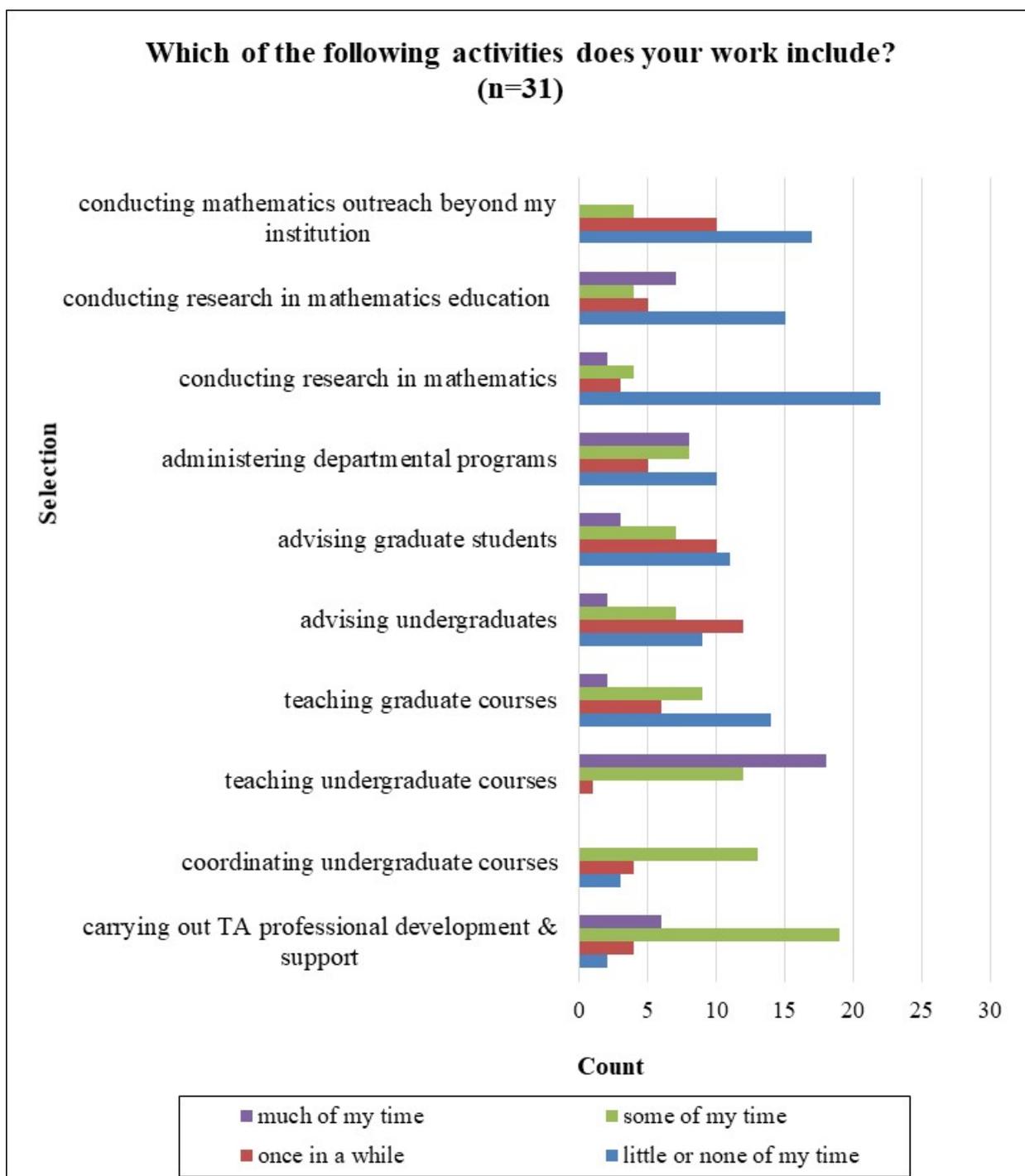
To understand the professional contexts of these respondents, we asked some questions about the nature of their jobs. Figure 2.2 shows work priorities for TAPD and Figure 2.3 shows the range of work activities they pursue. In open-ended responses, some clarified that their graduate student advising role was an informal one and not that of formal research advisor.

Figure 2.2: TAPD was one of many work priorities



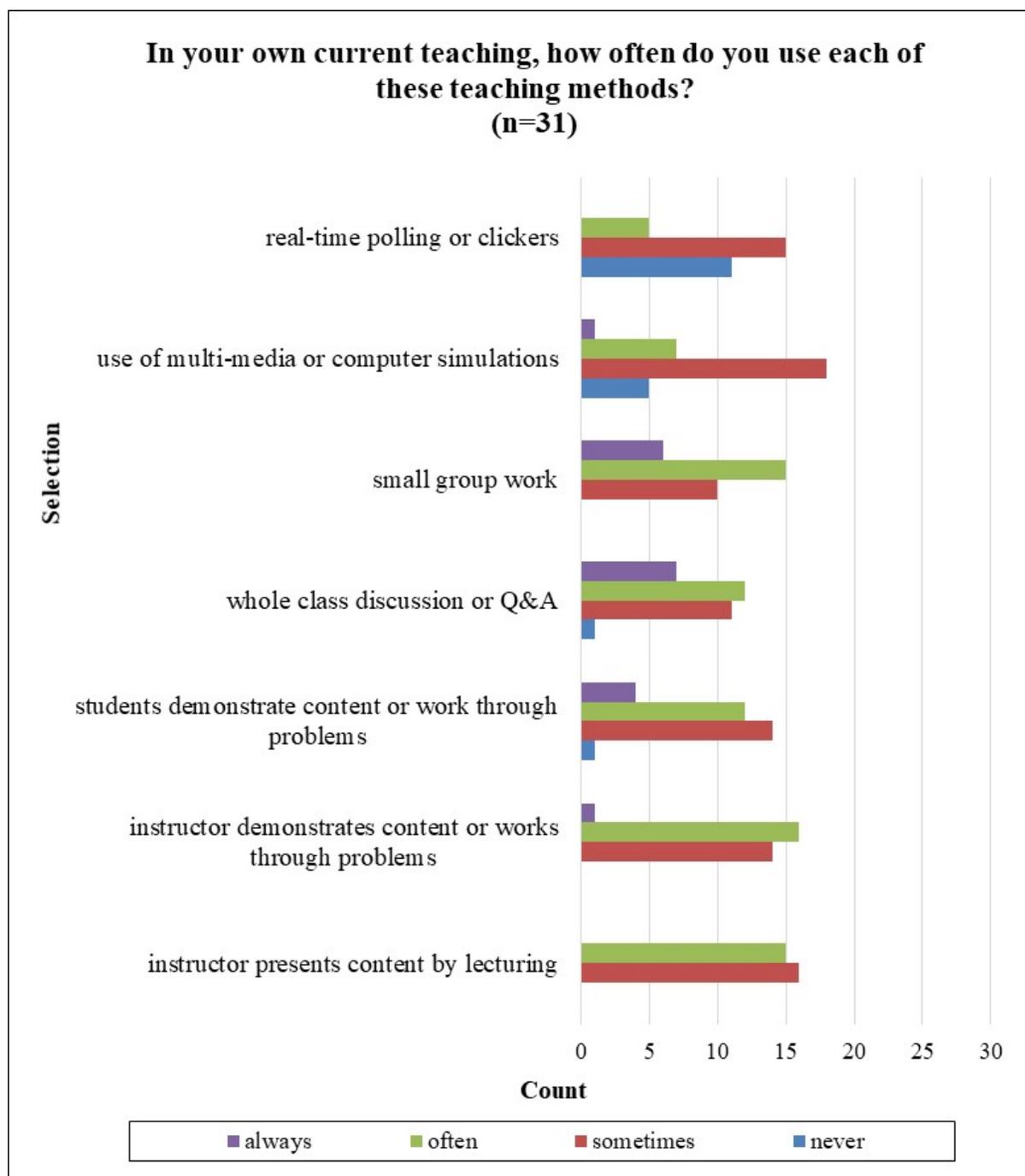
While there was high variability among individual responses, Figures 2.2 and 2.3 show that providing TAPD was a high or mid-level priority for most. Undergraduate teaching and course coordination ranked high among other calls on their time. This is consistent with project leaders' understanding that their audience comprises busy people for whom TAPD is only one of many demands. However, TAPD ranks strongly in all three domains of Figure 2.2—as a professional interest and as a priority for work time and scholarship. This in combination with the work activities indicated in Figure 2.3 suggest that the summer workshops reached people whose TAPD Provider role was formalized in their department and for whom TAPD is personally and professionally important.

Figure 2.3: Most respondents had teaching and course coordination duties



We asked respondents to report their own teaching methods, to gain a sense of their interest and expertise in the active engagement pedagogies that are emphasized in CoMInDS workshops. This information also helps to contextualize their answers about departmental teaching norms (Section 5). Most used lecture and instructor problem-solving fairly often, but many reported using small group work, whole-class discussion, and student problem-solving in their own classes at least sometimes.

Figure 2.4: Most reported using active engagement teaching sometimes or often

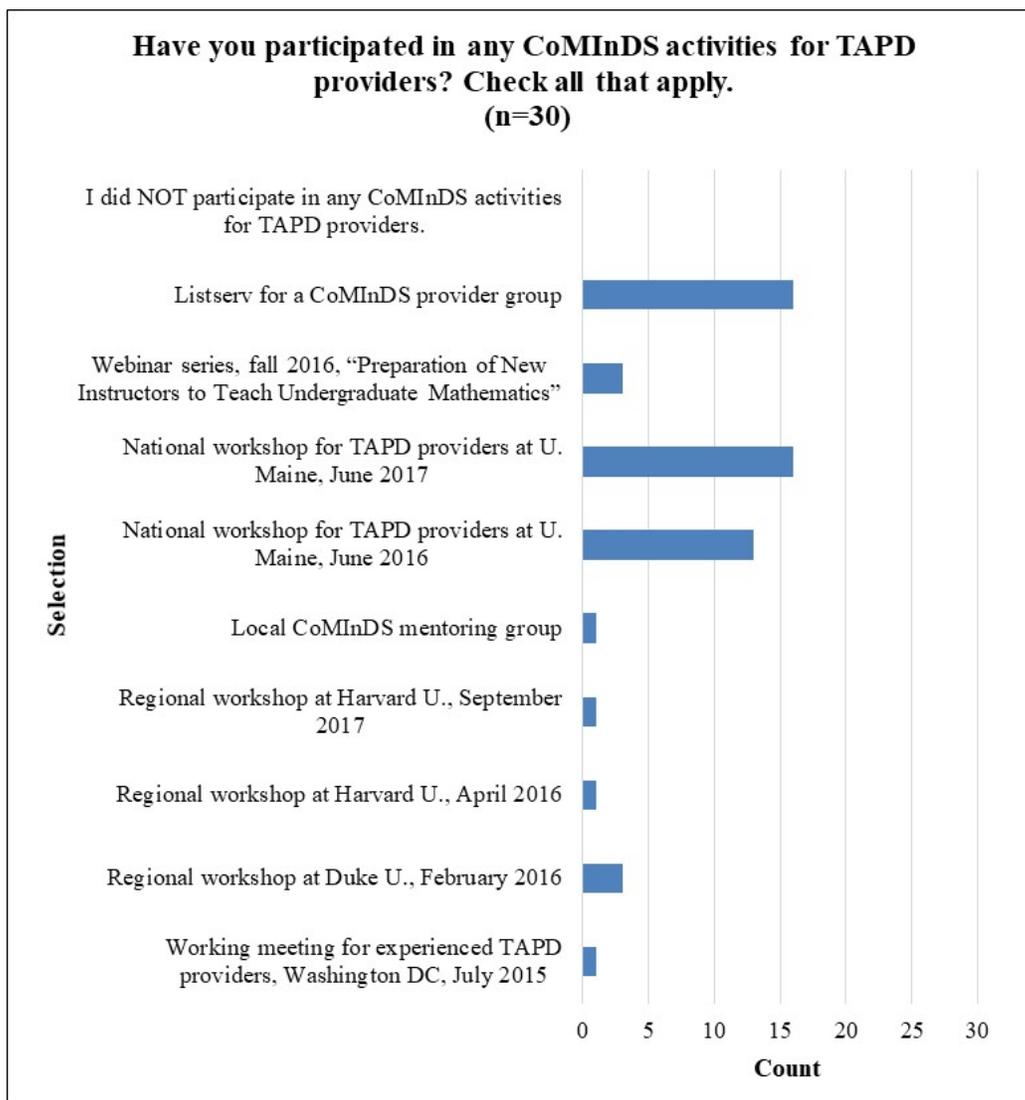


3. Provider Participation and Outcomes

Because the survey was sent only to workshop participants, every respondent should have indicated that they had participated in either the 2016 or 2017 national workshop at U. Maine. However, one person reported attending neither summer workshop, and another did not count him/herself as a Provider so did not receive this question on Provider activities. This question illustrates that human memories are not infallible (as if we needed proof!). Responses were well balanced between the 2016 and 2017 cohorts, which were equally represented in the population.

Participants reported taking part in additional online and face-to-face activities for Providers. The mean level of participation in Provider activities that was self-reported was 1.8 activities per person, which compares well to the mean participation recorded by the project team, 1.9 activities. Because some also participated in Researcher activities, the mean level of participation across all CoMInDS activities was 2.4 activities (from project records). High participation (reporting 3-6 activities in all) was seen among workshop participants who also participated in the Researcher activities and/or in the Boston-area regional workshops.

Figure 3.1: Providers had points of contact with CoMInDS beyond the summer workshop



We examined outcomes of these activities for Providers, by asking people to report their gains from participating. Five broad groups of possible outcomes were identified from analysis of the focus group discussions and probed in survey items:

1. Thinking about TAPD – clarity and understanding about TAPD goals and important ideas that underlie effective TAPD (4 items)
2. Programming for TAPD – practical resources and ideas for local programs (3 items)
3. Approaches to improving TAPD – ideas for improvement or evaluation (4 items)
4. Connecting to others – meeting and understanding commonalities with other Providers (4 items)
5. Professionalism – sense of oneself as an effective educator working in a professional domain (4 items)

Ratings on the gains scale were converted to numerical means using a scale of zero (no gain) to 4 (great gain). In Figures 3.2-3.6 the distribution of responses is plotted for each group of gains.

Figure 3.2: Provider gains in *thinking about* TAPD

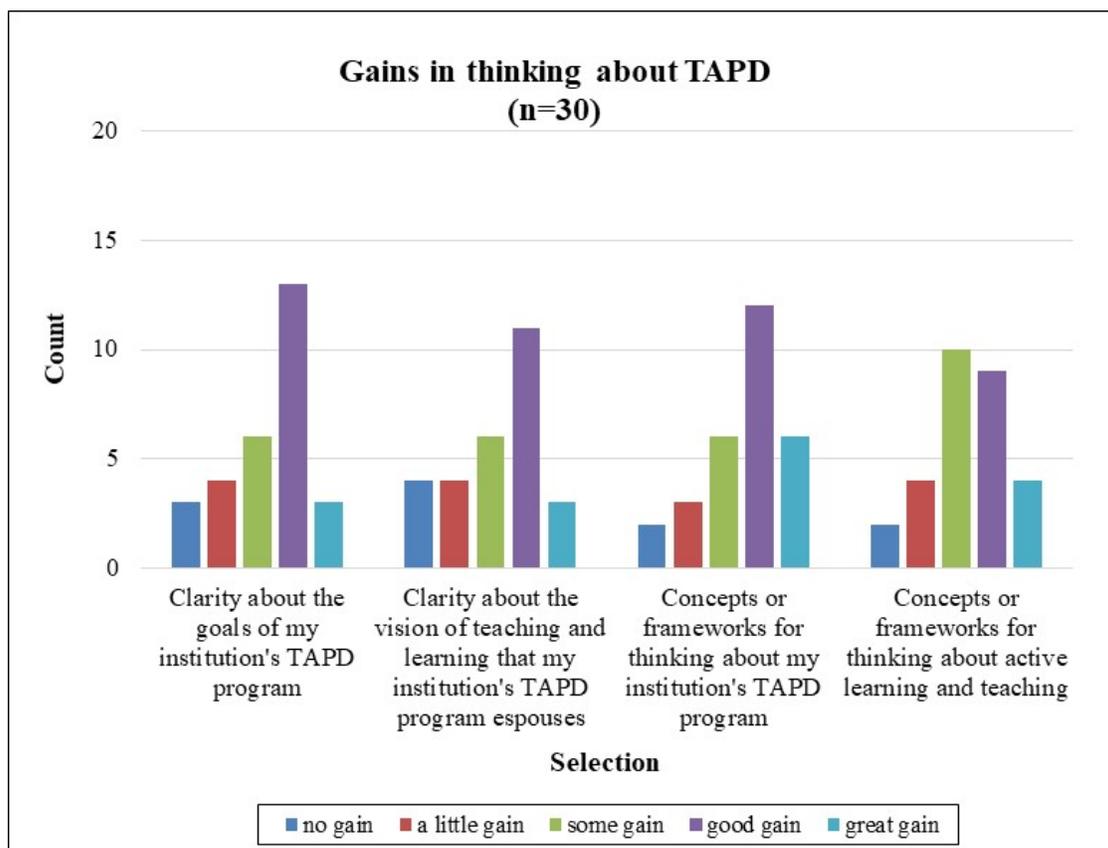


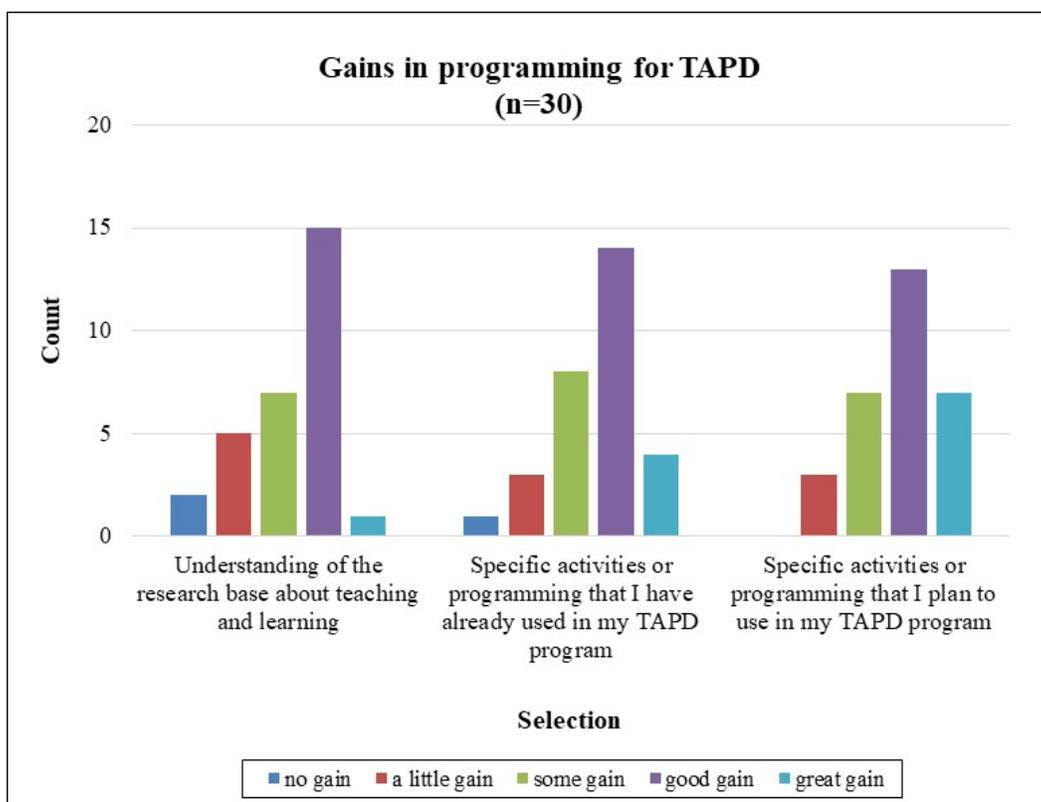
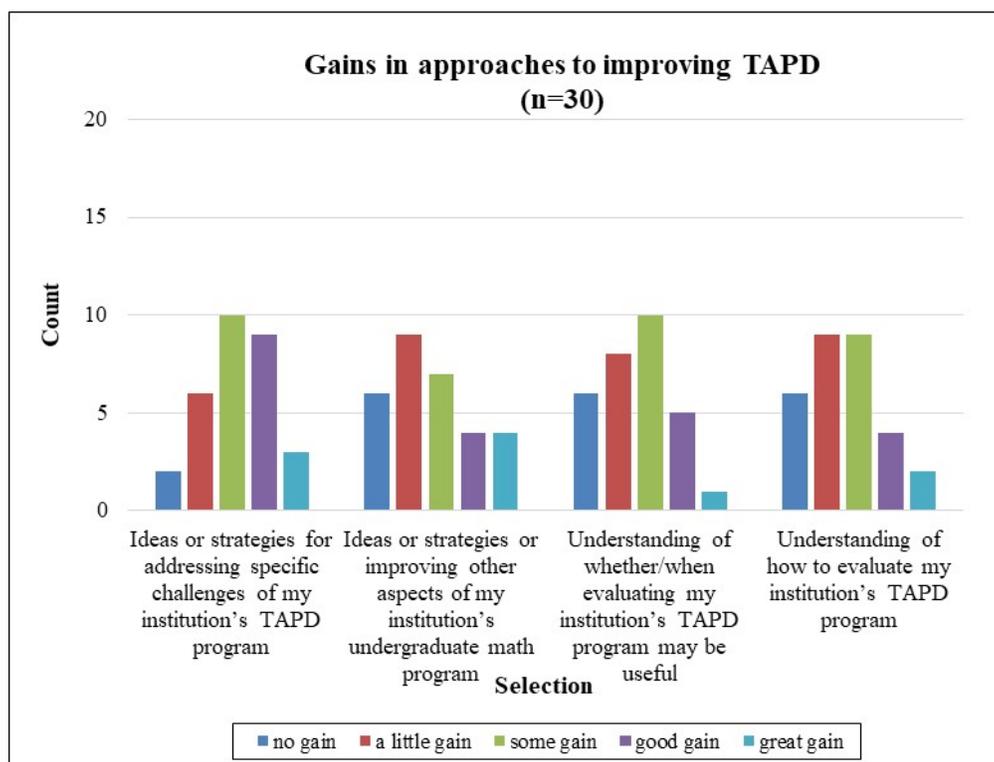
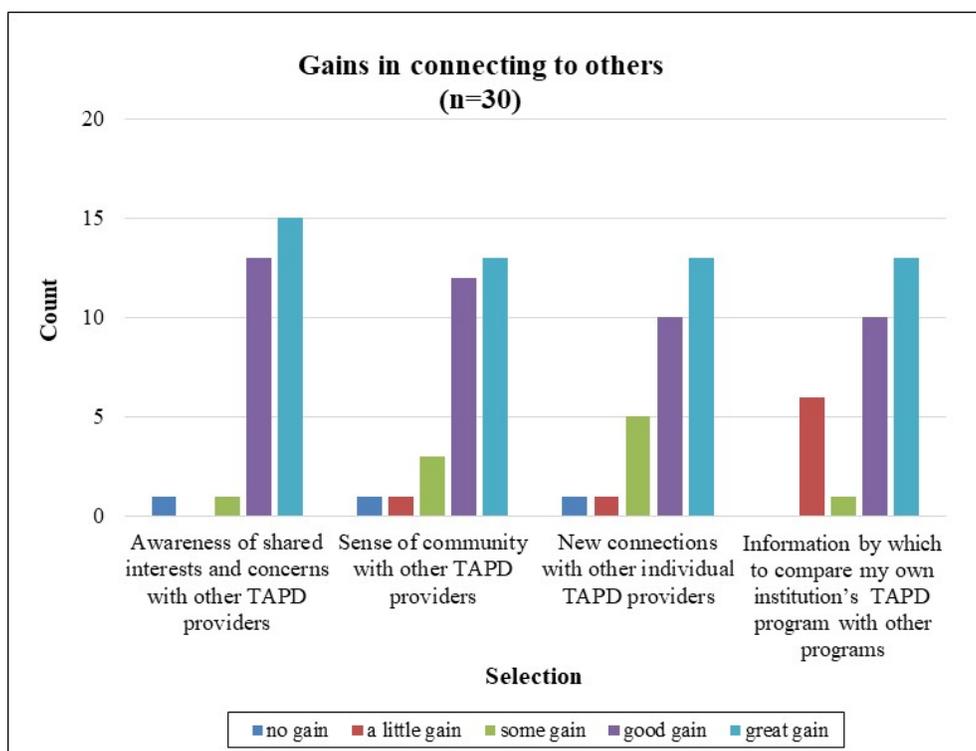
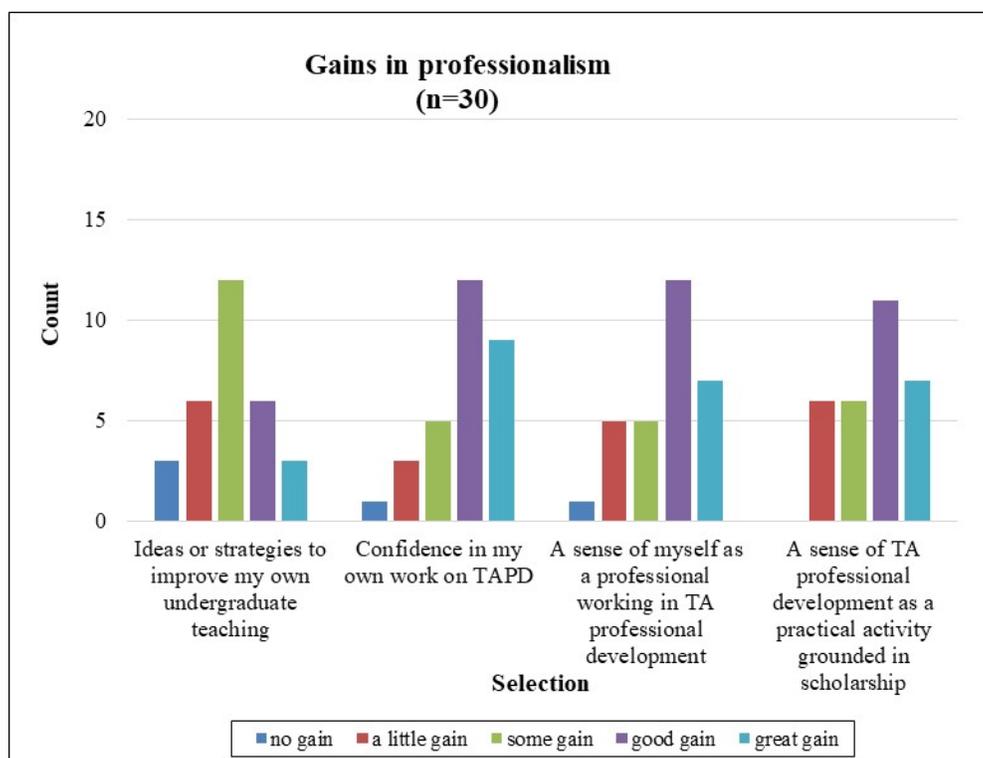
Figure 3.3: Gains in *programming* for TAPDFigure 3.4: Gains in *approaches to improving* TAPD.

Figure 3.5: Gains in *connecting to others*Figure 3.6: Gains in *professionalism*

Respondents could also write in gains that were not otherwise mentioned. Four people did so.

- I know where to find backup if needed to justify the time and resources we use on TAPD.
- I definitely appreciated this program and still appreciate the listserv conversations that followed. Thank you!
- I gained resources I would have not thought of looking for myself.
- I have a better understanding that a shared community exists.

Table 3.1 shows the mean gains ratings for Providers who answered the All-Comers survey, using a scale of 0 (no gain), 1 (a little gain), 2 (some gain), 3 (good gain), to 4 (great gain).

Patterns in the responses suggest that the strongest gains for Providers are in making connections. Gains in professionalism, programming, and gains in thinking about TAPD were moderate. Gains in considering how to improve TAPD were least reported by workshop participants.

Connecting to others > professionalism ~ programming ~ thinking > improving

The strong gains in connecting to others reported here are corroborated by open-ended comments that emphasize the importance of collegial connections with like-minded peers (Section 8). These interactions in turn foster confidence and a sense of oneself as a member of a professional community, which appear among the professionalism items.

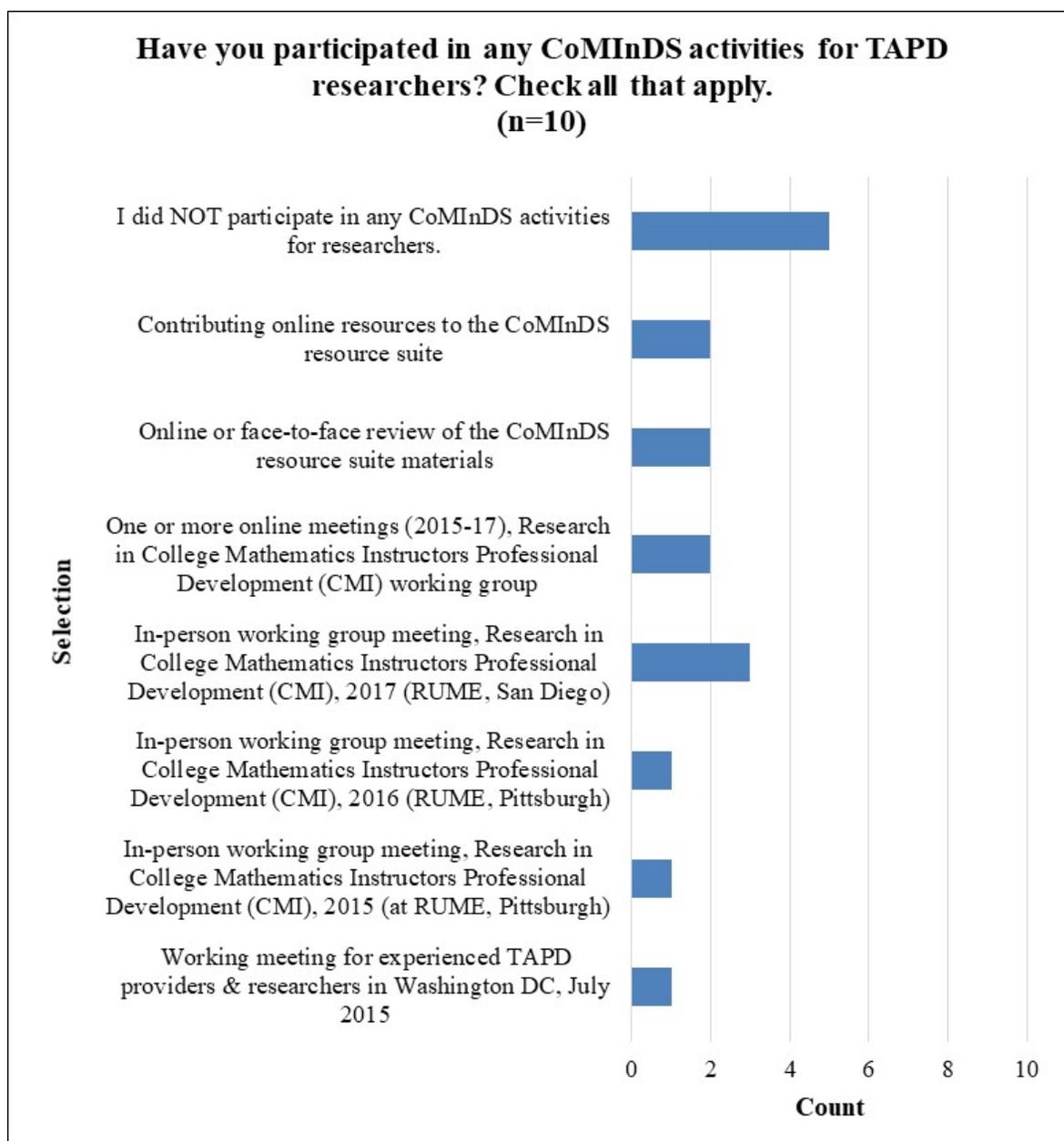
Table 3.1: Mean Gains for Providers, by Item and Item Group

		Mean (28-29 responses/item)
Gains in thinking about TAPD (means represent <i>some</i> to <i>good</i> gain)	Clarity about the goals of my institution's TAPD program	2.3
	Clarity about the vision of teaching and learning that my institution's TAPD program espouses	2.2
	Concepts or frameworks for thinking about my institution's TAPD program	2.6
	Concepts or frameworks for thinking about active learning and teaching	2.3
Gains in programming for TAPD (means represent <i>some</i> to <i>good</i> gain)	Understanding of the research base about teaching and learning	2.2
	Specific activities or programming that I <i>have already used</i> in my TAPD program	2.6
	Specific activities or programming that I <i>plan to use</i> in my TAPD program	2.8
Gains in approaches to improving TAPD (means represent <i>a little</i> to <i>some</i> gain)	Ideas or strategies for addressing specific challenges of my institution's TAPD program	2.1
	Ideas or strategies or improving other aspects of my institution's undergraduate math program	1.7
	Understanding of whether/when evaluating my institution's TAPD program may be useful	1.6
	Understanding of how to evaluate my institution's TAPD program	1.5
Gains in connecting to others (means represent <i>good</i> to <i>great</i> gain)	Awareness of shared interests and concerns with other TAPD providers	3.3
	Sense of community with other TAPD providers	3.1
	New connections with other individual TAPD providers	3.0
	Information by which to compare my own institution's TAPD program with other programs	2.9
Gains in professionalism (means represent <i>some</i> gain to <i>good</i> gain)	Ideas or strategies to improve my own undergraduate teaching	2.0
	Confidence in my own work on TAPD	2.8
	A sense of myself as a professional working in TA professional development	2.6
	A sense of TA professional development as a practical activity grounded in scholarship	2.6

4. Researcher Participation and Outcomes

At the end of the survey section probing their gains from participation in CoMInDS Provider activities—particularly the intensive workshop—respondents had a second chance to identify themselves as Researchers who studied TAPD. Of the 30 Providers, nine people did so, two more than those who self-classified this way on the initial question, in addition to one person who self-identified only as a Researcher, or ten in all. However, five had not participated in any CoMInDS activities for Researchers, so only five received questions about their gains as Researchers from participating. There is no strong pattern in the activities in which these Researchers took part.

Figure 4.1: Researchers engaged with the CMI working group and RUME conference



We examined outcomes of these activities for Researchers, by asking people to report their gains from participating. Four broad groups of possible outcomes were identified from analysis of the focus group discussions and probed through survey items:

1. Thinking about TAPD research – clarity and understandings about TAPD scholarship (3 items)
2. Connecting to others – meeting and finding shared interests with other Researchers (4 items)
3. Connecting research to practice—understanding the needs and interests of TAPD Providers in research findings, making connections to Providers (4 items)
4. Professionalism – sense of oneself as an effective educator working in a professional domain (4 items)

These categories were roughly parallel to those in the Provider gains sections, but the items were phrased differently using language specific to Researchers. Responses to the gains items were converted to numerical means using a scale of zero (no gain) to 4 (great gain). In Figures 4.2-4.5 the distribution of responses is plotted for each group of gains. It is important to recognize that the sample of respondents is quite small, and the bar charts displayed may amplify apparent differences.

Figure 4.2: Researcher gains in *thinking about TAPD* research

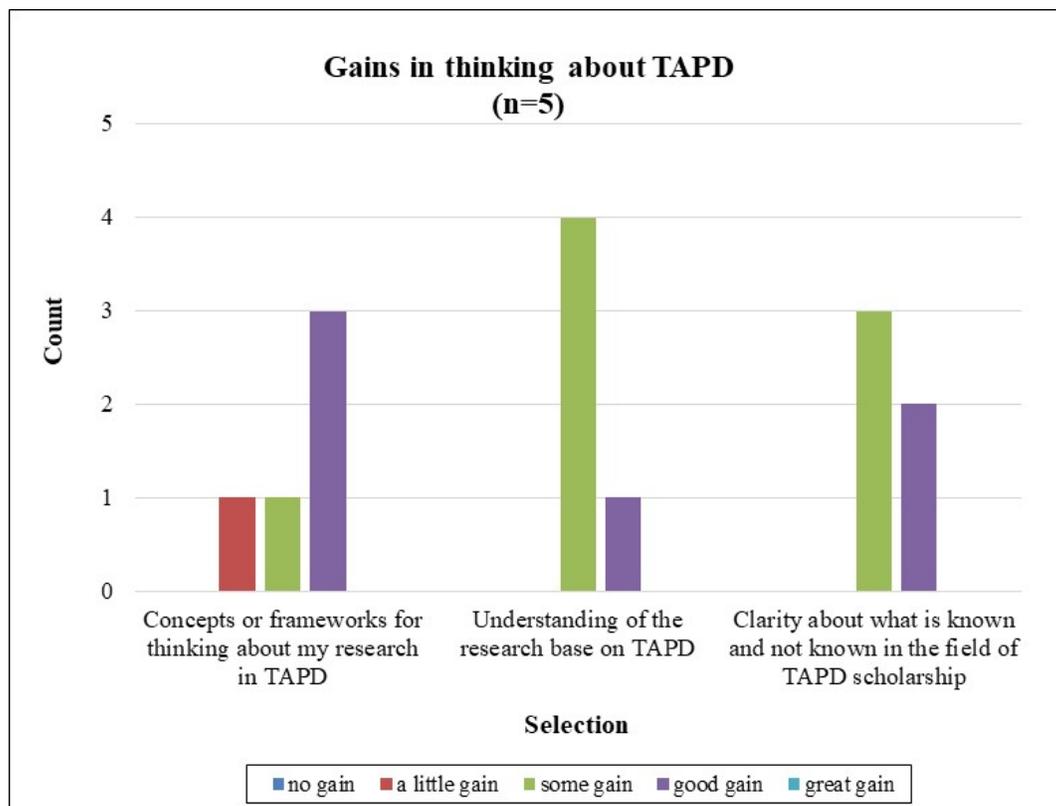


Figure 4.3: Researcher gains in *connecting to others*

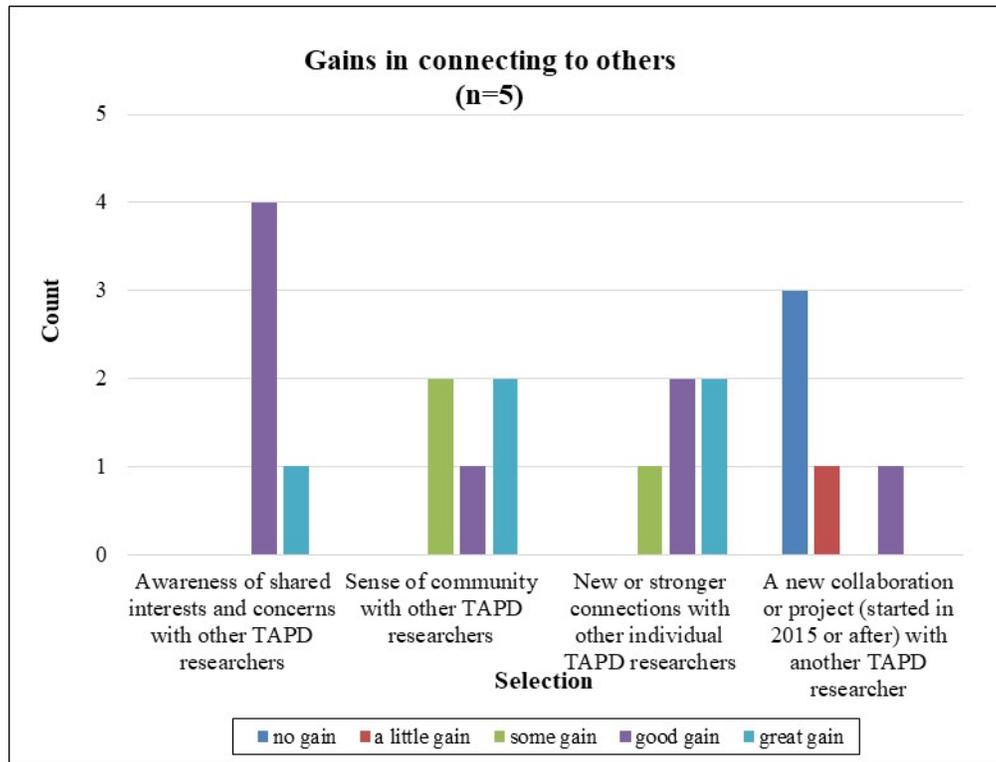


Figure 4.4: Researcher gains in *connecting research and practice*

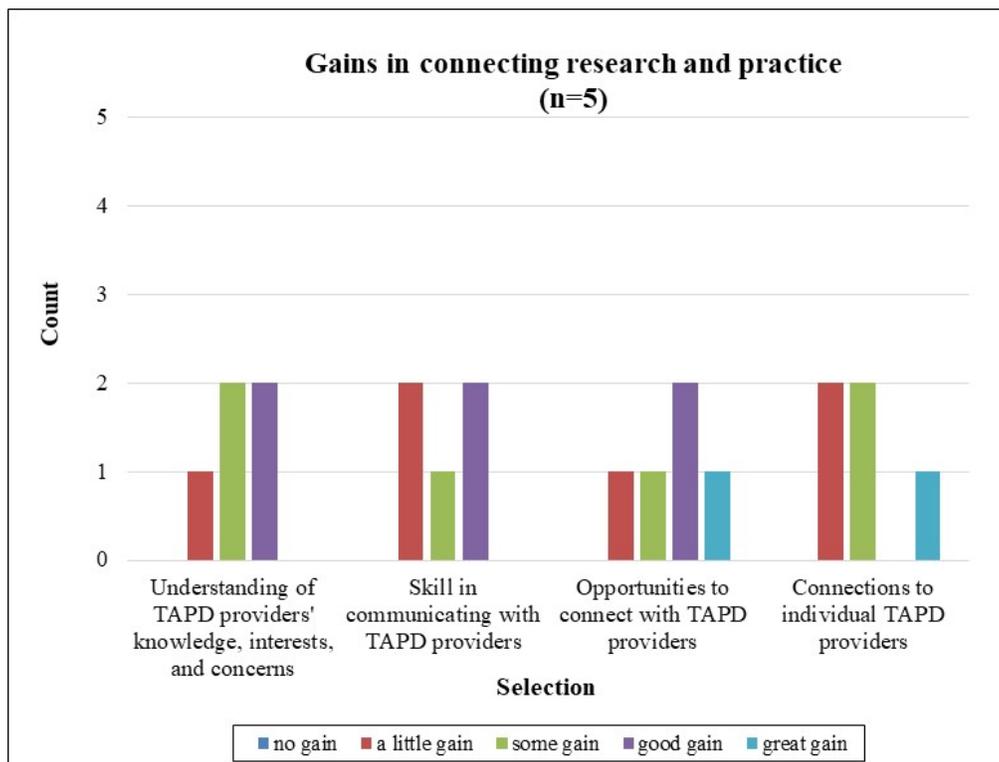
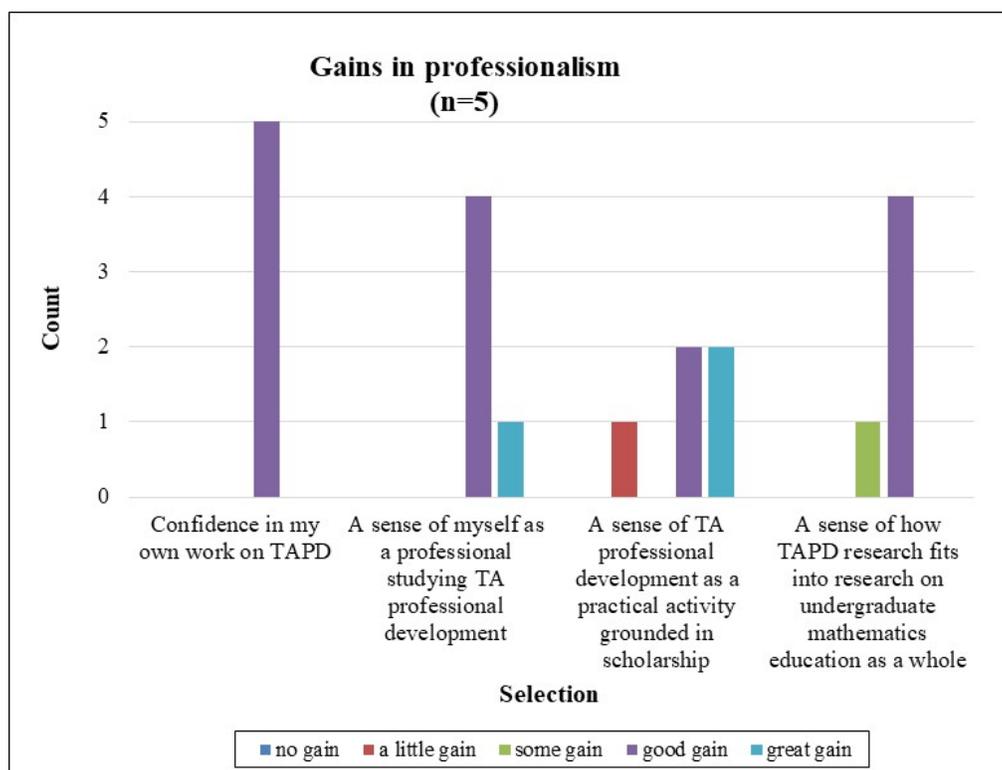


Figure 4.5: Researcher gains in *professionalism*



No one responded to the open-ended prompt for additional gains not covered elsewhere.

Table 4.1 shows the mean gains ratings for the five Researchers who attended a summer workshop and also participated in CoMInDS activities for Researchers, using a scale of 0 (no gain), 1 (a little gain), 2 (some gain), 3 (good gain), to 4 (great gain).

While the number of responses is small, the patterns in response suggest that the strongest gains for these respondents are in making connections to others and in professionalism. Making connections between research and practice, and conceptual gains related to research, are both lower-rated. This makes sense given the practical focus of the main workshop that these respondents attended. We suggest that their stronger sense of confidence and connection to other people is reinforced by participating in the summer workshop, relative to Researchers who participated in less intensive activities.

Table 4.1: Mean Gains for Researchers, by Item and Item Group

		Mean (5 responses/item)
Gains in thinking about TAPD research (means represent <i>some</i> gain)	Concepts or frameworks for thinking about my research in TAPD	2.4
	Understanding of the research base on TAPD	2.2
	Clarity about what is known and not known in the field of TAPD scholarship	2.4
Gains in connecting to others (means represent <i>a little to good</i> gain)	Awareness of shared interests and concerns with other TAPD researchers	3.2
	Sense of community with other TAPD researchers	3.0
	New or stronger connections with other individual TAPD researchers	3.2
	A new collaboration or project (started in 2015 or after) with another TAPD researcher	0.8
Gains in connecting research to practice (means represent <i>some</i> gain)	Understanding of TAPD providers' knowledge, interests, and concerns	2.2
	Skill in communicating with TAPD providers	2.0
	Opportunities to connect with TAPD providers	2.2
	Connections to individual TAPD providers	2.6
Gains in professionalism (means represent <i>good to great</i> gain)	Confidence in my own work on TAPD	3.0
	A sense of myself as a professional studying TA professional development	3.2
	A sense of TA professional development as a practical activity grounded in scholarship	3.0
	A sense of how TAPD research fits into research on undergraduate mathematics education as a whole	2.8

5. Participants' TAPD Programs

To gain a sense of the diversity of TAPD programs represented in the data, we asked respondents to describe factual and perceived features of their own program. Figures 5.1-5.2 show the distribution of program age and size.

Figure 5.1: Most TAPD programs are pre-existing but not long-lived

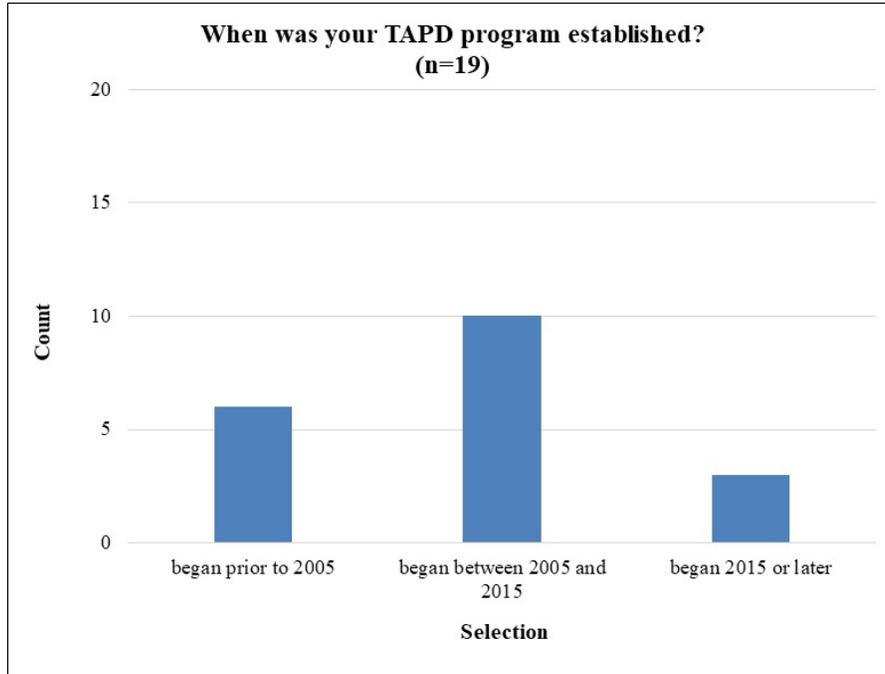
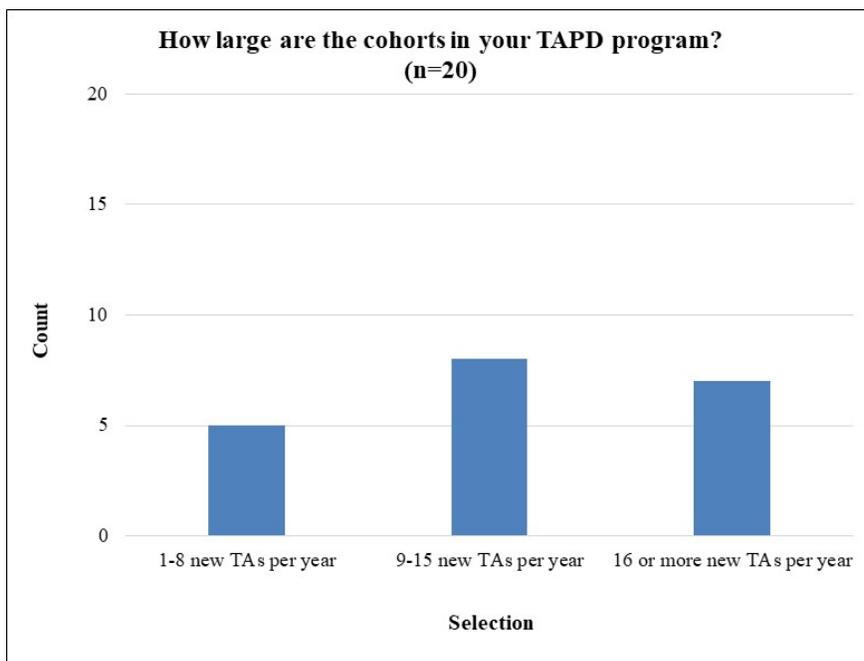


Figure 5.2: TAPD programs were diverse in size



We asked respondents to describe the level of support for TAPD that they perceived from key stakeholders. Figure 5.3 shows the reported support from chairs, deans, faculty in and outside the department, and the TAs themselves. Most respondents reported some to a lot of support from local stakeholders, with less support from faculty outside mathematics.

Figure 5.3: TAPD programs are most supported inside the department

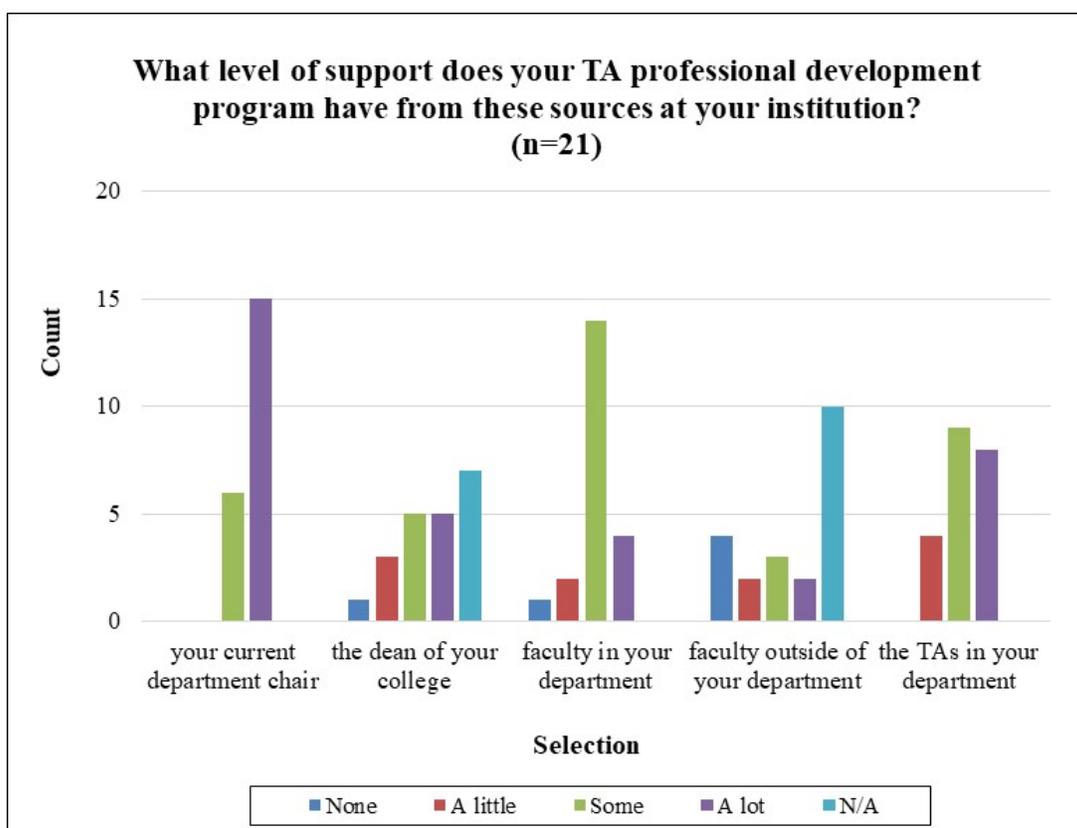


Table 5.1 shows the mean levels of support, using the scale 0 (none), 1 (a little), 2 (some), to 3 (a lot). N/A responses were omitted. Chairs, TAs and faculty in the math department were perceived as most supportive, while deans and faculty outside the department were not perceived as supportive.

Table 5.1: Perceived Level of Support for TAPD from Key Stakeholders

	Mean (21 responses per item)
Your current department chair	2.7
Dean of your college	1.3
Faculty in your department	2.0
Faculty outside your department	0.7
TAs in your department	2.2

We asked participants if they had made any changes in their TAPD program since becoming involved in CoMInDS. In all, seventeen people described changes—over half the sample. Ten people described changes to their course content or materials, with comments such as these:

- Yes, added video training to existing TAPD course, added different types of topics to graduate student seminar, added video requirements to courses taught by TAs.
- 1) I altered some activities in my 3-day initial "survival" TA training program. One activity I modeled off of Dave Kung's first presentation at the conference. 2) I used some of the video cases in our teaching seminar. 3) We've had two external speakers who respectively gave a colloquium and seminar that was focused on undergraduate mathematics education.
- I have included some of the activities included in the CoMInDS resource page into our TAPD program, and have started making changes to the focus of course coordination meetings to include more pedagogical discussions.
- We added more active learning examples and video examples to the TAPD initial training.
- I have implemented or updated activities in our TAPD program based on what we discussed at the CoMInDS workshop in 2017. The research and information discussed there allowed me to enhance my discussions with TAs about cooperative learning; content/pedagogical/pedagogical content/specialized content knowledge and how that is used in teaching; questioning skills; growth mindset; study skills.

Three people described efforts to extend or formalize evaluation of their TAPD programs.

- I am working on adding more peer interaction and feedback and better evaluation of the program in general.
- Made many minor tweaks (mainly to increase active participation) and introduced pre- and post-surveys to try and assess the efficacy of the program
- Although the University requires that we observe and evaluate all of our TAs each semester, it wasn't previously happening. As part of my job as TA Professional Development Coordinator, I now ensure that these evaluations happen and are properly documented by our faculty. I also follow up on TAs whose observations show that they may need more mentoring. I've also started a Math Teaching and Learning Seminar within our department.

Five people described structural changes: new courses, greater coherence, more extended TA support.

- Added full-year support seminar to summer workshop.
- We have been using what we learned at the CoMInDS workshop to develop a professional development course for our TAs which is currently planned to run for the first time in the Summer 2018 semester.
- We have restructured the approach and begun to look at it as a whole unit rather than a bunch of separate pieces. We are making connections between the different aspects and trying to make the larger program more coherent.
- Our program is running next year for the first time as a cohesive, fully structured course rather than informal mentoring. The CoMInDS workshop was instrumental to make the change happen.
- We try to incorporate an optional semester-long TAPD program in Fall 2016, but only a couple of TAs showed up. Currently we only have a pre-semester orientation TAPD program.

We also asked what changes they would like to make. Fourteen people provided answers of substance. Many reported more ambitious plans to broaden, deepen, or formalize their TAPD program, as these comments reflect:

- Implement an extended training before the beginning of the semester. Extend professional development opportunities to TAs beyond the first year. I also really like the videos available at <http://www.collegemathvideocases.org/> and I would like to use more of those in the TAPD program.
- Change it from a TAPD program during orientation for new TAs to a semester-long TAPD program for all new TAs.
- We currently have a course for first year TAs that needs a refresh. I'd also love to eventually create a follow-up course for 2nd or 3rd year students.
- Would like to improve our program for our 2nd year students --now that they have taught at least one class, would like to dig deeper.
- We are busy trying to make a long list of changes that we developed at the workshop. Our biggest concern now is to figure out how to assess and understand the impact of the changes we hope to implement next year.
- I would like to extend our training throughout the school year. It seems like we do an intensive training before school starts, but don't continue that support and throughout the year.
- I would like our seminar course for helping graduate students with their teaching be expanded to 3 hours, so whoever is teaching it has enough time to give it the proper attention it deserves.

Comments reporting changes to the content and pedagogy of the TAPD program included these:

- Set up some sort of observation/mentoring program for new TAs.
- More discussion by cohort of actual teaching practice.
- More written reflections as a start on a teaching statement.
- I would like more faculty involvement.
- I would like to offer more resources, both formally and informally, to TAs teaching their own courses. I would also like to have more evaluation of the TAs teaching besides the student evaluation and the once-per-semester faculty observation. Hopefully I will win over some support from the administration in my department.

Finally, a few people underscored their contentment with the changes they had made and described in the prior open-ended item:

- We are busy trying to make a long list of changes that we developed at the workshop. Our biggest concern now is to figure out how to assess and understand the impact of the changes we hope to implement next year.
- The whole structure of the program is the way we like it.
- The TA PD course is the change we have been wanting to make for several years, so we are excited to make this change a reality soon.

These responses are impressive given the relatively short time for action since the workshop. Many workshop participants made substantial changes to their TAPD programs, prompted by and drawing upon the CoMInDS resources.

Finally, as a measure of local culture around teaching, we probed norms around teaching as the respondent perceives them. Figure 5.4 shows the distribution of norms.

Figure 5.4: Most departments do not have strong norms for teaching

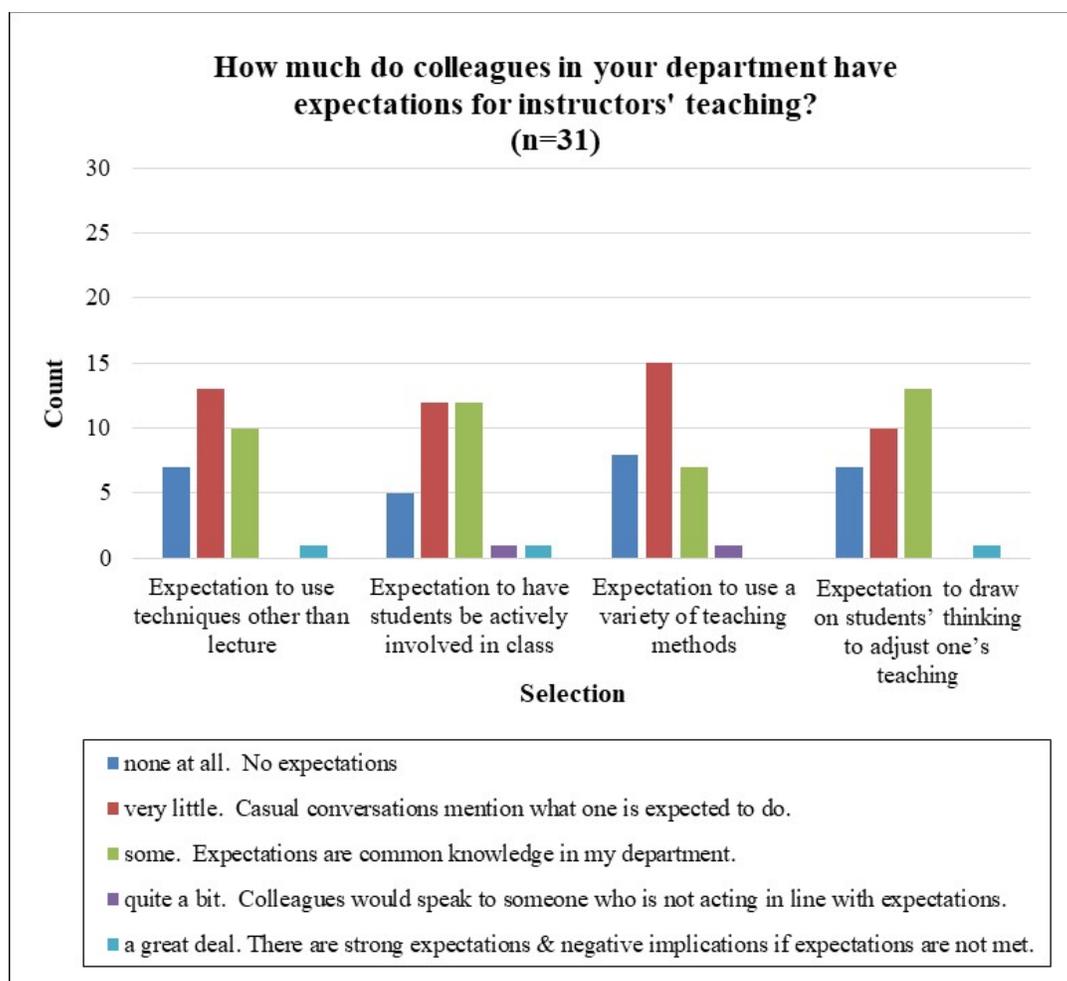


Table 5.2 shows the means, using the scale 0 (none), 1 (very little), 2 (some), 3 (quite a bit), to 4 (a great deal). In general, respondents did not report strong departmental norms for active engagement pedagogies, but there was wide variability in the norms reported by different individuals. The responses are similar to those who responded to the All-Comers survey.

Table 5.2: Departmental Expectations around Teaching

	Mean (31 responses per item)
Expectation to use techniques other than lecture	1.2
Expectation to have students be actively involved in class	1.4
Expectation to use a variety of teaching methods	1.0
Expectation to draw on students' thinking to adjust one's teaching	1.3

6. Participants' Professional Networks

Because CoMInDS explicitly sought to help TAPD Providers make fruitful connections, we asked respondents to describe their professional networks inside and outside their own institutions. External networks were slightly larger than internal networks. Separately, we will look for shifts in these networks as compared with pre-workshop reports.

Figure 6.1: TAPD Networks *inside* the Home Institution

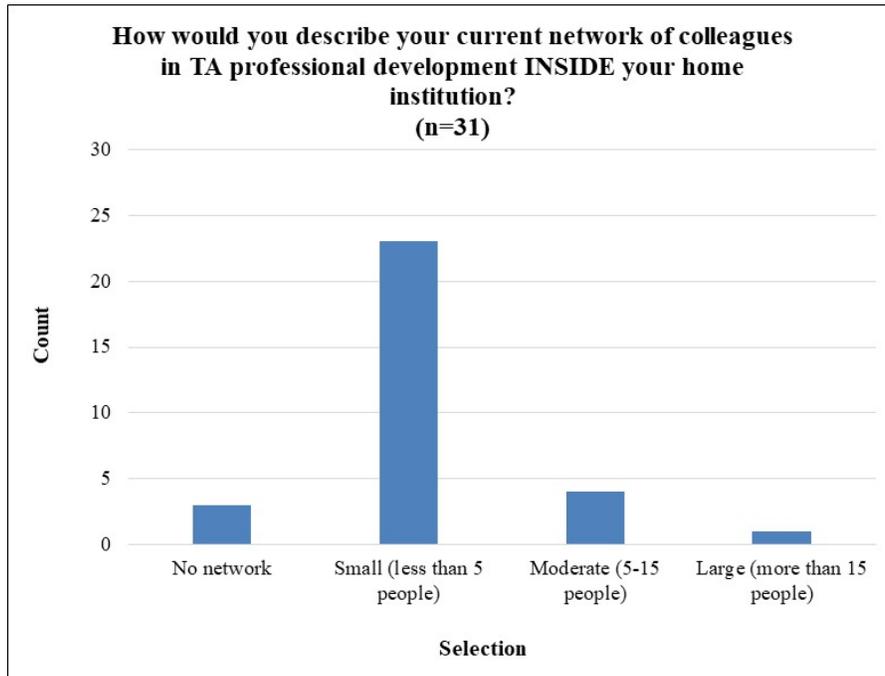
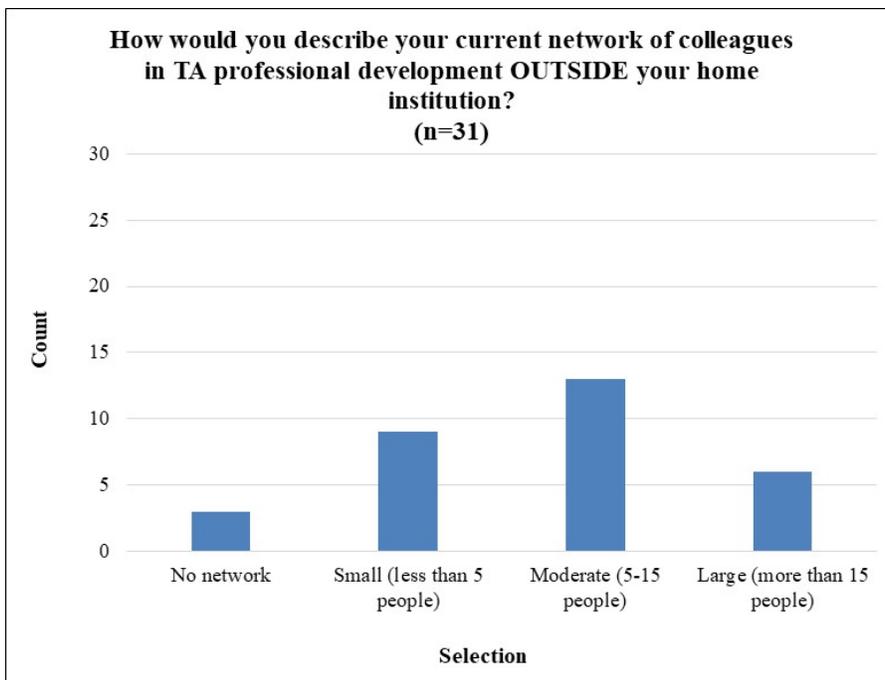


Figure 6.2: TAPD Networks *outside* the Home Institution



7. The CoMInDS Resource Suite

The CoMInDS instructional resource suite is not fully developed and launched yet, but a pilot version is available. We asked people if they had visited the site and (if so) if they had used any resources from it.

Figure 7.1: Nearly all respondents were familiar with the Resource Suite

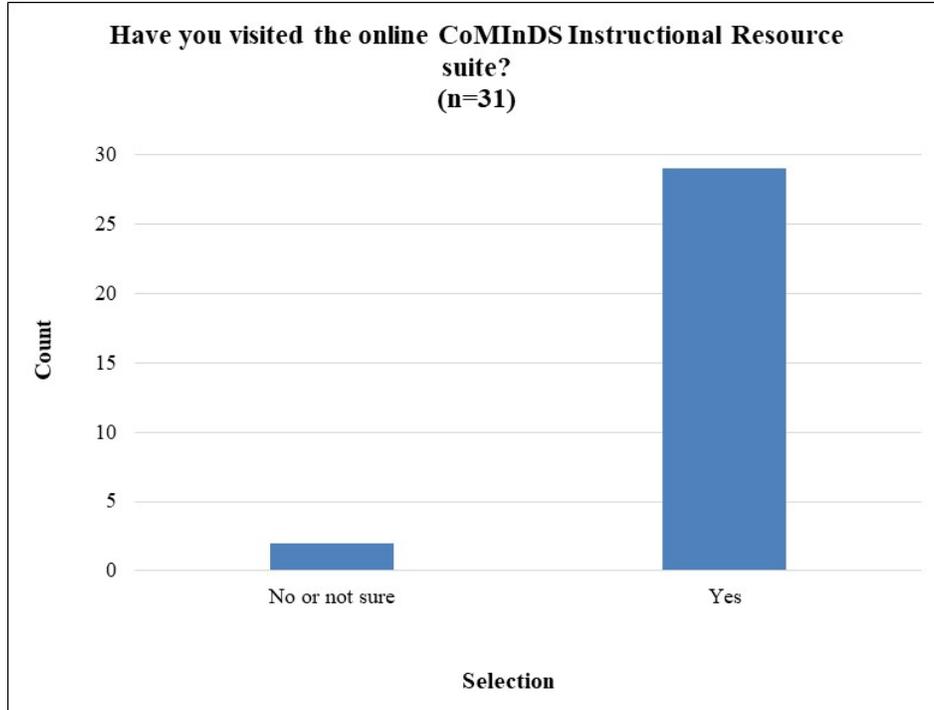
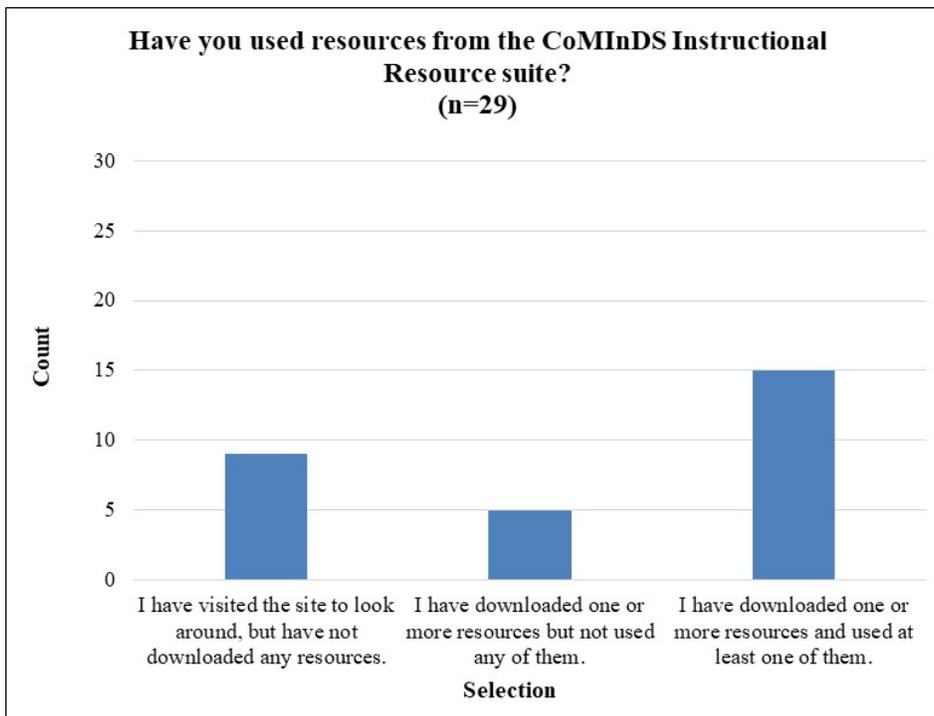
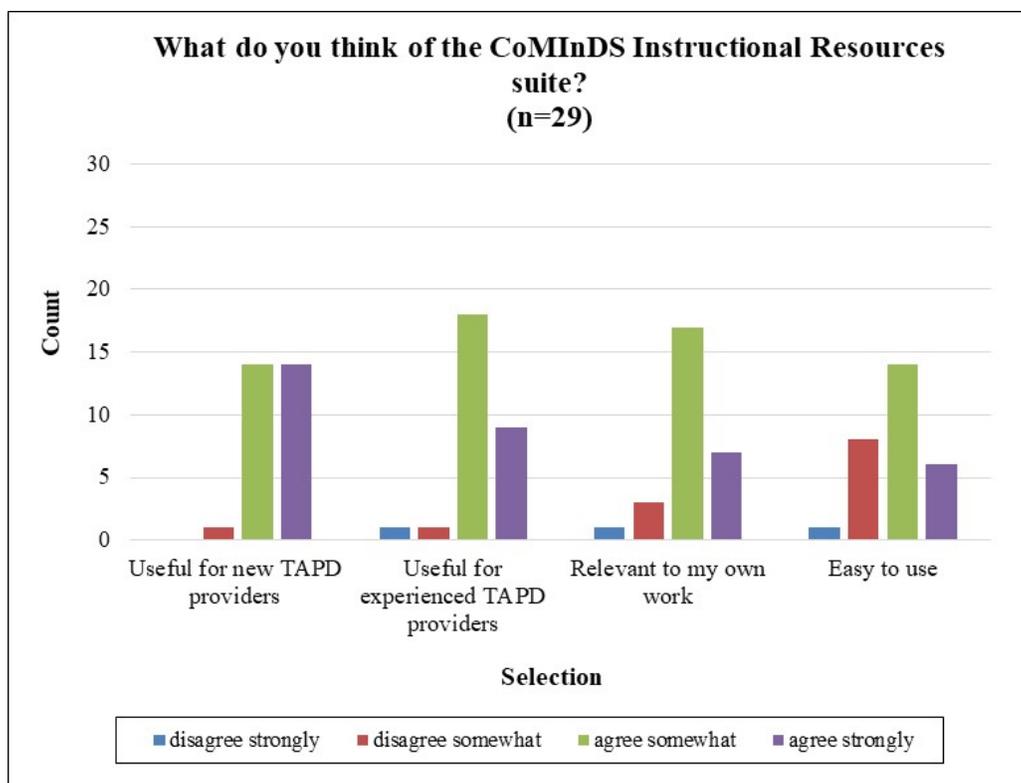


Figure 7.2: A plurality of respondents have used the Resource Suite



Of those who had visited the site to review or retrieve resources, impressions of its utility and relevance were generally positive. These ratings serve as a useful benchmark against which the forthcoming fully-powered site can be evaluated at a future opportunity.

Figure 7.3: Resource Suite visitors have largely positive impressions



Ten people responded to an open-ended prompt inviting suggestions to improve the Resource Suite. Two people hoped for more activities and videos, but the majority of comments (six) indicated it was difficult to navigate and find what they wanted, as these comments express:

- I am not sure how to fix this, but it is hard to sort through to find resources that I would find useful. It is a lot of material that I have been gradually going through. I have to download and read the material to know if it is relevant or useful for my purposes.
- ...I haven't visited it, especially recently. When I did go there it was difficult to find what I wanted. Maybe it has improved.

Other comments reflected the unfinished state of the website. The CoMInDS team is well aware of these concerns and the delays in rolling out the Resource Suite. This feedback does show that there is interest in the resources—but also that, when it is complete, active engagement strategies will be needed to recapture that interest among groups who were exposed to it but have not been able to make good use of it in the meantime.

8. Gots and Needs

Two open-ended prompts invited people to describe “the best” thing from participating in CoMInDS and the thing that would “help most” in future work on TAPD.

Responses to “best” things emphasized the value of exchanging ideas and sharing experiences with like-minded colleagues, and simply knowing that others shared their interests and concerns. Also highlighted were the high quality of the workshop resources and facilitators, and the opportunity to set aside dedicated time to do this work in a conducive environment—a luxury for many.

- Experience and information-sharing. Heard many interesting ideas
- Getting new ideas from session leaders and from other participants.
- Meeting people who hold similar positions to mine. Learning about other programs.
- The community aspect and meeting others who are also working on TAPD. I thought the most useful part of the workshop in Maine was getting a chance to talk to others about what they have done and what they plan to do.
- Participating with a colleague from my own institution; sharing with other such cohorts
- Meeting great people!
- 1. New Materials to expand our current Teaching Seminar 2. Participating in an expert execution of the techniques
- Knowing that there is a group of people who understand the need for TAPD programs and getting additional resources and information to improve our current program. I enjoyed the 2017 CoMInDS workshop; it was a fun and helpful group to work with.
- Meeting other people involved in TAPD.
- It was great to meet others from around the country who are involved with TAPD and to gain access to all of the resources on the website.
- Gaining perspective on what other institutions are doing with TAPD. Having an opportunity to talk and brainstorm ideas what changes that can be made to TAPD to reflect and promote pedagogical practices that we value as a community.
- I really appreciated meeting people in a variety of roles from many institutions struggling with the same or different issues. I wish I had had more time to contribute to the listserv, but definitely appreciated what I read there.
- The "How we learn" part was great in helping me putting myself in the students' shoes and I plan to use it with our TAs. The Resource Suite is an incredible source of materials.
- The resources
- Having 3 days in Maine to focus on TA Professional development with like-minded people! Having experienced researchers there helped too!!
- The CoMInDS suite to share and look at materials and also the listserv to be a part of a bigger conversation
- Networking opportunities & learning about other TAPD programs & researchers.

- Having time and context to think about and plan out our whole program.
- I loved how the facilitators modeled TAPD and active learning with us as workshop participants. I really like the video resources for GTAs to use for discussions and reflections on what they will do in the classroom.
- The facilitation of the sessions from the most recent meetings was outstanding. The facilitators created a respectful, productive environment for the attendees and useful information was discussed and shared.
- Connecting with colleagues. Meeting new people who I could network with.
- I felt re-energized in adapting my institution's current TAPD program. It was nice to speak with colleagues in a similar position to mine. This job can be really tough and lonely.

Things that would “help most” included three main types of needs. Some people identified a need for more and different resources, a need that may be addressed with the intended launch of a reorganized CoMInDS Resource Suite on a new platform.

- Put more of a focus on what are the learning objectives for TAPD and how can different assignments/activities be used to help achieve those objectives.
- Ideas for TAPD seminar topics and activities. I host biweekly seminars that I plan and create myself. Sometimes I run out of good ideas. It would be nice to have that all collected in one place. I also struggle to find good teaching videos for my TAs to critique. I've seen the videos on collegevideomathcases.org but they are far too specifically tailored to be of much use to me.
- more video resources on the web site

Others hoped for further professional development opportunities that would provide chances to participate with colleagues, advanced learning opportunities, and ongoing collegial discussions. The CoMInDS team is actively considering other models for offering professional development; efforts to stimulate the workshop-specific email lists have been only partially successful.

- 1. How to best evaluate our current programs 2. More workshops—I would like to go again with some colleagues.
- Workshop for advanced TAPD providers (e.g., people who have an established program, but want to improve on it or assess it).
- ongoing discussion with fellow CoMInDS participants, e.g. through listserv, of who's doing what and how well it's working
- Maintaining connections and sharing things in a more meaningful way than email exchanges.
- Continued networking with other CoMInDS participants and providers of TAPD.
- Continuing the support system through the CoMInDS group for new ideas.... I'm not sure where to take my program next!
- Something that continues to keep us in contact with other faculty involved in TAPD. The occasional question from the organizers to start a conversation don't seem to be all that effective, but I don't have any great ideas on how to do that.

Finally, additional comments identified needs for structural and cultural changes at respondents' home institutions. CoMInDS cannot directly address these local needs but may wish to consider how it can assist Providers in advocating for their programs.

- More acceptance that this is an important part of TA development among faculty.
- More colleagues at my institution to assist with TAPD.
- Having enough time to prepare and work on TAPD. I feel my other responsibilities as an instructor in the department do not give me the time I would like to put into our TAPD. If it was possible to get the department/university to value TAPD enough to give a course release to focus on it would be ideal.
- I would love to know how/where to apply for a small grant to have some funds. I have lots of ideas of things I could do to improve TA development, but most require some financial resources. I do not know where/how to start looking for this.
- Mostly things at my own institution. Scheduling for teaching, valuing teaching, valuing students... lots of things. It can be pretty discouraging sometimes to think I'm making any sort of a difference because our structures don't reward good teaching.

In sum, the results show that the summer intensive workshops reached a very suitable audience of TAPD Providers who took away useful knowledge and made valued connections. The extent to which they applied this new knowledge in making desired changes in their local TAPD programs is impressive. Additional needs are identified that suggest areas for future work.

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Appendix—Survey Instrument

CoMinDS Project Outcomes survey: Workshop follow-up

Welcome to the CoMinDS workshop

Dear colleague,
the CoMinDS project (College Mathematics Instructor Development Source) seeks to support math departments in providing high-quality professional development (PD) to graduate student teaching assistants (TAs). CoMinDS has been supported by the National Science Foundation and sponsored by the Mathematics Association of America.

As our project comes to an end, we ask you to please take a few minutes to answer some questions about your TA professional development (TAPD) program and your participation in CoMinDS. This information will help the project team understand what you have gained -- or not -- from CoMinDS programming, and will help us plan for the future.

Your participation is voluntary. You may skip questions you do not wish to answer, or choose not to participate. Your answers are anonymous and will not be reported in any form that identifies you individually; they will be part of an aggregate analysis of all survey responses. The project team will not know how you answered individually; the data are seen only by the evaluation team. Thank you for your candid responses!

By completing this survey, in part or in whole, you are agreeing to the use of these data in understanding how to improve the CoMinDS project and reporting to our funder, the National Science Foundation.

Ethnography & Evaluation Research is an independent research group serving as external evaluator for the CoMinDS project. We very much appreciate your assistance. Please contact me with any questions or concerns.

--Sandra Laursen, study director

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On behalf of the CoMinDS team:

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CoMInDS Project Outcomes survey: Workshop follow-up**Your institution and role****For this survey, we use the terms**

- **TA for all graduate teaching assistants, recognizing that different institutions may use different titles**
- **TAPD for professional development focused on teaching that is offered to graduate TAs in math at your institution**

1. What roles do you play in TA professional development (TAPD)? Check all that apply.

Provider: I deliver or help deliver TAPD at my institution

Researcher: I study TAPD or a closely related topic

Something else: Please explain

CoMInDS Project Outcomes survey: Workshop follow-up

Your involvement with CoMInDS

For this survey, we use the terms

- **TA - all graduate teaching assistants, recognizing that different institutions may use different titles**
- **TAPD - professional development focused on teaching that is offered to graduate TAs inmath**
- **Providers - people who help deliver TAPD at their institution**

2. Have you participated in any CoMInDS activities for TAPD providers? Check all that apply.

- Working meeting for experienced TAPD providers, Washington DC, July 2015
- Regional workshop at Duke U., February 2016
- Regional workshop at Harvard U., April 2016
- Regional workshop at Harvard U., September 2017
- Local CoMInDS mentoring group
- National workshop for TAPD providers at U. Maine, June 2016
- National workshop for TAPD providers at U. Maine, June 2017
- Webinar series, fall 2016, "Preparation of New Instructors to Teach Undergraduate Mathematics"
- Listserv for a CoMInDS provider group
- I did NOT participate in any CoMInDS activities for TAPD providers.*

CoMInDS Project Outcomes survey: Workshop follow-up

Your gains from participating in CoMInDS - 1

How much have you **GAINED** in the following areas from your participation in CoMInDS provider activities?

3. Gains in thinking about TAPD

	no gain	a little gain	some gain	good gain	great gain
Clarity about the goals of my institution's TAPD program	<input type="radio"/>				
Clarity about the vision of teaching and learning that my institution's TAPD program espouses	<input type="radio"/>				
Concepts or frameworks for thinking about my institution's TAPD program	<input type="radio"/>				
Concepts or frameworks for thinking about active learning and teaching	<input type="radio"/>				

4. Gains in programming for TAPD

	no gain	a little gain	some gain	good gain	great gain
Understanding of the research base about teaching and learning	<input type="radio"/>				
Specific activities or programming that I have already used in my TAPD program	<input type="radio"/>				
Specific activities or programming that I plan to use in my TAPD program	<input type="radio"/>				

5. Gains in approaches to improving TAPD

	no gain	a little gain	some gain	good gain	great gain
Ideas or strategies for addressing specific challenges of my institution's TAPD program	<input type="radio"/>				
Ideas or strategies or improving other aspects of my institution's undergraduate math program	<input type="radio"/>				
Understanding of whether/when evaluating my institution's TAPD program may be useful	<input type="radio"/>				
Understanding of how to evaluate my institution's TAPD program	<input type="radio"/>				

CoMInDS Project Outcomes survey: Workshop follow-up

Your gains from participating in CoMInDS - 2

How much have you GAINED in the following areas from your participation in CoMInDS provider activities?

6. Gains in connecting to others

	no gain	a little gain	some gain	good gain	great gain
Awareness of shared interests and concerns with other TAPD providers	<input type="radio"/>				
Sense of community with other TAPD providers	<input type="radio"/>				
New connections with other individual TAPD providers	<input type="radio"/>				
Information by which to compare my own institution's TAPD program with other programs	<input type="radio"/>				

7. Gains in professionalism

	no gain	a little gain	some gain	good gain	great gain
Ideas or strategies to improve my own undergraduate teaching	<input type="radio"/>				
Confidence in my own work on TAPD	<input type="radio"/>				
A sense of myself as a professional working in TA professional development	<input type="radio"/>				
A sense of TA professional development as a practical activity grounded in scholarship	<input type="radio"/>				

8. Did you make any other gains not mentioned here? Please tell us about them!

CoMInDS Project Outcomes survey: Workshop follow-up**Additional TAPD roles**

9. In addition to your TAPD provider role, are you ALSO a researcher studying TAPD or closely related topics?

- no
- yes

CoMInDS Project Outcomes survey: Workshop follow-up**Your involvement with CoMInDS - Researchers****For this survey, we use the terms**

- **TA - all graduate teaching assistants, recognizing that different institutions may use different titles**
- **TAPD - professional development focused on teaching that is offered to graduate TAs inmath**
- **Researchers - people who study TAPD or closely related topics**

10. Have you participated in any CoMInDS activities for TAPD researchers? Check all that apply.

- Working meeting for experienced TAPD providers & researchers in Washington DC, July 2015
- In-person working group meeting, Research in College Mathematics Instructors Professional Development (CMI), 2015 (at RUME, Pittsburgh)
- In-person working group meeting, Research in College Mathematics Instructors Professional Development (CMI), 2016 (RUME, Pittsburgh)
- In-person working group meeting, Research in College Mathematics Instructors Professional Development (CMI), 2017 (RUME, San Diego)
- One or more online meetings (2015-17), Research in College Mathematics Instructors Professional Development (CMI) working group
- Online or face-to-face review of the CoMInDS resource suite materials
- Contributing online resources to the CoMInDS resource suite
- I did NOT participate in any CoMInDS activities for researchers.*

CoMInDS Project Outcomes survey: Workshop follow-up

Your gains from participating in scholarly activities with CoMInDS - Researchers 1

How much have you **GAINED** in the following areas from your participation in CoMInDS researcher activities?

11. Gains in thinking about TAPD

	no gain	a little gain	some gain	good gain	great gain
Concepts or frameworks for thinking about my research in TAPD	<input type="radio"/>				
Understanding of the research base on TAPD	<input type="radio"/>				
Clarity about what is known and not known in the field of TAPD scholarship	<input type="radio"/>				

12. Gains in connecting to others

	no gain	a little gain	some gain	good gain	great gain
Awareness of shared interests and concerns with other TAPD researchers	<input type="radio"/>				
Sense of community with other TAPD researchers	<input type="radio"/>				
New or stronger connections with other individual TAPD researchers	<input type="radio"/>				
A <u>new</u> collaboration or project (started in 2015 or after) with another TAPD researcher	<input type="radio"/>				

CoMInDS Project Outcomes survey: Workshop follow-up

Your gains from participating in scholarly activities with CoMInDS - Researchers 2

How much have you GAINED in the following areas from your participation in CoMInDS researcher activities?

13. Gains in connecting research and practice

	no gain	a little gain	some gain	good gain	great gain
Understanding of TAPD providers' knowledge, interests, and concerns	<input type="radio"/>				
Skill in communicating with TAPD providers	<input type="radio"/>				
Opportunities to connect with TAPD providers	<input type="radio"/>				
Connections to individual TAPD providers	<input type="radio"/>				

14. Gains in professionalism

	no gain	a little gain	some gain	good gain	great gain
Confidence in my own work on TAPD	<input type="radio"/>				
A sense of myself as a professional studying TA professional development	<input type="radio"/>				
A sense of TA professional development as a practical activity grounded in scholarship	<input type="radio"/>				
A sense of how TAPD research fits into research on undergraduate mathematics education as a whole	<input type="radio"/>				

15. Did you make any other gains besides these? Please describe them.

CoMInDS Project Outcomes survey: Workshop follow-up

Dimensions of your TAPD program

Next we'll ask about some features of your TAPD program and teaching in your department.

16. When was your TAPD program established?

- began prior to 2005 began between 2005 and 2015 began 2015 or later

17. How large are the cohorts in your TAPD program?

- 1-8 new TAs per year 9-15 new TAs per year 16 or more new TAs per year

18. Since you became involved with CoMInDS, have you made any changes in your TAPD program? Please describe.

19. What changes would you *like* to make in your institution's TAPD program?

CoMInDS Project Outcomes survey: Workshop follow-up

Dimensions of your TAPD program - 2

20. What level of support does your TA professional development program have from these sources at your institution?

	None	A little	Some	A lot	N/A
your current department chair	<input type="radio"/>				
the dean of your college	<input type="radio"/>				
faculty in your department	<input type="radio"/>				
faculty outside of your department	<input type="radio"/>				
the TAs in your department	<input type="radio"/>				

CoMInDS Project Outcomes survey: Workshop follow-up

Your teaching context

21. How much do colleagues in your department have expectations for instructors' teaching?

	<i>not at all.</i> No expectations	<i>very little.</i> Casual conversations mention what one is expected to do.	<i>some.</i> Expectations are common knowledge in my department.	<i>quite a bit.</i> Colleagues would speak to someone who is not acting in line with expectations.	<i>a great deal.</i> There are strong expectations & negative implications if expectations are not met.
Expectation to use techniques other than lecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectation to have students be actively involved in class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectation to use a variety of teaching methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectation to draw on students' thinking to adjust one's teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CoMInDS Project Outcomes survey: Workshop follow-up

Your professional network

22. How would you describe your current network of colleagues in TA professional development INSIDE your home institution?

- No network Small (less than 5 people) Moderate (5-15 people) Large (more than 15 people)

23. How would you describe your current network of colleagues in TA professional development OUTSIDE your home institution?

- No network Small (less than 5 people) Moderate (5-15 people) Large (more than 15 people)

CoMInDS Project Outcomes survey: Workshop follow-up

The CoMInDS resource suite

24. Have you visited the online [CoMInDS Instructional Resource suite](#)?

No or not sure

Yes

CoMInDS Project Outcomes survey: Workshop follow-up

The CoMInDS resource suite 2

25. Have you used resources from the CoMInDS Instructional Resource suite?

- I have visited the site to look around, but have **not downloaded** any resources.
- I have downloaded one or more resources but **not used** any of them.
- I have downloaded one or more resources and **used at least one** of them.

26. What do you think of the CoMInDS Instructional Resources suite?

	disagree strongly	disagree somewhat	agree somewhat	agree strongly
Useful for new TAPD providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Useful for experienced TAPD providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relevant to my own work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The resource suite would be better if ...

CoMInDS Project Outcomes survey: Workshop follow-up

Broad gains and future needs

27. What one or two things were *the best* from participating in CoMInDS?

28. What one or two things would help you *most* in your future work on TAPD?

CoMInDS Project Outcomes survey: Workshop follow-up

Your professional context

Please tell us a bit about how TAPD fits in with the rest of your work.

29. How does TAPD rank in your work priorities?

	low	medium	high
TAPD is a professional interest for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing TAPD is a priority for my work time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studying TAPD is a priority for my work time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. Which of the following activities does your work include?

	little or none of my time	once in a while	some of my time	much of my time
carrying out TA professional development & support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
coordinating undergraduate courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
teaching undergraduate courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
teaching graduate courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
advising undergraduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
advising graduate students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
administering departmental programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
conducting research in mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
conducting research in mathematics education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
conducting mathematics outreach beyond my institution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

something else: please explain

CoMInDS Project Outcomes survey: Workshop follow-up

Your professional context - 2

31. In your own current teaching, how often do you use each of these teaching methods?

	never	sometimes	often	always
instructor presents content by lecturing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
instructor demonstrates content or works through problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
students demonstrate content or work through problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
whole class discussion or Q&A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
small group work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use of multi-media or computer simulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
real-time polling or clickers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CoMInDS Project Outcomes survey: Workshop follow-up

Demographic information 1

This workshop is funded by the National Science Foundation, a federal agency that requires that data about participants be collected in a form that can be analyzed for differences by gender, race, ethnicity and citizenship status.

32. How do you describe your gender?

- woman
- man
- non-binary
- prefer not to answer

Please explain, if you like

33. What is the highest degree offered in the mathematics department?

- Two-year degree (AA or AS)
- Four-year degree (BA or BS)
- Master's degree (MA or MS)
- PhD

Other (please specify)

34. NSF requires race and ethnicity information for US citizens, US nationals, and permanent residents. Do any of these describe you?

- Yes (I am a US citizen, US national, or permanent resident)
- No, none of these describe me

CoMInDS Project Outcomes survey: Workshop follow-up

Demographic information 2

35. Your ethnicity:

- Hispanic or Latino/a
- Non-Hispanic or Latino/a
- Prefer not to answer

36. Your race (please check all that apply)

- American Indian or Alaskan Native
- Asian
- Black or African American
- Native Hawaiian or Pacific Islander
- White
- Prefer not to answer
- Other (please specify)

CoMInDS Project Outcomes survey: Workshop follow-up

Matching questions

In order to match these data with your responses to prior surveys, we need a stable and unique identifier for each respondent. Your answers to the next two questions will be used to generate a unique string of letters and numbers to identify you but preserve confidentiality. This information will not be used for any other purpose.

* 37. Please enter your birthdate.

Date / Time

MM	DD	YYYY
<input type="text"/>	<input type="text"/>	<input type="text"/>

* 38. What model car do you drive?

CoMinDS Project Outcomes survey: Workshop follow-up

Thanks!

Many thanks for completing this survey!
We appreciate your help. Please contact me with any questions.

Sandra Laursen
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