

College mathematics instructor professional development providers: Who are they?

Over the last decade, significant growth has occurred within undergraduate mathematics education research. Research, development projects, professional conferences, and policy documents have generated and shared knowledge about people learning to be college mathematics instructors. Central to effective development of new college instructors are the *Providers*, people who support professional growth in teaching in activities such as seminars and workshops. Providers are critical to sharing the knowledge generated by research. Little is known about who becomes a Provider, why they do, and the knowledge needed for being a good Provider. The positions held by Providers vary locally according to departments' needs. Only recently have Provider professional communities (Wenger et al., 2002) emerged. This editorial offers insight into projects, resources, and findings around Providers and the contributions Providers make in shaping future improvements in undergraduate mathematics instruction.

1 | PROJECTS AND INITIATIVES

1.1 | Documents and resources

The last decade has seen several national efforts to support Providers' own professional development. The *College Mathematics Instructor Development Source* (CoMInDS) (Mathematical Association of America [MAA], 2020) is a significant example. Funded by the National Science Foundation (NSF DUE #1432381), the project created a library of resources for Providers to use in working with novice college mathematics instructors (e.g., graduate student teaching assistants and new instructors-of-record). The project also offered workshops where Providers collaborated and developed new resources to add to the library. The CoMInDS materials are now hosted by MAA as part of MAA Connect. Another noteworthy effort was the *Instructional Practices Guide* (IPG) (MAA, 2018). Developed and published by MAA, the IPG offers evidence-based best-practices for undergraduate mathematics teaching and learning. The CoMInDS resources and the IPG are valuable in supporting Providers to advocate for improved teaching within mathematics departments.

1.2 | Conferences

In addition to these resources, the MAA-affiliated national conference on Research in Undergraduate Mathematics Education (RUME) has been a center for growth. Over the years, the conference has expanded from a focus on student learning and teaching of proof to encompass a broad range of research in postsecondary mathematics. The conference now averages 350 attendees and accepts as many presentations and papers about instruction, including instructor development, as it does on student learning and cognition. Additional regional RUME conferences have been established (e.g., the Northeast RUME) to provide more opportunities for RUME researchers to collaborate.

1.3 | Funded projects

State and national funding agencies have an interest in research and development related to Providers. In addition to funding the CoMInDS project, the NSF has funded peer-mentoring programs for novice instructors (Rogers et al., 2017), larger scale research and development of professional learning for college teaching through the *Student Engagement in Mathematics through an Institutional Network for Active Learning* project (SEMINAL; Gobstein, 2016), and a project with regional hubs exploring the development of graduate teaching assistants using equity-aware and evidence-based teaching methods (Beisiegel & Pilgrim, 2020). Another recent NSF-funded project is building on the work of CoMInDS to better understand who Providers are, what they provide, and how best to support them: *Improving the Preparation of College Mathematics Instructors to Implement Student-centered, Inclusive Teaching* (Yee & Hauk, 2020). In 2022 this project conducted a national survey, sent to hundreds of people responsible for supporting learning about teaching by novice college mathematics instructors (e.g., university department chairs, course coordinators, workshop facilitators, seminar leaders). Results are being used to generate a tool for Providers to design, build, and

TABLE 1 Main group for professional development around teaching in your department.

Group	% of respondents ^a
GTA: Graduate Teaching Assistant; assists in teaching (e.g., recitation or problem sessions)	42%
GSI: Graduate Student Instructor; is instructor-of-record	34%
Novice Faculty Instructor: Faculty who are new to teaching at your institution	8%
ULA: Undergraduate Learning Assistant, supports instruction	1%
Other^b (briefly describe)	16%

^aMay not sum to 100 due to rounding.

^bThe “Other” category included both GSI and GTA (9, 9%), post-docs (3), and full and part-time faculty, not just novices (1).

tune local programs for preparing the next generation of college mathematics instructors. Fundamentally, the current challenge is helping Providers sort through existing materials and community connections to benefit their institutions.

2 | WHO ARE PROVIDERS?

To understand Providers, it is helpful to understand their work demands—audiences, structures, and topics. There are many types of instructors in college mathematics settings (e.g., graduate students leading discussion section or teaching as instructor-of-record, teaching faculty, research faculty) and types of institutions (2-year college, 4-year master's granting, 4-year doctoral granting). Here we offer a few highlights from the recent survey of Providers reported by Yee et al. (2023). More than 200 people completed parts of the survey, 95 of whom responded to all the items and reported that they considered themselves Providers for their higher education institution.

2.1 | Audience: Providing to whom?

The survey was aimed at Providers of professional learning for novice college mathematics instructors. We asked the Providers to choose one specific target group (one type of novice instructor) that their department considered central to the Provider's role. Table 1 summarizes the responses. What is notable in these results is that more than 80% reported a focus on graduate students—including graduate students who are teaching assistants (42%), instructor-of-record (34%), or both (9%).

TABLE 2 Faculty position for Providers.

Position	% of respondents ^a
Teaching Faculty	42%
Tenure-Track Research Faculty	35%
Tenure-Track Teaching Faculty	3%
Adjunct Faculty (i.e., time-limited contract)	3%
Other ^b (briefly describe)	17%

^aMay not sum to 100 due to rounding.

^bThe “Other” category included department chairs or directors (5), post-docs (2), and researchers (2).

TABLE 3 PD structures used by Providers.

Structure of PD	Percentage of responses ^a	N (% of respondents)
Presemester orientation	32%	83 (87%)
Meetings with coordinator	27%	69 (73%)
One course	19%	48 (51%)
Multiple seminars or workshops	10%	25 (26%)
Multiple courses	5%	14 (15%)
One seminar or workshop	2%	4 (4%)
Other ^b (briefly describe)	6%	15 (16%)

^aThe percentage of responses is the proportion of all responses (hence this column sums to 100%) while the *N* represents the number of respondents out of 95.

^bThe “Other” category included non-mandated seminars (4), mentoring structure (3), teaching certification programs (2), coaching (1).

2.2 | Faculty position of providers

We asked Providers to share their faculty position. As indicated in Table 2, 80% reported being either non-tenure-line Teaching Faculty (42%) or tenure-track faculty (38%). The majority being teaching faculty may not be surprising, but it does raise questions around a Provider's role in the department. As Providers tend to focus on graduate students (Table 1), it is worth noting that non-tenure-line teaching faculty have about as much responsibility for supporting graduate student's learning about teaching as do tenure-line faculty.

2.3 | Structures

We asked Providers to share the structures of the professional learning opportunities offered to novices in their departments. It is important to note that respondents could choose multiple structures. In Table 3, 87% of

respondents reported that presemester orientation was a structure they used and such a presemester effort represented about one third (32%) of reported structures. Other common structures were course coordination meetings (reported by 73% of respondents) and one or more formal courses about teaching (reported more than half of respondents).

2.4 | Conclusion

The highlights from Tables 1–3 provide details about Providers within the United States. First, Providers who focus on novice instructors report working mostly with graduate students (Table 1), who are the next generation of mathematics faculty. Second, nearly half of responding Providers were non-tenure-line teaching faculty (Table 2). This raises important questions such as, are there credentials or experiences necessary for Providers? What kinds of expertise do Providers have (and how did they get it) to equip them for the role? Table 3 illustrates that among many structures employed by Providers, presemester orientation and course coordination meetings are the most common. A little over half of respondents reported teaching a course about teaching college mathematics. This survey data helps in identifying what is currently being done by Providers. With continued development of policies, resources, and funded projects, it will be critical to see how Providers' target audiences and roles change and how structures for supporting others to learn about teaching college mathematics evolve.

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