Faculty Learning at the Individual and Group Level

A Multi-Year Analysis of an Interdisciplinary Science Faculty Learning Community Focused on Inclusive Teaching and Mentoring

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Unaware of the diverse challenges faced by students, faculty can unintentionally create environments that discourage student persistence especially for students who are historically underrepresented in STEM. However, through inclusive teaching and mentoring practices, faculty can construct a positive classroom climate that contributes to students' sense of belonging and persistence in STEM. Faculty learning communities (FLCs) provide a potential mechanism for providing faculty support in developing and successfully implementing inclusive practices. In this article, we describe (a) the implementation of a FLC focused on inclusive teaching and mentoring practices among science faculty across disciplines and ranks, (b) how participation in this multiyear, interdisciplinary FLC contributed to changes at the individual and group levels, including changes in faculty knowledge, skills, and implementation of inclusive teaching and mentoring practices, and (c) the ways in which the FLC fostered accountability for both individual and group goals. Implications for future initiatives designed to support science education reform through individual and institutional change are discussed.

A majority of careers being created today require a four-year STEM degree (Carnevale et al., 2010). While STEM jobs have grown at three times the rate of non-STEM jobs (Langdon et al., 2011), this trend has not yet translated into increased numbers of undergraduate STEM degrees. Instead, more than 50% of undergraduates who enroll in STEM programs leave before completing (NSF, 2017).

Undergraduates leave STEM programs, at least in part, because STEM fields have a reputation for a chilly classroom climate that has been documented extensively for students who have been historically underrepresented, such as women (Moss-Racusin et al., 2012), people of color (Carlone & Johnson, 2007; Harper, 2012; Johnson, 2007; Ong et al., 2011), and low-income community college transfer students (Packard et al., 2011; Reyes, 2011). Unaware of the diverse challenges faced by students, faculty may discourage students from interactions (Mervis, 2010; NASEM, 2016; Seymour & Hewitt, 1997), underestimate students (Reyes, 2011), or overlook their full potential (e.g., Carlone & Johnson, 2007). But the news is not all grim. Through the use of inclusive teaching and mentoring practices, faculty can construct a positive classroom climate that contributes to students' sense of belonging and persistence (Dewsbury & Brame, 2019; Hausmann et al., 2007; Luna & Prieto, 2009). Within STEM, faculty work with students often extends beyond the classroom into the laboratory and/or field; conversations in these spaces often involve students' longer-term plans and career pathways (e.g., Hunter et al., 2007). For this reason, this article addresses both inclusive teaching and mentoring practices in order to signal the broad scope of STEM discussions in and out of the classroom.

Defining inclusive teaching and mentoring practices

Inclusive teaching practices refer to a set of pedagogical approaches where faculty intentionally recognize that learners arrive with multiple complex social identities and intentionally strive to foster a sense of belonging to support student success (Ambrose et al., 2010; Dewsbury & Brame, 2019). Inclusive teaching is characterized by key practices including, but not limited to when faculty: (1) recognize power dynamics and work to mitigate bias, (2) elevate student voices,

(3) develop empathy through active engagement, and (4) transparently communicate expectations and strategies to succeed (see Dewsbury & Brame, 2019). Inclusive teaching practices support the development of student belonging and agency, which contributes to positive classroom climate (Winkelmes et al., 2016).

One dimension of inclusive mentoring is the provision of wise feedback, where faculty emphasize the combination of high standards and their beliefs in student abilities (Cohen et al., 1999; Yeager et al., 2014). Faculty cultivate trust by being deliberate in how they communicate and by being proactive. For example, access to opportunities can be unnecessarily restricted by a student's existing networks, and faculty are inclusive when they communicate opportunities to students broadly and proactively (see Smith, 2007).

The role of faculty learning communities

Though the positive impacts of inclusive teaching and mentoring have been well documented, questions remain regarding how to support faculty to develop and implement these practices successfully. One promising area of research points to the use of faculty learning communities (FLCs). As defined by Cox (2004), FLCs are "a cross-disciplinary faculty and staff group of six to 15 members who engage in an active, collaborative, yearlong program with a curriculum about enhancing teaching and learning" (p. 8). As described by Sirum and Madigan (2010), FLCs may leverage "structured, facilitated discussions of teaching and learning issues" (p. 198). Wenger's (1998) community of practice model provides a useful conceptual framework for the FLC process; three elements of this model are mutual engagement, shared repertoire, and joint enterprise. In a FLC, faculty demonstrate mutual engagement by convening and participating across regular meetings. A shared repertoire is established through the use of common readings and asking questions about practice. FLCs also work to establish "joint enterprise," which Wenger (1998) defines as a form of collective accountability that comes from negotiating shared goals.

As such, FLCs offer a way to encourage both individual- and group-level change, with the ultimate goal of creating sustainable, evidence-based instructional reform. Due to the collaborative nature of FLCs, FLCs are well suited "to initiate lasting and effective classroom reforms" (Sirum & Madigan, 2010, p. 198). STEM faculty have successfully used FLCs as a mechanism to implement evidence-based instructional practices (EBIPs) into their courses such as the integration of active learning (Addis et al., 2013; Sirum & Madigan, 2010) or course-based authentic research experiences (McDonald et al., 2019; Cervato et al., 2015).

Given the positive findings from FLCs and the importance of inclusive teaching and mentoring, we chose to implement an FLC focused on inclusive teaching and mentoring practices among science faculty at our institution. The theorized model is shown in Figure 1.

Current study

In this article, we explore two research questions associated with the implementation of our FLC: (1) How does participation in a multi-year, interdisciplinary FLC impact faculty participants' attitudes, skills, and implementation of inclusive teaching and mentoring practices, at both the individual and group level? and (2) Which specific features of the FLC contributed to changes at the individual and group levels? We also examined the ways in which the FLC fostered accountability for both individual and group goals.

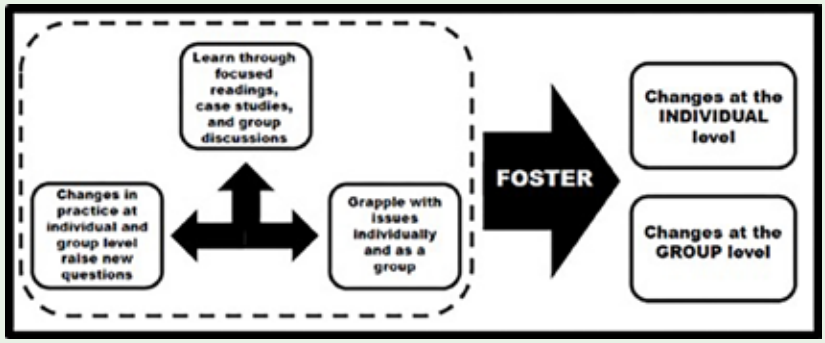
Method

Faculty learning community participants

This FLC took place at a small (approximately 2,500 undergraduates), liberal arts college in the northeastern United States. Because this work primarily focused on retaining sci-

FIGURE 1

Model for change within the faculty learning community.



ence majors, the FLC was originally targeted toward faculty members who taught first-year courses in biology, chemistry, physics, neuroscience, and environmental science, yet did extend to faculty teaching upper-level courses. Over the two-year period, 26 unique science faculty members (out of 32 invited) participated in the FLC, representing about three quarters of the science faculty at the college.

Faculty learning communities participants (35% identified as men, 65% as women) broadly represent the total science faculty both in rank and discipline. Twenty-two of the 26 faculty taught first-year students in chemistry, biology, physics, or psychology, while others taught advanced courses in biochemistry, neuroscience, and environmental science. The total sample included four full professors, five associate professors, 14 assistant professors, two postdoctoral associates, and one part-time faculty member. For the remainder of this article, this group will be referred to as FLC participants regardless of rank or discipline.

TABLE 1

Faculty learning community focus and readings.

Focus	Readings
Semester 1: Fall 2017 Best practices for increasing the belongingness, capacity, and interest of all STEM majors with a focus on first-year science students, underrepresented students, first-generation students, and community college transfer students.	Successful STEM Mentoring Initiatives for Underrepresented Students: A Research-Based Guide for Faculty and Administrators (Packard, 2015)
Semester 2: Spring 2018 Strategies for having difficult conversations with students; specific strategies focused on helping students to prepare for class.	Articles including: • Using Social Psychology to Help First-Generation and Low-Income students Through College (Crockett, 2017) • A Teaching Intervention That Increases Underserved College Students' Success (Winkelmes et al., 2016). • How Transparency Improves Learning (Yong, 2017) • A Note-Restructuring Intervention Increases Students' Exam Scores (Cohen et al., 2013) • Courageous Conversations: Advising the Foreclosed Student (Salinas & Ross, 2015). • Deconstructing Constructive Criticism: The Nature of Academic Emotions Associated With Constructive, Positive, and Negative Feedback (Fong et al., 2016). • Ohio State University's Advancement of Teaching web resource about having difficult conversations with your students (Ohio State University, 2019)
Semester 3: Fall 2018 Research-based strategies to improve student metacognition, study skills, and motivation.	Teach Students How to Learn (McGuire, 2015).
Semester 4: Spring 2019 Changes that can be incorporated into our introductory science courses to improve students' sense of belonging and science identity.	Articles including: • Building Better Bridges into STEM: A Synthesis of 25 Years of Literature on STEM Summer (Ashley et al., 2017) • Race and Gender Differences in How Sense of Belonging Influences Decisions to Major in STEM (Rainey et al., 2018) • The New Generation of Sudents: How Colleges Can Recruit, Teach, and Serve Gen Z (Selingo, 2018) • What College Instructors Can Do About Student Cyber-Slacking (Flanigan & Kiewra, 2018) • Group Work in Science, Engineering, and Mathematics—Consequences of Ignoring Gender and Race (Rosser, 1998) • A Brief Social-Belonging Intervention Improves Academic and Health Outcomes of Minority Students (Walton & Cohen, 2011)

Research context

This FLC initiative was not undertaken in isolation, but rather, as part of a larger series of initiatives underway at the college. Most relevant, the college received a federal grant in 2017, one of many received over the past decade focused on recruitment and success of historically underrepresented students in STEM. This grant paid for reading materials including two books. An additional foundation grant provided a nominal stipend to FLC participants and lunches in the first year. In year 2, the college continued to provide lunches (but no stipend).

Faculty learning community process

With the realization that no single instructional approach is appropriate for all faculty, all students, or all courses, it was imperative that we expand upon Cox's (2004) initial articulation of FLCs as addressing a singular, specific project or teaching and mentoring practice. Across the four semesters of implementation, the topics guiding the work of the FLC addressed inclusive teaching and mentoring practices, which targeted identity, belonging, transparency, and accessibility, the order of which was determined semester by semester by the group. Table 5 provides the FLC topics and readings.

Two FLC participants served as facilitators. Facilitators differed in discipline (chemistry and biology), rank (full professor and associate professor), and skill sets (previous chair and Project Kaleidoscope [PKAL] STEM Leadership Institute training). As facilitators, they had a decade of prior experience as collaborators on federal and foundation projects addressing STEM education, and this FLC was a natural outgrowth of their work to broaden participation in STEM. They were responsible for developing materials, keeping time and notes during meetings, and following up with administrators. One of the facilitators attended the PKAL STEM Leadership Institute where the plan for the FLC was developed. Thus, they served as process facilitators as they learned alongside their peers, much like other FLCs (e.g., Roberts et al., 2018).

FLC participants met five times each semester over lunch (11:30 a.m. to 12:45 p.m.). For each meeting, an inclusive teaching or mentoring issue was identified and FLC participants were asked to read prior to the meeting (see Table 1 for the schedule of readings). Case studies, written by the facilitators, were also used to personalize situations and help FLC participants recognize and understand the student perspective (Asai, 2019). For example, one case study described the experience of exclusion during an in-class activity by a student of color who was randomly assigned to a student group. Before attending the FLC, participants were asked to read an article describing the importance of considering race and gender when selecting groups (Rosser, 1998). In addition, during the meeting, faculty discussed best practices in small-group selection. Finally, the group worked together to identify actionable items that FLC participants could easily implement into their teaching or mentoring practices (a change at the individual level) or initiatives that the group could work on together (change at the group level). Facilitators took notes to document collective progress, and individual FLC participants or subcommittees volunteered to follow up on nominated items.

Data collection

Multiple data sources informed this project. To address the first question about FLC participants' attitudes, skills, and instructional practices, as they relate to inclusive teaching and mentoring practices, we used a survey instrument. The survey link was

TABLE 2

Changes in attitudes and knowledge.

To what extent did you make gains in the following as a result of your participation in the faculty learning community?	Percent responding a good or a great deal N = 17	Percent responding a good or a great deal N = 14
	Year 1 (Y1)	**Year 2 (Y2)**
a. Enthusiasm for teaching and mentoring	59%	57%
b. Interest in the teaching and learning research and literature	59%	50%
c. Awareness of who our students are	77%	93%
d. Knowledge of what students from diverse backgrounds need to thrive	77%	86%

provided via e-mail to the FLC participants and the results were anonymous. This research project was approved by the College's Institutional Review Board (IRB 2019-20-09). The 13-question survey was modelled after the Participant Assessment of Learning Gains (PALG) survey, used in previous FLC work, and targeted attitudes and skills (Sirum & Madigan, 2010). In addition, open-response items were added to address practices/implementation (e.g., Based on what you learned in the FLC, are there specific changes you have made or plan to make in your teaching and/or mentoring? If yes, describe.) and FLC features that promoted learning (e.g., What was the most important thing you did/discussed/learned during the FLC, and why was it so impactful?). After the first semester, the survey was edited modestly to improve clarity, and the number of items reduced to more closely align with the goals of the FLC. For the purpose of this article, only questions included on both iterations of the survey will be discussed.

Data analysis

In order to address the first question (how participation in the FLC impacted participants' attitudes, skills, and implementation of inclusive teaching and mentoring practices, at both the individual and group level), we generated descriptive statistics for all closed-response survey items that addressed attitudes and skills (see Tables 2 and 3). In addition, text from open-response items regarding implementation were read and reviewed multiple times in a way consistent with Saldana's (2009) recommendation "to organize and group similarly coded data into categories or 'families' because they share some characteristics" (p. 9), and sought to identify the broad sentiment similar to "major codes" described by Bogdan and Biklen (1992, p. 177). We categorized implementation responses for all FLC participants except the three who did not submit open-ended responses. To address the second question, about effective features, we thematically coded responses to open-response items reflecting why the FLC was an effective support for faculty learning. In order to analyze group-level changes, we also categorized and summarized the notes regarding department changes, noting if these changes were in practices, policies, or physical spaces.

Results

Changes within individual faculty learning community participants

Changes in attitudes and knowledge. FLC participants reported they changed their attitudes across all dimensions surveyed (see Table 2), with the greatest impact on their "awareness of who our students are" and "knowledge of what students from diverse backgrounds need to thrive." These changes are important, because one focus within inclusive teaching

TABLE 3

Changes in skills.

How much has the faculty learning community added to your skills in each of the following?	Percent responding a good or great deal N = 17	Percent responding a good or great deal N = 14
	Year 1 (Y1)	**Year 2 (Y2)**
a. Inclusive pedagogical design	45%	43%
b. Motivating students to persist	65%	57%
c. Design of interactive learning activities	6%	21%
d. Improving the classroom learning environment	53%	21%
e. Utilizing formative assessment strategies (to assess student learning during the learning process rather than evaluating learning at the end)	40%	21%
f. Understanding and using the research literature to improve inclusive teaching and learning	35%	50%
g. Teaching scientifically (teaching as research)	7%	29%
h. Your overall effectiveness as a teacher	31%	21%
i. Your overall effectiveness as a mentor	71%	43%

and mentoring is understanding who students are and what they need to experience success and persist in STEM programs.

Changes in skills. As shown in Table 3, 71% of FLC participants in year 1 and 43% in year 2 indicated that their participation in the FLC made them more effective mentors. In year 1, the focus of the readings was inclusive mentoring (review Table 1). In addition, 65% of faculty in year 1 and 57% in year 2 reported improvements in their skill to motivate students to persist. Furthermore, 35% of faculty in year 1 and 50% of the faculty in year 2 reported their participation helped them to understand, using the research literature, how to improve inclusive teaching and learning. Here we note in year 2, more emphasis was placed on inclusive teaching (review Table 1).

Changes in instructional and mentoring practices. As shown in Table 4, when asked what specific changes they made or planned to make to their teaching and/or mentoring, FLC participants indicated that they were thinking about student belongingness and transparency. Furthermore, in year 1, 43% of FLC participants indicated that they would approach mentoring and difficult conversations differently based on what they had learned in the FLC.

Factors contributing to group accountability in faculty learning communities

Twenty percent of the survey respondents noted that the collaborative nature of the FLC contributed to making their participation powerful. When asked, "What was the most impactful thing that you did/discussed/learned during the FLC?," 7% of the survey respondents agreed that "sharing of resources/strategies between faculty" was very important to their learning. One participant commented on appreciating "the practical advice and conversations." Another FLC participant shared, "Reading some of the literature and listening to other faculty talk about their experiences helped me think about how to do things better." Another commented:

Just hearing others talk about their difficult mentoring situations. It has made the list of people I talk to about different students and advisees broader because I know who has dealt with certain issues. Really, anytime we as faculty get together to talk about our own experiences doing the things that we all do is very powerful for me in terms of feeling like I'm not alone and that others are struggling and enjoying and failing and succeeding at the same things regarding our students.

Thus, the FLC provided a peer network and a sense of community. FLC participants also emphasized being impressed by the willingness of their colleagues to improve. One shared, "I was struck by the devotion of the science faculty across the board at our college." This FLC participant added:

I am so impressed by the sensitivity of the FLC members and their willingness to work with students from diverse backgrounds and to systematically improve the way we are educating all of our students. It is inspiring to work with these individuals and has me wanting to give it my all as well.

Another FLC participant appreciated how much their colleagues "genuinely want to improve their teaching skills and create an inclusive environment." Yet another commented: "Anything we can do to keep building our skills sharp and building new skills will make us better faculty." This willingness among FLC participants, including senior faculty, to share openly that they wanted to learn more was important to the cohesion of this FLC.

A critical feature of the FLC was the opportunity to apply readings to case studies that focused on identifying concrete examples for changes in practice. One FLC participant noted:

We always hear about how these things are important, but we don't often get concrete examples, even from our highly-paid speakers at Academic Development Day. Reading about and discussing specific examples had much more impact on me because it made it all seem real, and it gave me a sense of urgency regarding doing something about the situation.

Another FLC participant underscored that the experience offered "practical, and often evidence-based, tools to improve." Finally, another valued the rapid timetable for turning discussion into action, as they identified "actionable items during the fall FLC and during the spring started to act on those items."

Changes at the group level

At the group level, at the conclusion of each semester, FLC participants volunteered to follow up on a specific initiative and/or sub-committees were formed. Many changes focused on facilitating access to resources at the departmental and/or institutional levels intended to increase students' sense of belonging in the sciences and at the college (see Table 5). Changes to facilitate access to financial and academic resources included a textbook lending library, precourse assessments to identify students who would benefit the most from additional aca-

demic resources, and the development of a science-specific application of learning theories course.

Departmental changes to increase students' sense of belonging in the sciences included monthly posters highlighting the various career paths of our STEM alumni along with quotes from diverse leaders in STEM, and the creation of a fund to invite diverse speakers to science research seminars. Institutional changes to increase students' sense of belonging in the sciences included a proposal for a science cohort housing program and a summer science bridge program. Currently, one subgroup is working on reimagining the first-year science curriculum, which will be centered in a new grant proposal.

Discussion

This article documents the learning involved in a multiyear, cross-disciplinary science FLC focused on inclusive teaching and mentoring practices. Using Wenger's (1998) community of practice model, we were interested in the negotiation of joint enterprise, referring to group accountability and the creation of group and individual goals.

Echoing the findings of Addis et al. (2013), involvement positively impacted FLC participants' attitudes, skills, and instructional practices. We documented many individual changes in practice, from changing syllabi to using intentional classroom grouping practices. A large percentage of the FLC participants agreed that after participating they have a better sense of their students' identities and needs, and gained knowledge around inclusive teaching and mentoring. Dewsbury and Brame (2019) emphasized the importance of faculty empathy in creating a positive classroom climate.

TABLE 4

Changes at the individual level after faculty learning community involvement.

Theme	Sample response
Mentoring: Modifying approach to mentoring and difficult conversations N = 6	"I am going to approach my mentoring and advising conversations differently and try to listen to the students differently to identify potential self-perceptions about their own abilities and sense of belonging."
Teaching: Grouping students in class to improve belonging N = 7	"I will be more mindful when designing in-class and out-of-class group work to be sure that all voices are included, roles are defined, and that students who belong to a minority are not isolated in their groups."
Teaching: Supporting effective study strategies and/or discussing growth mindset N = 7	"I feel many first year students need to unlearn many bad habits before they can begin to learn how to study and to think critically in a way that foster success at the college level. This does not happen overnight. It takes time, so I intend to spend more time with the students teaching them how to study. I intend to teach them more about elaboration using active study strategies, teach them about spacing of shorter study sessions, and testing yourself as a way to actively learn the material."
Teaching: Increase representation of diverse scientists N = 4	"Assign more articles that include scientific leaders/researchers from under-represented groups."
Teaching: Syllabus statement to reflect financial supports N = 2	"I am going to include a statement on my syllabi that recognizes the class may contain students who cannot afford course materials and that I am willing to work with such students in supporting their success in course content. Not being able to access course materials while paying a tuition at our College is completely unacceptable. I want to make a statement that I recognize this and it should not be an obstacle."
Teaching: Transparent assignments N = 2	"I plan to be more transparent in my teaching and make sure that my assignments have a specific purpose."
Teaching and Mentoring: Empathy for students' lived experiences N = 2	"For students of color and students from lower [income backgrounds], I want to be more sensitive and understanding of their challenging circumstances many of them face on a daily basis. I intend to make lots of small changes, but the big change will be increased sensitivity and empathy."

Faculty learning community participants reported an increased awareness of student barriers to success that deepened their sense of empathy and propelled them into action to improve classroom climate.

Furthermore, these findings support and expand upon Sirum and Madigan's (2010) assertion that "FLCs can lead not only to collegial discussions about teaching and learning on a consistent basis but also to faculty instructional behavior changes" (p. 199). Having faculty across ranks and disciplines participate was a contributing factor to the success of this FLC. The willingness of senior faculty members to participate and share their experiences was motivating for many, especially new faculty. Joint accountability was reflected in the creation of action lists that FLC participants volunteered to push forward, both to the administration (e.g., creating a new fund) and to their own colleagues (e.g., proposing a new course, offering new services, placing new posters in their spaces). At a practical level, a shared action document allowed individual faculty to volunteer to see through action items, facilitating distribution of responsibility and agency. The large number of changes at the group level has provided a sense of movement and action, and this has in part fueled the motivation for the FLC to continue. The sense that FLC participants could choose their own individual goals and prioritize discussion topics that they would like to learn about also helped them to retain ownership.

The transformation documented within this FLC was "emergent, not prescribed" (Herman et al., 2018, p. 32). According to Goldstein et al. (2010), emergent change is accomplished by harnessing the natural development of the innovations within a group (bottom up) and by the amplification of the changes to

TABLE 5

Changes at the group level after faculty learning community involvement.

Semester focus	Changes made at the group level
Semester 1: Fall 2017: Best practices for increasing the belongingness, capacity, and interest of underrepresented STEM majors.	1. Created monthly posters featuring diverse alumni; inspirational quotes from established diverse STEM professionals. 2. Included discussions of the growth mindset and the importance of metacognition in introductory courses. 3. Established a textbook lending library for science students and worked with the Office of Advancement to support this library. 4. Developed weekly drop-in centers run by science faculty and student mentors at times that matched student availability. Personal invitations were sent to students to attend. 5. Developed a chemistry math assessment. Required students who scored below a 75% to participate in a General Chemistry Mathematics module as a co-requisite with General Chemistry I.
Semester 2: Spring 2018: Strategies for having difficult conversations with students.	1. Implemented a summer student/faculty reading group with a focus on issues of diversity and inclusion. 2. Facilitated a break-out session at the College's Conference on Diversity and Inclusion focused on FLC's learning about student persistence and success in science.
Semester 3: Fall 2018: Research-based strategies to improve student metacognition, study skills, motivation.	1. Facilitated a break-out session at Academic Development Day focused on FLC learning to support student success. 2. Presented actionable items (e.g., STEM summer bridge program, a learning theory course) to college administration.
Semester 4: Spring 2019: Changes that can be incorporated into our introductory science courses to improve students' sense of belonging and science identity.	1. Obtained approval for a pilot one-credit, science-specific application of learning theories course entitled Strategies for Success in Science (SSS). 2. Developed a STEM cohort housing program to start in Fall 2019. 3. Began writing a proposal for the development of a summer bridge program for entering. 4. Collected data on students' sense of belonging in the sciences. 5. Identified a cohort of faculty to write a new grant focused on a new inclusive first-year science curriculum. 6. Established a fund through the Office of Advancement to invite diverse speakers to STEM research seminars.

the entire organization (top down). Group-level changes include new services and courses, as well as changes in the physical spaces. The FLC participants took ownership of their learning process and this energy contributed to organizational change. As evidence, this FLC has already presented their findings to the larger college community through sessions at two Academic Development Days. Faculty were drawn to the FLC model because of the collaborative design. They stayed engaged when they saw fellow FLC participants demonstrate a willingness to change their practice and follow up on concrete action steps. The mixture of faculty from all levels of experience and science disciplines, combined with individual ownership and group-level accountability appeared to reinforce each other, creating momentum for cultural change at the institution where participants were collectively invested in inclusive classroom and mentoring innovations that improve student belonging and success.

Prior research focused on institutional change speaks to what we have learned from our FLC. When faculty innovators envision a theory of change where individual faculty do things differently in their classrooms, but do not necessarily politically engage for group-level systemic change, they may be disappointed when reform does not materialize at the institution (see Kezar et al., 2015). More successful changes for STEM reform can be observed when departments work together to undergo change, and when they receive support from their administrators. In this FLC, one of the facilitators acted as the liaison between the FLC and the administration, communicating relevant action items nominated by the group. For example, after reading *Teach Students How to Learn* (McGuire, 2015), FLC participants identified the need for providing a one-credit, science-specific application of learning theories course for first-year students. The group quickly received approval to pilot the course the following semester and the college committed additional funds for a course instructor. While Kezar (2007) cautioned about administrators moving too swiftly in their own visions, we also agree that administrators need to be responsive to faculty energy, or else that energy can wane (Elrod & Kezar, 2016).

Further, we acknowledge that this work took place on a small campus, where it was possible to enlist the majority of STEM faculty across a two-year period of time. A larger university may require a more deliberate strategy of employing FLCs. Wieman et al. (2010) described a department-level strategy that may be necessary at large research universities; simply asking for the first 20 volunteers will not shift practice when the department is not behind the change, whether philosophically or through resources. Within this approach, an FLC can still support participants, but participants represent individuals and their departments. The Association of American Universities (2017) recently reported on a consortium of large research universities who signed on to a collective change effort for undergraduate STEM education; this example underscores the power of a peer collective to solidify commitment and accountability at a larger scale.

This project encompassed faculty across ranks and a broad range of disciplines from the natural and physical sciences that may be applicable to other institutions. Many institutions may face the challenge of faculty demographics that do not reflect the diversifying student body and wanting to improve their inclusive teaching and mentoring practices. We acknowledge the limitation of self-reporting from FLC participants as the primary data source, even though some report on behavioral action. Our future work involves surveying students to learn more about their experiences to examine the alignment (or lack thereof) in key areas of inclusive teaching and mentoring. Future work involving STEM faculty learning could expand beyond FLCs to understand the role of informal faculty learning, such as co-teaching or engaging in pedagogical conversations.

STEM educational reform relies on faculty making change. Here, we described the promise of a multiyear FLC involving faculty across ranks and disciplines working together. This set of activities, readings, and group accountability can help others seeking to promote more inclusive teaching and mentoring on their campuses. ■

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