

INVESTIGATING MATHEMATICS DEPARTMENT LEADERS' EXPERIENCES AND UNDERSTANDINGS OF EQUITY

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In the wake of national movements calling for attention to equity, colleges, departments, and instructors are now faced with various responsibilities to implement practices and structures to support diversity, equity, and inclusion (DEI). This project aims to design a professional development program for mathematics graduate teaching assistants (MGTAs) by helping them learn evidence-based teaching practices to support diverse groups of learners in engaging mathematics activities. Part of these efforts included investigating department leaders' understanding of equity. This paper focuses on interviews with department leaders at a large, public, research university. Our analysis shows that despite the implementation of university structures focused on improving equity, department leaders had very different understandings of equitable teaching, and reported differences in how equity factors into their roles.

Keywords: Professional Development, Equity, Inclusion, and Diversity

Introduction

The majority of mathematics graduate teaching assistants (MGTAs) spend between 12 to 20 hours each week working for mathematics departments as instructors or teaching assistants (Selinski & Milbourne, 2015). In some departments, MGTAs have the opportunity to teach their own courses, while in other departments, MGTAs do not teach their own courses but instead lead recitations or lab sessions that support large enrollment courses taught by faculty members. During a two-year master's degree program, MGTAs might have the opportunity to teach as many as seven classes or lead as many as 24 recitations, and in a six-year doctoral program 15 classes or 60 recitations. At some doctoral-granting institutions, MGTAs teach up to 68% of Calculus I courses (Selinski & Milbourne, 2015). This means that during their graduate programs, MGTAs contribute to the learning experiences of hundreds, if not thousands, of undergraduate students.

Because of their significant impact on the teaching and learning of undergraduate mathematics (Ellis, 2014; Miller et al., 2018; Selinski & Milbourne, 2015), it is important to address MGTAs' development as educators. One important piece of this preparation is addressing equity and inclusivity in their classrooms. To this end, we have designed a professional development (PD) program specifically for MGTAs focused on equitable, inclusive, and engaging teaching practices. Our vision is to have this PD program adopted as a permanent department structure, with the aspiration of creating more equitable learning environments through a larger systemic change process (Reinholz et al., 2020). Change initiatives benefit from department-level implementation because departments represent relatively coherent units of

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culture (Reinholz & Apkarian, 2018). This coherence may support innovation efforts more broadly and can contribute to the sustainability and effectiveness of the implementations (Reinholz et al., 2018).

Departments are not monolithic, though, and contend with differing goals and varying cultural and institutional issues. Consequently, the first stage of this project is to investigate perspectives of faculty members serving in departmental leadership roles to learn about various supports and barriers that might impact an MGTA PD program. This requires “exploring clashes of values that may lie at the heart of institutional resistance to change” (Reinholz et al., 2020, p. 3), as transformation efforts need to unite stakeholders in an ongoing and cyclical process to adapt to changing contextual factors (Reinholz & Apkarian, 2018; Smith et al., 2021).

In this report, we address two research questions that inform the development of the MGTA PD program:

1. How do department leaders conceptualize equitable teaching?
2. What role does equity have in department leaders’ positions and considerations?

Theoretical Framework

We utilize Reinholz and Apkarian’s (2018) adaptation of Bolman and Deal’s (2008) four-frame model of organizational change to study departmental cultures and change within them. This framework provides context for exploring how department cultures may support or hinder change initiatives by taking into consideration institutional structures and norms through a systems approach (Henderson et al., 2011; Kezar, 2011). In particular, the four constructs, or frames, explored are: *structures*, *symbols*, *power*, and *people*. Reinholz and Apkarian (2018) define these frames:

Structures are the roles routines and practices of a department; their enactment and meaning are dependent on *symbols*, which are the norms, values and ways of thinking in a department; changes are ultimately enacted by *people* whose individuality impacts their intentions and perceptions; and the distribution of *power* determines who makes certain decisions and influences interactions (p. 7)

For this report, we focus on the people frame, which is also referred to as the human resources frame (Bolman & Deal, 2008). This frame highlights that each department is composed of individuals that have their own goals, agency, needs, and identities (Reinholz & Apkarian, 2018). The department needs people (and vice versa) and exists to serve human needs, especially those of students, who have their own unique goals (Bolman & Deal, 2008). Tensions within the people frame can be caused by the differing needs, goals, and values amongst various stakeholders within the department. Department chairs, in particular, are well positioned to provide leadership in navigating these differences, such as by creating an inclusive and supportive culture for faculty, staff, and students (Bystydzieński et al., 2017; Fried, 2003; Hecht et al., 1999; Wergin, 2003).

Data Sources and Methods

We report on the analysis of baseline interviews with leadership in one mathematics department at a large, public, PhD granting university prior to implementing a PD program for MGTAs focused on equitable and inclusive teaching practices. We characterized department leaders as those who we identified as powerbrokers with the ability to influence department-level decisions regarding MGTA PD. For example, the department chair, the graduate chair,

experienced coordinators, and those who contribute to existing MGTA PD within the department received invitations for interviews. Our focus on these important figures is in recognition that “change effort requires sanction from the appropriate power holders to succeed” (Reinholz & Apkarian, 2018, p. 5). Three of the six department leaders accepted our invitation and were interviewed. These interviews were audio recorded and transcribed. For this report, we refer to these interviewees by their roles: (1) the department chair whose role is to oversee the entire department in its research and teaching missions, (2) the associate chair whose role is mostly to support the department chair and take on tasks delegated by the department chair, and (3) the graduate chair whose role is to oversee graduate admissions and the progress of graduate students through either the master’s or doctoral program. Each of the participants are mathematicians who had either been invited to serve in their specific role or volunteered to serve in their role when the position became vacant.

The semi-structured interview protocol focused on learning about how equity and inclusivity were addressed by the department as a whole and with respect to the MGTAs’ teaching practices, how equity and inclusivity were understood by department leadership, and the department leaders’ perceptions of the department and its direction. Some questions that were asked included: How would you like MGTAs to engage with students?; What is most important to you for MGTA professional development?; How would you describe equitable teaching?; and, In what ways does the department or college value equity and inclusivity?

Analysis

For our first phase of analysis, we used an inductive open-coding approach (Miles & Huberman, 1994) for interview responses that related to our research questions regarding department leaders’ conceptualization of equity and the role of equity in their position. Our second phase of analysis incorporated an axial coding method to surface emerging patterns and distinctions from our codes. Additional consideration in this phase was given to the department leaders’ positions in the department. Lastly, we utilized the people frame as an explanatory construct to make sense of what we were seeing in the data. In particular, we referenced this frame to conceptualize how department leaders were contending with the varying needs, goals, and values of the stakeholders that their position was responsible for addressing, as well as their own.

Findings

There was a noteworthy difference in department leaders’ responses to questions about equitable and inclusive practices. In particular, the department chair expressed significant institutional pressures, such as how the department would be ‘measured’ in whether and how it supported diverse groups of students. In comparison, the other department leaders expressed little, if any, institutional pressures in their respective roles. Thus, we saw their different leadership roles as moderating their views and descriptions of equitable and inclusive teaching practices. We address each leader’s responses to questions related to equity and inclusivity and the context of their roles in those responses.

The Department Chair

When the department chair was asked “*How would you describe equitable teaching?*” he did not provide a direct answer, instead describing the pressures he felt from society as a whole as well as those from the institution. With regard to societal pressures, he stated “our society is just rigged in a way [that] makes it really hard for some people to succeed... I’m keenly aware from my position right here that the forces that affect all of those things are way deeper than anything

that happens when they set foot in my classroom.” With this in mind, he went on to describe “equitability” in his own teaching as “[making] sure that I’m not accidentally saying something that’s going to make someone doubt whether they belong ... And so, for me, it’s just, you know, don’t inflict more damage.”

The department chair shared that much of his work and how he directs some of the focus of the department is mandated by the dean’s and the institution’s focus on DEI. One example of this was the requirement that each department in the college needed to establish a DEI committee. The department chair shared, “I can’t claim ... that I was the instigator of this, although, you know, eventually we would do it. But the dean requires this.” Because of the mandate, the department chair had assembled a committee of faculty and graduate students who had each expressed interest in DEI issues in the department. The department chair had given the committee an assignment to write a mission statement for the department that focused on DEI.

In comparison to the two other department leaders, the department chair experienced significant institutional pressures and scrutiny. He voiced his frustrations several times during the interview, noting:

Every now and then I get held accountable. You know, math departments are very vulnerable in this regard because, you know, D-F-W rates and graduation rates. I can’t tell you how many times I’ve sat around a table with [de-identified]... And we get going on student success or failure rates in classes and next thing I know, everybody in the room is looking at me going what are you going to do about that? [...] And-and one of the things that has upset me most is that every now and then a crusading high-level administrator walks into my office and throws some statistics down in front of me about how achievement gaps are particularly bad in mathematics. And you know, I don’t deny or debate any of that.

Consequently, the department chair’s focus on equity was mostly based on “hard-nosed measurables” because that was the lens by which his performance would be measured by the institution.

As a result, he described some of the work in his leadership position consists of advocating for the mathematics faculty and the DEI work and training that they engage in. These efforts seemed to come with disheartenment over his view that the university’s president reiterates the existing inequities instead of acknowledging the work that is done:

[I]t’s extraordinarily demoralizing. Because I know that my faculty are ... going to the seminars and the workshops where they are being trained ... in developing the ways to be inclusive and to implement teaching practices that promote equitability and inclusivity. I know they’re doing that work. But when I hear my president saying those things over and over again, as if it’s ... endemic to the institution, it’s a blow ... But I think it’s important ... to see and acknowledge the people who are doing the work ... even if it’s not showing up in the measurables yet, to acknowledge that it is happening.

This focus on measurables led to his recognition of a need to collect and track data for his department. He shared that this would enable him to guide his department with regard to PD to ensure they are collectively “making any progress.” Consequently, he suggested that when evaluating equity related efforts, “one looks for impacts and sort of measurable effects.”

The Graduate Chair

When the graduate chair was asked “*How would you describe equitable teaching?*” he shared that he perceived equity to mean equality, that “every student is treated in the same fashion in a classroom.” He characterized inclusive teaching as “you can’t leave anybody out.” However, he

described that “the system” should not be changed for students, stating “the kid that for whatever reason doesn’t show up half of the time, or, ... for whatever reason [is] the one that, you know, looks funny to you or act[s] weird. No you can't ... change the system for any of those people.” The graduate chair did not view DEI as a principal component of his role and he expressed little accountability towards equity in his position. This was interesting given that the department chair proudly noted that the department had worked “very hard to make sure that our graduate admissions policies and practices are inclusive and holistic. And we are keeping track of our progress in terms of diversity and in terms of, you know, what-what the demographics of our incoming classes [of graduate students] are.”

When asked about whether he encourages faculty and MGTAs to engage in opportunities focused on inclusivity and equity, the graduate chair responded:

I personally don’t do it ... I really don’t think in these terms, so it’s funny. I try to run the graduate program, okay.. [laughter]. You know, which is a very different thing than leading a college or department. So personally, I do not do that. I do not encourage faculty members or TAs to go and engage in those types of opportunities. But I see the leaders, you know, above ... me. I see those do it definitely, and I think it’s their role. I mean I’m not trying to duck responsibility.

In this statement, he implicitly acknowledged that his role as graduate chair had different requirements than the department chair’s role, and so he did not feel similar pressures to attend to DEI-related issues. Yet, he eventually recognized that there are aspects of MGTAs’ potential future careers that could involve DEI, such as academic tenure, promotion, and hiring practices; he expressed, “I think those have really tightened up already and have at least in my opinion become equitable and inclusive.”

The Associate Chair

Unlike the department chair and graduate chair, when the associate chair was asked “*How would you describe equitable teaching?*”, he was able to explicitly reference various student supports, such as the need to create a welcoming environment that would promote access and accommodate different learning styles. He suggested the need to contend with various barriers to student learning. One point of emphasis, his response contrasted with the graduate chair’s conceptualization because he suggested providing flexibility for students, especially during the COVID-19 pandemic. He added that flexibility was also needed due to other aspects of students’ lives, such as other jobs and pressures that might interfere with their learning.

The associate chair described the various ways in which DEI related to different aspects of his position prior to becoming associate chair. He referred to advocacy training that was required to participate in various hiring committees, and similar training that was needed for his previous role as department chair. He also described roles he had served in that were directly related to department’s vision for DEI, such as being co-chair of a committee that established department acknowledgements regarding DEI values. Part of this responsibility required finding common ground amongst department members with regard to DEI values.

The associate chair also discussed his efforts at promoting diversity within mathematics to the department community and emphasized the importance of this with graduate students. He acknowledged the overrepresentation of while male mathematicians and the need to “make a sustained effort to say this is not all there is, and bring up a contribution of female mathematicians.” These efforts included organizing department colloquia and events, such as one to show a movie on a prominent mathematician from an underrepresented background, which was followed by “long conversations.” Similarly, he discussed the memberships that the

department has with various regional and national alliances and described his participation.

Department Leaders' Views of PD for MGTAs

The leaders were asked questions about MGTAs' teaching roles and professional development. The associate chair was the only department leader to mention equitable teaching when discussing the important teaching outcomes for MGTA PD. He described the need for MGTAs' teaching to be responsive to the needs and backgrounds of the student body, and to be able to provide a classroom environment that is welcoming and accessible:

For professional development I think-well two things come to mind: one is, you know, pedagogical tools to-to-to address different backgrounds in the students, to accommodate different teaching styles. And together with that is, you know, tools for providing a welcoming environment and an environment that promotes the access and equity.

This sentiment was in opposition to what the graduate chair suggested. To him, an ideal outcome would be a successful continuation of the status quo. He described this as: "[W]e want to give it along, pass it along to the next generation ... you know, try to see yourself as a little link in a chain, you know, where you pass on from the next, to the next generation. And then they'll do it again, hopefully." Lastly, the department chair had a more individualized conceptualization than the other two leaders. He suggested that the most important outcome of MGTA PD would be for better career preparation, sharing: "I have to view graduate study as a professional pathway. You know, this really is something that you're doing because you think it leads to a career. You're not doing it for personal growth or, you know, to become a better citizen or stuff like that."

Discussion

While the college and department have explicit diversity action plans and statements, and despite awareness of various department and institution DEI initiatives, the three department leaders shared very different visions of equity and equitable teaching. This embodies Gutiérrez's (2002, 2017, 2018) description of the word equity as being complicated by a long history of conceptualization. In her work, she shares that this often results in the word *equity* retaining simplistic or superficial definitions that refer to a wide range of meanings and contexts that have led many to believe that they are speaking of the same ideas/topics despite having different definitions. The differing viewpoints, values, and goals of these department leaders highlight possible tensions that change initiatives might have to contend with, as described by the people frame.

Because of his unique position, we were particularly interested in the department chair's views on equity. The department chair's communications about equity seemed largely influenced by other university officials, including his dean. He adopted language that he attributed to these leaders, especially his focus on "measurable outcomes." Similarly, the department chair's view on equity seems to be shaped by, or aligned with, his description of the university president's focus on "endemic" deficiencies instead of the work that faculty are doing. He shares a bleak view that efforts within the classroom could only hurt students instead of help. Yet, this understanding of equity does not serve the students of the department, nor does it respond to the students' needs and identities. The department chair's seeming indifference towards explicitly addressing equity in the classroom does not bode well for departmental change and innovation efforts in this regard; especially as he is uniquely positioned to provide leadership in directing support towards such efforts.

One key aspect of the people frame that surfaced with the individual goals and agency

amongst the three department leaders. A range of accountability towards integrating or encouraging DEI efforts emerged in our analysis. On one end of the spectrum, the graduate chair seemed to shun any responsibility for advocating for DEI, sharing that he thought it was the responsibility of those “above” him, saying that “I think it’s their role.” Meanwhile, the department chair felt it was his responsibility to advocate for the DEI-related work of those in the department. And lastly, the associate chair recounted various ways that they supported DEI in their work, both explicitly in their actions or implicitly by participating in related PD.

Conclusion

We conclude with thoughts about how this work may influence the development of our MGTA PD program focused on equitable teaching practices. Through our analysis we found several tensions within the people frame that were caused by the differing needs, goals, and values amongst the department leadership. Our analysis yielded several barriers and supports for our planned implementation of the MGTA PD program. First, the different understandings of equity and equitable teaching demonstrate challenges of explaining the program and its learning outcomes to various leaders and stakeholders within the department, including leaders, faculty, and MGTAAs. The MGTA PD program focuses more on qualitative measures of teaching (e.g., engaging students and creating welcoming environments) and might not be accepted and supported by a department chair who feels under pressure to produce “hard-nosed measurables.” Second, given that the graduate chair does not view it as his responsibility to encourage opportunities focused on equity, such a PD program may experience challenges with MGTA recruitment and sustainability. Similarly, his view that ideal PD outcomes would enable the perpetuation of current teaching practices is in opposition to our project’s vision of changing teaching practices.

The interviews also surfaced various supports for the implementation of our PD program. Department leaders shared that college and university leadership are focused on avenues to leverage DEI efforts. Although the graduate chair demonstrated disinterest in advocating for equity-related opportunities, the other department leaders highlighted that there are faculty members who value these experiences and efforts. Leveraging such college- and university-level support will be instrumental in building, and maintaining, a sustainable MGTA PD program.

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