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STEM faculty response to proposed workspace changes

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Abstract

Purpose – The purpose of this paper is to use an affordance approach to understand how university faculty use and value their workspace and respond to proposed spatial changes.

Design/methodology/approach – A mixed method survey was given to faculty in the college of engineering at a large public American university. Data were analyzed using an affordance lens.

Findings – The analysis indicates that the majority of engineering faculty highly value private offices and appears resistant to non-traditional workspace arrangements.

Research limitations/implications – The authors performed the analysis with a relatively small sample ($n = 46$).

Practical implications – University administrators need to communicate with faculty and take their opinions on spatial changes seriously. Changes to space may affect STEM faculty retention.

Social implications – This paper could affect the quality of work life for university faculty.

Originality/value – The paper provide needed research on how faculty use and value their workspace while discussing the implications of alternative workspaces within the academy. Theoretically, the authors contribute to ongoing research on relationship between material and social aspects of organizational spaces.

Keywords Space, Affordances, Non-traditional workspace, STEM faculty, Workspace

Paper type Research paper

Physical workspace makes a difference for varied work-related outcomes (Elsbach and Pratt, 2007). Although organizations have traditionally privileged large, corner offices that communicate individual achievement (Konar *et al.*, 1982), knowledge work is increasingly collaborative, leading organizations to redesign workspaces to be more flexible, open, and efficient (Meyerson and Ross, 2003). Similarly, universities are experimenting with open office plans to save money and increase collaboration and productivity (Biemiller, 2010; Leonardi and Barley, 2011; Pinder *et al.*, 2009; Shabha, 2004; Templeton, 2010). As universities become more like businesses, it is unsurprising that they are attracted to this corporate strategy. Given differences between the university and other organizations (e.g. high autonomy of faculty, lack of traditional managerial structure) and lack of research on faculty workplaces, such changes might function differently in universities.

To address this issue, we explore the material and social aspects of academic workspace. We understand materiality as the material and form that together make up properties of artifacts that do not change despite changes in place, time, or context (Leonardi, 2012). We recognize that materiality, including workspaces, have social dimensions (Ashcraft *et al.*, 2009); through talk and action, people construct meaning about spaces.

We use a mixed method design to study faculty uses and valuations of workspace in the college of engineering (CoE) at a large US university undergoing expansion.

We contribute theoretically and pragmatically to three areas. First, we explore faculty workspace needs and values. Second, we argue that university administrators need to understand that the materiality of a space cannot be changed without considering its social meanings. Third, we offer implications for the recruitment and retention of faculty. Despite positive hype about non-traditional workspaces, faculty reported that it would take significant incentives for them to change spaces and several threatened to leave the university over spatial changes.

Literature review
Space and organizational change
Organizational scholarship has recently undergone a "minor spatial turn" (Beyes and Steyaert, 2011, p. 48; see Taylor and Spicer, 2007 for a review). Previously, most research on organizational space operated from Cartesian assumptions that space was material, static, and functional (Kornberger and Clegg, 2004). Now scholars understand organizational space as a changing and multiple social production (Dale and Burrell, 2007), while also considering the embodied, lived experience of being in workspaces (Beyes and Steyaert, 2011). For example, entry-level employees and managers experience space differently as they interact with it and therefore produce different workspaces within the same office building. As their organizational positions change, the spaces they produce also change. This literature demonstrates the social significance of organizational space and moves beyond the study of material space as objective (Dale and Burrell, 2007).

In part, scholarly interest in organizational space has been driven by the large number of organizations that have changed workspace configurations from traditional office spaces in which workers have their own offices or cubicles to open offices with no walls (Duffy, 1997). In some of these spaces, workers still have their own desks, but other organizations have implemented hot-desking in which workers sit at new spaces every day (Hirst, 2011). Advantages of open offices include flexibility (Duffy, 1997), cost-savings (Shabha, 2004), increased informal interaction (Brennan *et al.*, 2002), and appearance of concern about sustainability (Leonard, 2013). These benefits appeal to management, but managers often fail to recognize that spatial changes are not only material, but also social (Dale and Burrell, 2007; van Marrewijk, 2009). Given how drastic some of these changes are, research needs to explore the implications of these changes for retention and recruitment.

Changes to space also often have unintended social consequences. For example, although open offices are intended to increase freedom, they can result in more structure and surveillance because workers are not trusted or need to impose rules about behavior like noise levels to be productive (Leonardi and Barley, 2011; Halford, 2005; Thanem *et al.*, 2011). Management styles also change in open offices (Halford, 2005) and identity is affected as employees no longer claim territory over specific spaces or the ability to display identity-related artifacts (Elsbach, 2003). The symbolic function and role that buildings play within organizations can change, with unintended symbolic consequences resulting from material spatial changes (van Marrewijk, 2009). For example, Pepper (2008) found that a building designed to symbolize openness through its materiality was seen to be the cause of decreased openness. These examples demonstrate not only the trade-offs of open offices, but also that effects of material changes are rarely straightforward (Dale and Burrell, 2007). These studies have shown that managers cannot implement spatial changes and expect predictable behavior changes to follow. Instead, they must consider the social aspects of space and possibilities that workers understand and produce space differently.

Academic workspace
In this paper, we are specifically concerned with faculty offices at universities. There is a lack of research, particularly empirical studies, on university physical space (see Temple, 2008 for this argument) and almost no research that considers space from faculty perspectives. We suggest that universities are unique organizational types because of faculty's role. Unlike most organizations in which employees generally work toward the same goal, faculty work fairly independently on projects of their own choosing and thus value autonomy and control over their work (Gornall and Salisbury, 2012). Universities are also unique because they have large numbers of workers with specialized expertise who would be difficult to replace. As a result, universities often try to placate faculty for retention (Pinder *et al.*, 2009), particularly because major university goals (teaching and research) would not be possible without faculty (Verhaegen, 2005). Because of this, it is important to understand faculty uses and perceptions of space.

Research on the physical university has focussed on specific spatial aspects including doorways (Bell and Forbes, 1994), hallways (Hurdley, 2010), landscapes (Waite, 2014), building defects (Olanrewaju, 2012), and routes through campus (Peltonen, 2011). Although these studies have focussed on university space, they have treated universities as any organization, rather than considering how universities might function differently. Additionally, although space is a fundamental aspect of universities (Temple, 2009), most research on university space has focussed on the student (see Temple, 2014), overlooking other university stakeholders, like faculty.

The need to study faculty workspaces in universities is timely as universities begin to shift to open office plans, particularly in the sciences (Trani, 2014). Such changes are driven by administrative desires to reduce costs while increasing productivity and collaboration rather than faculty demand for new spaces (Guterman, 2004; Leonardi and Barley, 2011; Trani, 2014; Shabha, 2004). For example, Shabha (2004) showed that hot-desking or other flexible configurations would be more efficient and less expensive in universities because office spaces are only in use 44 percent of the time, reflecting growing neoliberal management of universities (Davies and Bansel, 2010). Although anecdotal evidence indicates that shared workspaces are beneficial for scientists (Guterman, 2004), there has been virtually no empirical research on the efficacy of or response to new workspaces in the academy (Pinder *et al.*, 2009; van Heur, 2010). The one exception is a report by Pinder *et al.* (2009) that offers mixed findings and concludes that workspaces need to be designed on case-by-case bases. Here, instead of looking at spatial efficacy, we explore faculty response to proposed changes, seeking to understand workers' meanings.

Given that research on the efficacy of open plan offices in corporate environments is mixed (Elsbach and Pratt, 2007) and the aforementioned research describes the often unintended consequences of spatial change, open offices may not be effective in university environments. One potential consequence unique to universities is difficulty in retaining faculty. Within engineering, particularly, faculty can fulfill their values, use their skills, and receive higher remuneration in non-academic labor markets (Olson, 2013; Searls, 2009). Although pressures for external funding reflect increasing academic managerialism, those who obtain this funding are rewarded (Davies and Bansel, 2010). Because we studied faculty in the college that brings in the highest levels of external funding at the university, we predict that if many of the faculty sampled threatened to leave, the university likely would respond to retain these personnel. A desire to save money on facilities or increase productivity and collaboration through

new workplaces may backfire, particularly for high-performing faculty. Providing workspaces that are pleasing to faculty may be an increasingly important element of faculty retention.

Thus, research is needed to show what faculty want from their workspaces and how they might respond to proposed changes. We address these issues using the case of a CoE at a university undergoing workspace reconfigurations. Therefore, we ask:

RQ1. How do CoE faculty members currently use space?

RQ2. What features, if any, do faculty members want in reconfigured workspace?

RQ3. How do faculty members report that they would respond to reconfigured workspace?

Method
Participants
Participants were 46 faculty of the CoE at a large midwestern university. Our sample represents 11 percent of the entire CoE faculty. Although the sample is small for a quantitative study, the open-ended responses richly complement our quantitative data. The themes that emerged from qualitative analysis were present repeatedly throughout the data, demonstrating theoretical saturation.

In terms of rank, participants reported professorial ranks as Full (28.3 percent), "I prefer not to respond" (23.9 percent), Assistant (23.9 percent), Associate (10.9 percent), Named/Distinguished (4.3 percent), and Other (6.5 percent). Most participants were men (47 percent), with 23 percent women, and 30 percent preferred not to respond. Their ages varied: 26-34 (8.7 percent), 34-44 (21.7 percent), 45-54 (15.2 percent), 65-74 years (4.3 percent), and prefer not to respond (37 percent). Most participants were US born (63 percent), 8.7 percent were non-US born, and 28 percent preferred not to respond. Participants' ethnicities were Asian (3 percent), White (57 percent), Unknown (3 percent), and Prefer Not to Respond (37 percent). We suggest that many participants declined to give demographic information because they did not want to be identified with the personal and passionate responses regarding reconfigured workspace.

Procedures
The research team sent an e-mail to the distribution list of all CoE faculty members with a link to complete the survey online.

Instrumentation
The survey for this study was developed in cooperation with CoE administration to address personnel and workspace issues the college was facing.

Open-ended prompts. Open-ended prompts asked: to what extent participants use various types of workspaces and their reasons for choosing their top three locations, to describe their ideal workspace at their university and the most important aspects of that workspace, to describe unacceptable workspace arrangements, and what incentives would be necessary to convince them to relinquish their current office.

Importance of workspace qualities scale. Importance of workspace qualities was measured using an adapted version of Ferguson *et al.*'s (1997) scale, consisting of 11 items. A sample item is "In your office space, how important is protection from outside noise and conversation?" Participants responded to each item using a

seven-point scale (1 = "Not very important" to 7 = "Very important"). Reliability was relatively high (Cronbach's $\alpha = 0.76$). See Table I for all scale items and descriptive statistics.

Qualitative analysis

An inductive thematic analysis based on grounded theory (Charmaz, 2000) was used to code responses to the open-ended survey questions. Two researchers independently coded all responses to pertinent questions from the survey and met to compare their interpretations to further build shared codes and categories (Weston *et al.*, 2001). We then created a hierarchical coding scheme by stacking codes that conveyed similar sentiments. For example, one researcher had coded for Rest, Access to Food, and Exercise. Subsequently through discussion, these three were grouped into a higher order category of well-being. Analysis was an iterative process cycling between individual coding and group discussion of codes.

Results

How faculty use and value space

RQ1 asked how CoE faculty members use space at work. We addressed *RQ1* in two ways. First, we analyzed participant responses when asked about the extent to which they spend time working in various places. The pattern of means suggests that participants spent the majority of their work time in their CoE office on campus ($M = 4.3$, SD = 1.1; where 1 = "not at all" and 5 = "very large extent"), in addition to home ($M = 3.1$, SD = 1.2) and formal shared spaces like conference rooms on campus ($M = 2.8$, SD = 1.0). Faculty members reported spending the least work time outdoors ($M = 1.2$, SD = 0.48) and in campus libraries ($M = 1.2$, SD = 0.57).

Second, we analyzed participants' open-ended responses about why they choose to work in particular space(s). Faculty reported four features of their university offices that lead them to spend most of their work time there. The first aspect, the office contained all necessary resources and materials, included faculty responses such as, "location of reference/work material," "all material and computer files available," and "is where my computer and other resources are located." The second property, proximity, included responses such as, "[the office is a] known place where others can

Item	Mean (SD)	Skew	Kurtosis
Privacy from being overheard by others	3.85 (1.17)	−1.25	0.99
Privacy from being overlooked by others	4.20 (0.96)	−1.37	1.92
Typical noise levels	3.63 (1.12)	−0.59	0.03
Protection from outside noise and conversation?	6.46 (1.03)	−2.20	4.53
Visual privacy?	5.87 (1.41)	−1.01	−0.07
Ability to hold private conversations on the phone?	6.33 (1.33)	−2.16	3.98
Ability to hold private conversations in person?	6.62 (1.05)	−3.35	11.27
Ability to undertake quiet, concentrated work?	6.48 (1.26)	−2.39	4.67
Interacting informally with colleagues?	4.93 (1.77)	−0.83	0.09
Collaborating with colleagues?	5.09 (1.80)	−0.73	−0.07
Meeting with visitors?	5.98 (1.40)	−1.08	−0.27

Table I.
Descriptive
statistics for
items from
importance
of workspace
qualities scale

Notes: Stem for items 1-3 read, "How satisfied are you with the following aspects of your office accommodations?" and for 4-11 read, "In your office space how important is." Responses ranged from 1 "very dissatisfied/not very important" to 7 "very satisfied/very important"

find me," "most convenient for meeting with colleagues and students," "central location to people," and "where I have all my files, materials, equipment, and support staff." The third trait, quietness and privacy, included responses "quieter," "a place with privacy to hold meetings with students," and "can close door for privacy and productivity." Finally, the fourth aspect, productivity, was indicated by responses such as, "[the office] is efficient, private, and close to colleagues and students," "can spend a lot of time with students on research, also on writing," and "the privacy, access to materials, and efficiencies are critical." These features indicate that faculty perceived that location and physical aspects of workspace are important and that individual, on-campus offices allow them to work successfully.

Faculty's ideal workspace features
Our second research question was future-focussed with the goal of understanding what features faculty would like in reconfigured workspaces. We approached *RQ2* in three ways. First, findings suggested that the most important attributes include (see Table I): the ability to hold private conversations in person ($M = 6.62$, SD $= 1.05$), undertake quiet, concentrated work ($M = 6.48$, SD $= 1.26$), protection from outside noise and conversation ($M = 6.46$, SD $= 1.03$), and the ability to hold private conversations on the phone ($M = 6.33$, SD $= 1.33$).

Second, we identified 11 important characteristics of faculty members' ideal workspace from responses to open-ended prompts. In envisioning their ideal workspace, participants reported the following preferences: privacy along with access to work materials, proximity to lab and collaborators, and flexibility and multiple functionality. Respondents expressed their desire for offices that were capable of "being open or closed," and had "a door so I can take a nap or pump [for breastfeeding] if I need." In discussing privacy, faculty indicated a general need for control over their workspace. Access and proximity were also significant as respondents wanted to be close to people with whom they collaborated and their labs. Spaces that offer flexibility and multiple functionality were reflected in statements about wanting offices where they can do individual work as well as meet with research teams: "space with adequate room for my daily work and space to meet with 3-4 others to accommodate team projects and meetings with alumni."

Regarding technological features, faculty members' ideal offices provide access to abundant and current technology including "excellent computer and internet access," phone, videoconferencing facility, speed and reliability, and quality office equipment. Many faculty members indicated their wish for offices that are adequately sized. In general, faculty reported that their ideal workspace would be larger than their current office. Additionally, the size of one's office also indicates status and can function as a symbol of professional achievement (Konar *et al.*, 1982). Accordingly, some faculty wanted new offices to offer indication of status while others would rather have new offices indicate equality because different office sizes and "hierarchy" in the existing arrangement "negatively impacts morale."

Faculty also desired workspaces that provide an aesthetically pleasing environment. Windows, sunlight, tall ceilings, and views of the outdoors were some of the desired environmental characteristics. Additionally, faculty wanted their workspaces to look "inviting" through the ability to "decorate my space," change color of the desks and walls, change the tile flooring to carpet or hardwood, and have "professional workplaces without looking bland INSTITUTIONAL." Similarly, faculty wanted offices that provide comfort. Faculty valued large circular tables for meetings,

comfortable seating, flexible "work environment[s] not bounded by ergonomics of space," and equipment for presentations. Faculty members stated the desire for offices that give them control over "climate," "noise," and "office sounds." Offices that provide opportunities for well-being – rest, food, and exercise – were also important (e.g. "ability to nap" and a "TreadDesk Treadmill").

Faculty's unacceptable changes to workspace

Our third approach to address *RQ2* involved responses to what would constitute an unacceptable change in workspace. Five constraints present in unacceptable workplaces emerged: unconventional workspaces, lack of space, lack of privacy, environmental aspects deemed unacceptable, and lack of proximity. The first constraint points to the potential inadequacy of unconventional workspaces, such as shared or open offices, cubicles, or hot-desking where workers do not have permanent workspaces. Responses indicated that faculty members found sharing with other faculty members highly disagreeable. Faculty wrote, "Sharing small space with others. That will make me leave [institution]," and "Sharing office with another professor. I did this a decade or so ago and it was awful in terms of productivity." Second, lack of space was reported as an unacceptable constraint. Responses included "anything less than I currently have – that is, an office that isn't centrally located, private, and doesn't have room for a small table." The third constraint was a lack of privacy or too many interruptions. Responses included: "Shared loud workspaces; constant interruptions" and "Working in an open-area with no privacy – I work with confidential information for the University." The fourth constraint included certain environmental aspects deemed unacceptable including a lack of windows, no natural light, too much noise, and not enough storage. Finally, lack of proximity to support staff or other faculty was considered unacceptable. Responses reflecting this theme ranged from, "I prefer face-to-face interactions so close access matters," to "distance from colleagues with whom I would like to collaborate."

Faculty's response to changes in workspace

Finally, *RQ3* asked how participants would respond to potential changes in their workspace. To address this question participants were asked, "What incentives would convince you to give up your college of engineering office?" Responses generally indicated that high-value incentives would be needed and that their current workspaces are both important and effective. For example, one participant wrote, "I can't think of any. I only need one office – not more than one. But having my own office is pretty important." Five themes emerged: nothing (meaning no incentives would be sufficient), money, ability to work from home, an equal or better office, and options for privacy. The first theme, nothing, included responses such as "where would I go? I don't work outside CoE," "None. Would likely move to another university if forced to give up CoE office," and "Stupid question – very stupid question." From the responses to this prompt, it is clear that faculty could not identify an incentive that would convince them to relinquish their offices. For example, the response, "where would I go? I don't work outside CoE" indicates that many faculty members work primarily in their CoE offices and labs, and that these spaces were perceived as essential. As a result, non-traditional workspace conceptualizations may not work for these faculty members.

Responses within the theme money included "mountains of money. In fact more money than would be reasonable to ask," "increase my salary by 50 percent," and

"subsidize the expenses I would have with no office – phone, printer, copier, scanner, whatever." Responses in the ability to work from home theme included "to work from home," "If I could work from home I would be willing to give up my CoE office," and "Encouraging telecommuting and providing technical support for setting up and maintaining a home office." Responses within the theme equal or better office included "Another office of equal or higher quality" and "Make the new space better and more useful, more attractive, than my office." Finally, responses in the options for privacy theme included "provide 24/7 access to a secure, private space when I need it," "there has to be a means to allocate some time to a quiet and private space to talk with students and do work," and "would need ability to find quiet spot or meeting space when necessary."

Additionally, in the question about what would constitute unacceptable workspaces, several respondents said if their unacceptable conditions became reality, they would leave the university and find employment elsewhere (as demonstrated in some of the above quotes). One participant wrote, "I did this for 15 years here and I will find a job elsewhere before going back to that lifestyle." Responses like these suggest that faculty are resistant to workspace changes and might take positions elsewhere, demonstrating that their current offices provide needed features for working. A different work environment like hot-desking would not provide most of the features that faculty report needing or wanting. Participants' strong responses and need for high incentives for change also illustrate the potential dangers of making changes without faculty buy-in.

Discussion
This study contributes theoretically and pragmatically to how faculty use and value workspace, spatial change in universities, and STEM faculty retention.

Faculty perspectives on university space
We first contribute to scholarship on university space by providing insight into what faculty members want in their workspace. There has been little previous research on the physical space of universities (Temple, 2009), and none on faculty use or perceptions of space. We contribute to this area in three ways. First, both quantitative and qualitative data indicate that faculty members spend the majority of work time in their assigned campus offices. Participants' reasons for choosing offices as their primary workspace include access to necessary resources and materials, proximity to colleagues and students, provision of privacy and quiet, and perhaps relatedly, the high levels of productivity experienced in this setting. These data, along with faculty reactions to hypothetical changes, suggest that faculty see no substitutes for private offices.

Second, the most important characteristics for workspace include the ability to hold private conversations, the ability to undertake quiet, concentrated work, and protection from outside noise and conversation. In identifying their ideal workspace, respondents valued spaces that provide privacy, control, access, proximity, technology access, size, indication of either status or equality, an aesthetically pleasing environment, comfort, physical well-being, and flexibility.

Third, respondents were resistant to open plan or shared offices and any office design that was too small, lacked privacy, was not close to their lab or collaborators, or had poor aesthetics and ergonomics. These preferred and unacceptable aspects provide starting points for future research on faculty workspace needs as well as identifying

elements to be incorporated into future workplace design. They also demonstrate the importance of space for faculty. Faculty do not see space as a backdrop for work, but an essential tool for productivity.

Spatial change in universities

In previous research on space in academia, administrators have made spatial changes to lower costs or foster collaboration (Gieryn, 2002; Guterman, 2004; Leonardi and Barley, 2011; Shabha, 2004; Trani, 2014). In these cases, administrators have focussed on objective space aspects with little consideration for social meanings of space. We show that the meanings and values that faculty apply to space contrast with characteristics of new business workspace forms like hot-desking. This conflict follows previous research demonstrating that changes to material workspaces are about more than physical layout and that workspace meanings must be managed (Pepper, 2008; van Marrewijk, 2009). Faculty's strong resistance to change demonstrates the importance of space in universities. Space is not simply a context for work, but is tied to issues including productivity, identity, and communication.

Practically, administrators looking to make changes to faculty workspaces need to consider what workspace means to users in addition to physical characteristics. As our data demonstrate, faculty members were passionate about avoiding workspace changes with some stating that they would leave the university over spatial changes. Administrators need to take seriously that space is not only material and objective, but also lived and social. This study begins to provide resources on what faculty may want from their workspace, but administrators need to listen to their faculty. Even if there are no objective improvements in productivity or other work outcomes in certain spaces, space still matters for work because of the meanings employees ascribe to it. Ongoing organizational research needs to consider these aspects of contextualized work.

Theoretically, we contribute to an understanding of the importance of place (lived and meaningful space) in universities (Temple, 2009). Faculty reported spending the most time working in their own offices, identified control over their workspace as important, and were resistant to changes that would involve shared or non-permanent space. These findings suggest that having a place to make one's own is important to faculty. These characteristics of workspace bring the social and material aspects of space to light; faculty value a space that they can configure in material (in terms of aesthetics and comfort) as well as social ways (faculty exert ownership and construct meanings about their space). This finding extends the research on organizational space change by showing that lack of ownership may be one unintended consequence of spatial change. Future research can continue to investigate how faculty members make their workspace into personal places and the implications for productivity and identification with the university.

Workspace and recruitment and retention of faculty

Third, this study has implications for the recruitment and retention of faculty. The CoE studied has an international reputation and most faculty have strong records in research and external funding. As a result, the faculty sampled likely have career options elsewhere, in both the academy and private sector (Searls, 2009). Faculty said that nothing or only very high incentives would prompt them to give up their current workspaces and several stated that changes to new workplace styles would cause them

to leave the university. Given the high-research capital that many of the faculty sampled likely have and the fact that faculty retention in STEM is less than 50 percent (Kaminski and Geisler, 2012), faculty departure is a real threat. Additionally, given that women in STEM occupations are more likely to leave their occupational fields than men (Glass *et al.*, 2013) and that women in STEM feel limited by an academic culture that they perceive as providing them fewer resources, limited support, and unequal leadership (Xu, 2012), there are also issues related to the retention of diverse faculty.

These findings suggest practical steps for administrators considering changes in faculty workspace. First, other research has shown that employee participation in office redesign has helped spatial transitions (Våland, 2011). Engaging faculty in office redesign seems essential to avoid alienating them and to make the new spaces most useful. Additionally, proposed changes would likely need to be accompanied by communication from the CoE and an invitation for dialogue with faculty. Second, in a field like engineering, communication and collaboration are especially important. As employees communicate their satisfaction or dissatisfaction with their workspaces, this can impact employee morale or organizational culture.

Limitations of this study include the relatively small sample and the lack of disclosure of demographic information. Observations and follow-up interviews with faculty members could add greater context and help triangulate existing data.

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