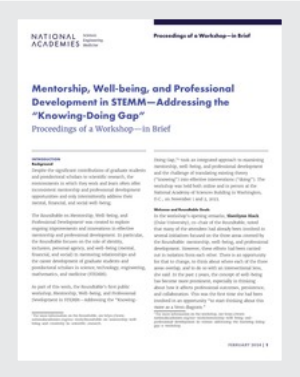

Mentorship, Well-Being, and Professional Development in STEMM: Addressing the "Knowing-Doing Gap": Proceedings of a Workshop—in Brief (2024)

DETAILS

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Proceedings of a Workshop—in Brief

Mentorship, Well-being, and Professional Development in STEMM—Addressing the "Knowing-Doing Gap"

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INTRODUCTION

Background

Despite the significant contributions of graduate students and postdoctoral scholars to scientific research, the environments in which they work and learn often offer inconsistent mentorship and professional development opportunities and only intermittently address their mental, financial, and social well-being.

The Roundtable on Mentorship, Well-being, and Professional Development[1] was created to explore ongoing improvements and innovations in effective mentorship and professional development. In particular, the Roundtable focuses on the role of identity, inclusion, personal agency, and well-being (mental, financial, and social) in mentoring relationships and the career development of graduate students and postdoctoral scholars in science, technology, engineering, mathematics, and medicine (STEMM).

As part of this work, the Roundtable's first public workshop, Mentorship, Well-being, and Professional Development in STEMM—Addressing the "Knowing-Doing Gap,"[2] took an integrated approach to examining mentorship, well-being, and professional development and the challenge of translating existing theory ("knowing") into effective interventions ("doing"). The workshop was held both online and in person at the National Academy of Sciences Building in Washington, D.C., on November 1 and 2, 2023.

Welcome and Roundtable Goals

In the workshop's opening remarks, **Sherilynn Black** (Duke University), co-chair of the Roundtable, noted that many of the attendees had already been involved in several initiatives focused on the three areas covered by the Roundtable: mentorship, well-being, and professional development. However, these efforts had been carried out in isolation from each other. There is an opportunity for that to change, to think about where each of the three areas overlap, and to do so with an intersectional lens, she said. In the past 3 years, the concept of well-being has become more prominent, especially in thinking about how it affects professional outcomes, persistence, and collaboration. This was the first time she had been involved in an opportunity "to start thinking about this more as a Venn diagram."

[1] For more information on the Roundtable, see https://www.nationalacademies.org/our-work/Roundtable-on-mentorship-well-being-and-creativity-in-scientific-research.

[2] For more information on the workshop, see https://www.nationalacademies.org/our-work/mentorship-well-being-and-professional-development-in-stemm-addressing-the-knowing-doing-gap-a-workshop.

Black's questions included: Where are the intersectional pieces between professional development, well-being, and mentorship? How do they impact one another? When we put them together, what synergies allow us to advance the academy in a way that makes it more inclusive and allows more individuals to thrive? The Roundtable is hoping to foster innovation by thinking through these questions, among others, using an intersectional lens and bringing them together in an evidence-based way. Building upon their Statement of Task, the Roundtable created a Framing Document,[3] which serves to elucidate the goals, definitions, and approaches to their work.

The Roundtable intends to compile and share qualitative and quantitative data on mentorship, well-being, and professional development, including the intersections between them, said co-chair **Kimberly Griffin** (University of Maryland). They want to amplify the work that has already been done and highlight current practices and emergent strategies. "Best practices are really tricky, but we are going to do our best to identify as many practices as we can," highlighting the context within which those practices are being implemented.

Griffin described the Roundtable members as scholars, practitioners, and leaders across the STEMM ecosystem. It is "highly diversified in terms of expertise, knowledge, lived experience, and insight into [our] three topical areas," Black added. Members of the Roundtable have strong commitments to advancing equity and justice—both across the board and particularly in the STEMM ecosystem, Griffin said. The Roundtable members in attendance introduced themselves and briefly discussed their professional expertise and interests, including understanding the experiences of marginalized populations, using mentorship as a lens and catalyst for transformation, and applying professional development to STEMM identity formation.

Persistent disparities for STEMM colleagues and students from marginalized and minoritized communities have been in place for a very long time and oppressive experiences can be amplified in mentoring relationships. "We know that individuals from marginalized and minoritized communities may have less access to professional development. We know that their well-being may not be as good," Griffin said. She asked participants to think about how to use the Roundtable as space to understand the experiences of a variety of individuals, including members of the LGBTQ+ community, people with disabilities, and people of color, among others. "How do we understand how they experience science, and how we can really leverage the best of these three dimensions to help them thrive and promote those conversations moving forward?" The Roundtable wants to be mindful of advancing conversations about structural change and systemic change.

Black noted that members of the Roundtable have outlined several goals for their overall work and for this workshop. First, they want to focus on the intersections and interactions between mentorship, well-being, and professional development, and how that amplifies the effect of each.

Second, they plan to identify beneficial practices by drawing on varying types of supportive evidence. Evidence-based practices are "critical" to the Roundtable's success. "We know that one of the reasons that many interventions are not successful in this space is because they are derived off of gut instinct versus evidence-based or validated measures." However, there will be data collection and aggregation focused on lived experience, Black noted, that can then be leveled with evidence-based methodologies, including qualitative and anecdotal stories, as well as quantitative metrics and surveys. There are also many "really wonderful interventions" that are running, but may not have been written up or shared broadly. "We are hoping to serve as a resource to develop some of the work and get it disseminated," she said.

Third, they want to help create a national research practice learning network, hoping to elevate what is working around the country. Black noted that the workshop has participants from government agencies, the nonprofit space, funding agencies, institutions, and corporations, and there are many different practices in

[3] For the Roundtable's Framing Document and other workshop meeting materials, see https://www.nationalacademies.org/event/41011_11-2023_mentorship-well-being-and-professional-development-in-stemm-addressing-the-knowing-doing-gap-a-workshop.

these areas to learn from. A learning network is "one of the ways to bring them all together and begin to see some commonalities."

Fourth, they will explore how systemic changes can be implemented across the STEMM ecosystem for holistic development for every group—from graduate students and postdoctoral scholars to faculty and STEMM colleagues outside academia. "All of the groups working together is what determines the ability of the ecosystem to thrive," she said.

Finally, the Roundtable hopes to commission a gap analysis of what is needed in mentorship, well-being, and professional development in STEMM—with this workshop starting that work, Black said.

THE KNOWING-DOING GAP: A FIRESIDE CHAT

Audrey J. Murrell (University of Pittsburgh) served as workshop planning committee co-chair and introduced **Jeffrey Pfeffer**, a professor of organizational behavior at Stanford University's Graduate School of Business to discuss the "knowing-doing gap." Pfeffer, along with co-author Robert Sutton, popularized the concept of the knowing-doing gap in their 2000 book *The Knowing-Doing Gap: How Smart Companies Turn Knowledge into Action*.[4] Pfeffer explained he and Sutton had been inspired to write the book after several encounters with people telling them that they knew much about the research on management practices, but admitted they did not actually implement any of them.

A similar story from the private sector illustrates the extremes of the knowing-doing gap, Pfeffer said. A company that produced office furniture normally had a 20-year lead time but decided to change their organizational structure with the intention of cutting it down to 7 years. A year after that decision, however, nothing had happened and no one had actually implemented the change. He noted the prevalence of a lack of follow-through in academia as well: "When you see presentations [or] meetings where there are commitments to do things and nothing ever really changes."

Pfeffer identified four forces he commonly sees contributing to the knowing-doing gap: confusing or substituting talk for action, fear, measuring the wrong things, and substituting memory for thinking. Within the enormous problem of physician and healthcare provider burnout in the United States, he sees a huge issue in substituting talk for action. "So many people believe that meetings, PowerPoint presentations, and discussions somehow solve a problem," he said, adding that those activities are important in figuring out *what* actions should be taken, but they do not substitute for actual action.

Fear can contribute to the knowing-doing gap, Pfeffer noted, through worries about others' reactions or fear that the action will not work. A potential remedy for this is encouraging rapid prototyping, which is common in product design, but not common in management practice. Pfeffer also identified institutional momentum as a potential contributor to knowing-doing gaps. He described this as "memory substituting for thinking" or operating based on "how we have always done things." He noted that the status quo can take precedence, even if it is not necessarily the best way to achieve new objectives.

Most organizations are measuring the wrong things, focusing on costs and expenses rather than results, Pfeffer said. This is also tied to rewards and incentives that influence behavior. For example, if someone is supposed to be rewarded for improving diversity, equity, and inclusion or well-being, that cannot happen if their performance is not measured along those dimensions, he added.

Describing an idea from Robert Kaplan called the "balanced scorecard," Pfeffer explained that corporate America's focus on financial results alone was backward-looking because it did not include predictors of future performance, such as customer loyalty and building competencies within the company. He stated that rewards and measurements are critical for focusing

[4] Pfeffer, J., and R. I. Sutton. 2000. *The Knowing-Doing Gap: How Smart Companies Turn Knowledge into Action.* Harvard Business School Press.

people's attention and that these can serve as a way for organizations to signal priorities. Murrell asked how he saw this playing out in higher education, and Pfeffer noted that in many cases in medicine and academia, individuals are awarded for their own performance and achievement, but relatively few higher education institutions reward people for the development of their colleagues. In all his years at Stanford, he has never been evaluated on his mentorship to junior faculty members. In contrast, during the leadership of David Kelley at the design firm IDEO, staff were also measured by their peers on how helpful they were on their projects, specifically on technical projects where they offered substantive advice and support.

He also mentioned the work of Sylvia Ann Hewlett on sponsorship versus mentorship regarding the development and promotion of women. Hewlett's perspective is that "mentors give advice, sponsors give promotions," so that women "need people who will take them under their wing and not only give them advice but give them the promotions and the responsibilities and the jobs that will make them successful," he said. Murrell questioned whether this framing accounted for well-being, adding she did not want to disentangle well-being and professional development, particularly for underrepresented groups. Pfeffer agreed that being concerned about well-being and inclusion is important but stressed the value of sharing potential opportunities. We need to be concerned about using power as advocates, promoting awareness of and offering available opportunities, and saying "I am sponsoring you; I am going to take you up with me. As I get promoted, you are going to get promoted." Murrell asked if the disproportionate lack of retention of women and people of color as they move up in the organization could be a signal of a knowing-doing gap. Pfeffer responded that it is a signal that we have created workplaces that are not only unwelcoming but also unsustainable. In some cases, these workplaces are also unsafe, which affects well-being.

Murrell then asked about the value of satisfaction as a measurement in mentoring relationships, noting, "learning is uncomfortable, change is uncomfortable," so satisfaction may not be the best metric. Pfeffer described how USAA, an insurance and banking company that serves members of the U.S. military, measured the effectiveness of their development and training programs. Instead of asking trainees to provide feedback by using what he called "happy sheets" (i.e., satisfaction surveys), a few months later they asked trainees' bosses and colleagues about any improvement in the trainees' job performance. That type of information acts as a measurement of the effectiveness of a particular program and how it affected the trainees.

An online audience member asked whether we could assume that "more is better" in mentorship, since it is multidimensional. In other words, the more dimensions of support a mentor provides or a mentee has, the better the outcomes are. Murrell said although there are substantial tools and literature on the different roles in the mentoring relationship, people tend to default to using only one. Embedded in the broader conversation is an exploration of being more relational in our view of mentorship, as opposed to having a definitional and one-dimensional perspective. Pfeffer agreed that learning and help can come from everyone that you are connected with. When asked about outcomes in terms of the knowing-doing gap, Pfeffer said that there is still a lot of work to be done to reduce symbolic action, where meetings are held to discuss a problem as opposed to doing things that would result in actionable change and accountability.

Role of Leadership

Leadership is essential because leadership directs resources, Pfeffer said. "Change does not have to come from the top, but if it is not supported by the people at the high levels of the organization, not much is going to occur." Direct involvement is crucial as well, he added. A common issue he has seen are leaders appointing or hiring a single person to address something the institution knows is an issue without taking any action on the fundamentals of the institution itself; for example, appointing a wellness director instead of considering how the structure of work or hours affects faculty, graduate students, and postdoctoral scholars or what is driving people out of the organization. Instead,

leaders can hold themselves accountable for making sure that things move in the right direction, Pfeffer said.

A Roundtable member asked Pfeffer what are some ways that students can take a proactive approach to improving mentorship relations. He noted the potential power of collective action, mentioning that Stanford's graduate students, as well as residents at the medical school, had recently voted to unionize. It does not have to be a formal union, he said, but an organization that could countervail the power of senior leadership "that is probably happy with how things are, because if they were not…they would have changed things already."

Another questioner asked how to deal with measurements that include norms and practices that directly disadvantage underrepresented groups. The measures themselves have to be improved, Pfeffer said, giving the example of symphony orchestras moving to blind auditions to avoid biases against women and underrepresented groups. There are already blind reviews in the research process, and rethinking the use of student ratings of teachers is another way to approach this. Overall, higher education institutions need to be clear about objectives—and reflect inward. "Are we doing what we need to do to develop people and if we are not, let's diagnose what the problem is and figure it out," he said.

This connects with leadership's responsibility to build capacity across all individuals at the institution, something Pfeffer says is rarely happening now, both in higher education and across the country. We live in a world in which the workforce is increasingly diverse, and if organizations are going to succeed in a world in which intellectual capital is important, all parts of their workforce have to function at a high level. "You have to get people at the most senior levels of the organizations (e.g., deans, provosts, and university presidents) to say that talent development of every human being that we hire is a strategic priority, and it is as important as anything else that we do," he said.

APPLYING THE KNOWING-DOING GAP FRAMEWORK

Andres Diaz (University of Arizona) introduced a framework activity for applying the knowing–doing gap to prepare for the wider discussion. Diaz started with a common example: going to the grocery store to buy food. If we want to eat healthier, we have a lot of knowledge about foods that can generally improve our overall well-being, but executing this task often has limitations. Diaz asked the Roundtable what they had encountered that got in the way of buying healthier foods. Among the examples offered were a lack of time to appropriately plan and select healthy foods, already being hungry at the store, not being good at cooking or having difficulty working with healthier food, budget and food availability, information on food labels, and transportation to get to the store.

Diaz then offered another example: exercising, which is another task that is generally good for you, but executing it is often complicated. He added that exercise involves acting consistently. Translating that to mentorship, professional development, and well-being, improvement takes consistent effort across months or years.

Not knowing what to do can be a barrier, said workshop planning committee co-chair **Wesley Marner** (Morgridge Institute for Research). "I have walked into the gym and thought, I have no idea where to start." In mentorship, especially for the mentee, it can be bewildering to know what to focus on. **Jabril Johnson** (Morehouse School of Medicine) said these barriers sounded familiar to his work studying prostate cancer disparities: lack of education becomes a huge barrier.

Black reflected that both practical examples involved doing things for yourself, whereas in mentorship and professional development, other people are involved. She asked how the decision-making process might change if you had to buy groceries for 10 people in your family rather than only for yourself.

Sometimes we do not follow through on the things we know have good outcomes, Griffin said, because we are trying to juggle lots of different priorities (e.g., going to the gym would mean getting up earlier and missing out on sleep, or going later, and not being able to put your child to bed). Sometimes what we know is best for a mentee could come at a negative cost for the mentor.

Centering someone else's well-being and professional development can come at a personal cost, and that makes it difficult to know what to do, she added.

Diaz suggested that personal transparency can help address the gap. For example, it is important to him to exercise regularly to retain mobility, and knowing that helps execution. "Being honest about why it is that we want to institute this policy" can set up a more honest framework moving forward, he said. Awareness of time horizons also makes a difference because measuring effectiveness can take time, said **Chris Smith** (Virginia Tech). Diaz agreed, saying what success looks like for a mentee might take a decade, which is much the same for any institutional change, even if it is highly effective and garners support.

Highly effective mentors generally are extremely comfortable with being uncomfortable, said **Joi-Lynn Mondisa** (University of Michigan). Creating ways for them to try and fail and learn quickly is important, but environments where mentors are likely to be punished or penalized for trying are unlikely to create wider change.

Group dynamics play a part in making one's decisions, responded Johnson. While you may not perceive something to be personally important, if you are part of a group where the consensus believes it is important, that can shift priorities. Diaz added this also applies to supporting quality mentors. Supporting those who see the value in it, even when you may not, can increase support for better mentorship as a larger altruistic goal.

SYSTEMS AND STRUCTURES TO SUPPORT AND INCENTIVIZE MENTORSHIP, WELL-BEING, AND PROFESSIONAL DEVELOPMENT

Emily Miller (Association of American Universities [AAU]) began the discussion on systems and structures by offering a few examples from large research universities, as well as some framing questions. In response to the consensus study *Graduate STEM Education for the 21st Century*,[5] AAU launched a Ph.D. education initiative. One of the key challenges that schools were struggling with was creating a widely accepted definition of mentorship on the doctoral level. The mentor-mentee relationship can be ambiguous, and involves a two-way exchange of knowing and learning, Miller said. Implementing mentorship practices and policies can be hard to formalize on campuses, because it relies on personal relationships and individual connections.

The AAU initiative also looked at how to support doctoral students through a full range of career pathways. Miller described how professional development involves the full life cycle of graduate students through postdocs as well as how well-being is "critically important," but that definitions of well-being are individualized. She asked what the bounds of accountability are for both individuals and systems toward well-being and professional development.

Integrating mentorship, professional development, and well-being also means integrating outcomes for learners, faculty, and staff. In undergraduate education, Miller noted, "There has been a real discussion that we cannot achieve student success if we do not think about faculty success." The structures and mechanisms that fund doctoral students have a great influence on professional development and what a mentor-mentee relationship looks like. In response to an "unhealthy system," graduate and doctoral students are increasingly organizing and pushing for unions. She sees this as a further challenge for mentorship, because "you are entering into highly negotiated relationships." The incentive system for faculty does not currently value and recognize the work of well-being, mentorship, and professional development, Miller added. More collaborative or collective action to deliver on an institution's multiple missions is in tension with a system that advances people individually. Miller said she agreed with Pfeffer on the importance of senior leadership's engagement on these issues, but part of that work is reimagining their institution's workforce.

Miller ended her remarks by sharing a comment from an online participant that mentorship is not valued enough by institutions to adequately compensate for the time and effort needed. Lack of quality mentorship is rarely significant enough of a concern to deny advancement or to prevent someone from being tenured or promoted,

[5] National Academies of Sciences, Engineering, and Medicine. 2018. *Graduate STEM Education for the 21st Century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25038.

Griffin responded. Thus, it is important for institutions to both reward effective mentors and hold ineffective mentors accountable.

Griffin reflected that almost all conversations she had about bad mentorship had been in private, or told to her in confidence, making it hard to determine what to do going forward. Duke University created faculty advancement seed grants, Black noted, offering funds for building capacity or fostering a learning community, separate from research productivity. More "low-risk, high-reward" opportunities like this can serve as a key motivator for faculty, she said.

Lorelle Espinosa (Alfred P. Sloan Foundation) underlined Miller's point about how graduate students were funded—adding direct funding through research grants was an entrenched way to support students across graduate education—and it is something she would love to see the Roundtable address in more depth.

Unionization, Faculty Frustration, and Opportunity

Fátima Sancheznieto (University of Wisconsin–Madison) asked Miller for clarification on how she sees the rise of unionization complicating the mentor–mentee relationship. Miller observed that unionization is a symptom of "an unhealthy and exploitive reality existing on our campuses" and is creating an opportunity for graduate students and postdocs to have a voice in the system. "The rules and the regulations and legalese" around the academic labor movement have created significant changes in how faculty and the institution itself can engage, she said, adding the frequency and the pace of collective bargaining is rapid. Sancheznieto noted these challenges are not necessarily new but are being shifted from "graduate students and postdocs who are disenfranchised…to people in positions of power who were not willing to see or willing to act on those disparities in the first place." At the very least, unionization is forcing changes that people were otherwise unwilling to engage in, Sancheznieto added.

While unionization is trying to address an unhealthy and exploitive culture from the students' perspective, Miller has heard from some faculty that conversations with students are perceived as being or actually are prohibited. Sancheznieto noted that on the other side are graduate students and postdocs who previously lacked power to address abusive relationships. She understood the frustrations of some faculty but stressed that making people in power uncomfortable has empowered students. "[Is] it a problem or an opportunity for growth and change?" she asked.

Smith said this conversation brought up the wider issue of reenvisioning the workforce. He questioned the role that graduate students and postdocs serve, asking, "Are they here to produce a product or are they trainees we are trying to grow and develop, and can the two things even occur together?" In Sancheznieto's view, multiple roles can be held. It may be a cognitive shift, but that change in framing is not necessarily a negative outcome. In practice, institutions treat graduate students and postdocs as trainees, but unions treat them as employees, Griffin said. So, not only is there a cognitive shift but a structural shift that institutions need to respond to.

Well-Being, Timeline for Assessment, and Negative Incentives

Laura Lundsford (Campbell University) turned the discussion to well-being and how faculty are questioning how much of addressing well-being should be a part of their job. Measurement and assessment are critical, she said, because they offer a guide for faculty faced with a wide breadth of potential issues. "I understand why a lot of faculty, myself included, cannot save the universe with some of the wellness issues we see showing up on our campus."

Hironao Okahana (American Council on Education) questioned whether measurement should focus on the act of mentorship or the outcomes of mentorship. If it is the latter, what is a fair timeline for the assessment? If the timeline is longer, how can that be applied to promotion or other kind of reward or incentive mechanisms?

Black noted research in this area says that both cumulative and summative assessments are important. Holistic measures of assessment should capture the process in addition to the outcomes, she said, and the challenge is identifying the correct outcomes that

reflect the relational part of mentorship practices. She mentioned a section of the FIRST grants[6] that are seeking to measure the effect of the relational intervention on the system.

Regarding outcomes, negative incentives are a focus area for Murrell. Research has shown that using metrics such as publication numbers, author order, and other common factors as primary measurements puts pressure on individuals to engage in unethical behavior. There are unequal power dynamics between faculty and students that can lead to the taking of authorship and even the outright stealing of research or data. Graduate students and postdocs have told her they cannot say anything about being victims of unethical practices because their funding will be interrupted as a result. This suggests a need to better understand the negative incentives that the system supports and the resulting outcomes. "Our incentives are not reinforcing what we say we value," she said. The pressure for competition and success, particularly among faculty has made this worse, not better, and in some ways, unionization equalizes some of these pressures.

Nuances in Mentoring Relationships

In a mentor–mentee relationship, one mentee could have a positive experience with a mentor, but someone else could have a different experience with the same mentor. Miller asked the Roundtable to reflect on how that nuance could be addressed.

There are ongoing efforts to tease apart those concerns, Black said. CIMER (Center for the Improvement of Mentored Experiences in Research)[7] gathered samples of mentorship agreements to show how different tools are being used to think creatively about that relationship. Transparent, clear expectations stated up front are important. "Otherwise,…we are trying to retroactively fit models to say whether someone was good or bad without understanding what those words mean to the parties involved." Until there is more transparency and clarity on those expectations on both sides of the relationship, it will be hard to get a clear answer, Black said, adding that this is a gap that the Roundtable and wider academy can address.

Mentorship is a skill that improves as you do it more, but it is also a product of personalities, which speaks to potential mismatches and the value of mentors playing different roles in your career, Diaz said. "I have mentors who I would never talk to about experimental design, but I would talk to them about attending a conference or networking." When mentees are better versed or more aware of the versatility of mentorship, it is better for their expectations, and for the mentor to leverage what they excel at. Miller noted that funding mechanisms are unfortunately not particularly structured well for multiple mentors.

Lundsford said she had previously assumed that graduate students needed psychosocial support first. In her work with a worldwide STEMM mentoring program, she found out that was sometimes not the case: "It looks like as long as they get it at some point, the order does not matter." Thinking about measurement from the student perspective will help us, she said, because students' perceptions—which will vary—are more important than reality.

In discussions with larger groups of faculty and her clinical work with trainees, mentorship has been the number one issue that has come up, said **Kate Hagadone** (University of Michigan). While it is easy to be distracted by tales of a particular case, she reflected that what she finds useful is to determine a systemwide goal. Knowing the expectations of good mentorship and consequences for abusive mentors can help in those situations, if students feel they have a way to address concerns if they arise.

Outcomes are complicated by a couple of factors, Murrell said: what might be positive for the mentee might be horrible for the mentor, and vice versa. Satisfaction scores can become more complicated when looking at other objectives for the mentorship relationship because transformation is going to be uncomfortable while you are engaged in it. Innovation literature shows some of that conflict actually produces change and different sorts

[6] For information on FIRST grants, see https://commonfund.nih.gov/FIRST.
[7] For information on CIMER, see https://cimerproject.org/cam-nrmn/.

of outcomes. "There has got to be a place where we allow for mentoring relationships to be complex, disruptive, and uncomfortable, and maybe that uncomfortableness is a short-term gateway to really powerful transformation," Murrell said.

Wider Evidence and Levers for Change

In the efforts to improve teaching and learning, there is a movement to encourage a broader, full range of evidence, Miller said. Similarly, she encouraged Roundtable members to think about various ways faculty members can document evidence, including reflective practice in mentoring or progress of the outcomes that are meaningful both to them and to the institution.

An online attendee asked what can be done to change negative incentives, given that toxic behavior in a high-dollar grant setting is unlikely to be addressed. Quality Enhancement Plans (QEPs) as part of the accreditation process could be a lever, as priorities in a QEP gets money and an internal team behind it, Miller said. While promotion and tenure happen very few times across a career, Black mentioned, there is an annual review for pay increases or bonus at some schools. Valuing "colleagueship" in these reviews could shift systems faster than occasional tenure decisions, she suggested.

BREAKOUT DISCUSSIONS

On the second day of the workshop, attendees were divided among six groups and discussed mentorship, well-being, and professional development in the context of culturally responsive practices and ways to define and assess these concepts at the institutional level. Toward the end of the day, representatives for the groups summarized the discussions.

Culturally Responsive Practices in Mentorship, Well-being, and Professional Development[8]

Johnson said his group discussed how people's fear, lack of cultural competency, and worries about complications drive inertia in existing systems. Group members observed cultures of performative or superficial speeches about elevating women, people of color, and neurodivergent individuals, but did not have avenues to fight against a work culture that may be toxic toward them.

Johnson's group also discussed possible solutions. International students at Dartmouth College built communities that supported each other, evolving from a small group to a larger one. As a result, the faculty saw a significant change in the behavior and attitude of these students, and faculty could opt in to learn more about their students and improve their own cultural competency.

Mondisa's group discussed how the knowing-doing gap for culturally responsive practices was influenced by faculty who fear offending someone or stepping over boundaries, as well as the difference between lack of awareness and lack of knowing what to do. One can know how they want to mentor, but "there is a significant lack of knowledge in terms of people not being trained, not being educated, not being equipped, and not knowing about certain resources."

Mondisa also mentioned several observations from group members about different actions they have seen on their own campuses. For example, a graduate student association created change by advocating for international students struggling with housing arrangements and inviting leaders to see the living situation. And an oceanography program included funding for swimming lessons for some of its trainees, after getting to know them better and becoming acquainted with their needs. These are examples of strategically thinking about how to leverage grants to support needs that may not be automatically obvious, she said. Another participant noted they had been involved in a program that trained postdocs in inclusive mentoring practice, allowing them to bring that practice back to their research groups.

Brian Burt (University of Wisconsin–Madison) said his group discussed how important it is to define well-being, given it is different for each individual and can change. What someone needs today might be different next week

[8] Previous work from the National Academies in *The Science of Effective Mentorship in STEMM*, Online Guide V1.0, described culturally responsive mentorship practices as those attitudes, behaviors, and practices that enable mentors to work with mentees with different cultural backgrounds. For more information, see https://nap.nationalacademies.org/resource/25568/interactive/mentorship-defined.html#section4.

or next semester, "so even as we seek to create these definitions, they can be dynamic," Burt said. Some of the elements of well-being discussed in the group were feeling physically and culturally safe, care of health conditions, financial security, and language barriers. The sense of being safe or feeling of belonging might shift based on location. "It could be that you are doing a great job mentoring within your lab, so a student could feel safe there," but they may not be safe within the larger department or institution.

Burt's group also discussed different ways to measure accountability and collecting some sort of assessment, including developing student-level profile logs that were aggregated. The information could be collected across different advisors, allowing a wider assessment of how the student and the department was doing, moving it toward structural change.

Defining and Assessing Mentorship, Well-being, and Professional Development at the Institutional Level

Diaz said his group discussed the multidimensionality of mentorship, and how a traditional form of mentorship is not necessarily the standard. They also discussed how one might measure "trust" and other intangible, qualitative aspects of mentorship programs for a fuller picture.

One of the points Smith's group generated was the need to engage and build community with those who serve individuals from historically underrepresented groups. Much could be learned from minority-serving institutions such as Historically Black Colleges and Universities, Hispanic-Serving Institutions, and Tribal Colleges that have been building community and support for diverse populations, Smith said, instead of trying to "reinvent the wheel".

Another topic the group discussed was how to build institutional support. Stanford University has a postdoc fellowship program that recruits individuals from historically underrepresented groups, Smith said. A key metric of this program's funding is a clear mentoring plan and proposal that indicates a conversation has taken place between a prospective mentor and mentee about career goals and how this experience is going to help advance those goals, he explained. These metrics are less about the science and more about whether a particular faculty member and postdoc are well matched.

Along that line, the group discussed National Science Foundation mentoring plans that are submitted as part of larger funding requests, especially for postdoc and grad student support, Smith said. As a result, institutions have created guides, but faculty submitting these plans may not be customizing them, turning it into a bureaucratic step instead of the advancement of a specific mentee.

Lundsford said her group discussed fear as part of the knowing-doing gap, but from the perspective of students who are afraid to approach mentors. They also observed that when certain programs or initiatives were required or measured, mentoring education resulted in increased leadership competencies. However, some faculty members experience an "inequitable distribution of effort" around mentorship. Also, some new faculty who were motivated to act had trouble finding the information they needed.

Her group also noted how some mentoring faculty talk about well-being, but then they do not model it in their own careers. In the space of clinical mentorship and professional development, the Gilliam Fellows Program[9] was mentioned as a successful example, but the group noted it was time and money intensive. Most graduate students are funded by research assistantships, where there may not be a mentoring expectation attached, she said.

Creating Cultural Change

Burt opened the wider conversation by asking Mondisa and others to share more of their discussions on creating cultural change. Mondisa said her group discussed cultural change on different levels, including individuals leveraging the power of organizations to act as intermediaries to drive cultural change and improve well-being. Peer mentoring can also create cultural change about who counts as a mentor and can help build culturally responsive mentoring and professional development skills. A conversation between faculty and

[9] For more information on the Gilliam Fellows Program, see https://www.hhmi.org/programs/gilliam-fellows.

students about creating cross-departmental mentoring and professional development networks became a mutually illuminating experience as faculty learned about students' concerns, and students learned they could ask for different types of support.

Johnson's group discussed what happens when a clearly articulated mentorship contract is breached by the mentor or mentee. One member of the group suggested using the departmental chair as a neutral party, while another member mentioned an example of a graduate student, with a director role, systematically ensuring that students are meeting with their advisor and vice versa. Some ideas to drive cultural changes discussed in Johnson's group included building communities online with graduate schools and having graduate students engaged in the process of hiring faculty in their department.

Structuring and Adapting a Mentoring Plan

Burt asked Diaz and Smith to expand on the idea of developing a mentoring program that is both structured and flexible. A mentorship relationship inherently needs to be adaptable, but it can be based on evidence, Diaz said. "You build the mentorship program with an evidence-based skeleton, but then you allow the mentor and the mentee to fill in the skeleton with things that they both excel at," as well as their individual expectations for that relationship, he said. Flexibility and transparency can also lead to personal agency for the mentee, change the dynamics, and provide a sense of well-being through the promotion of self-worth and professional development.

Smith added it is important to remember that mentoring plans or similar tools are "living documents." Coming back to the plan over time prevents it from becoming a one-time checklist and encourages an ongoing dialogue. Mondisa gave an example of her lab's own living documents: she developed lab cultural guidelines and expectations that tell students what she is offering and how she operates, then asks them their thoughts. She uses mentoring plans that are reassessed each semester, describing them as both a "check-in" and "compass" for both sides of the mentoring relationship.

Getting beyond Frustration

Burt highlighted different kinds of frustrations that were discussed: frustration at the lack of knowledge and frustration about the gap between knowledge and action. How do we get through or beyond those frustrations? he asked.

Lunsford said institutions could be more deliberate about sharing resources with faculty, including written documents, as well as repeating these messages, especially in the first few years for new faculty. Repeatedly sharing where mentees can get assistance serves as a safety net for those who have the least amount of power. Providing tools and easier access to information is important, Marner said, but mentorship is a two-way street: it can also help the mentor. If you have an environment among mentees where they have agency to seek out quality mentors or to act in their own mentor relationship, that is a prompt for mentors to improve as well.

During their conversation, Johnson said an online participant referenced a quote by Jean-Baptiste Alphonse Karr that suggests that even dramatic shifts do not necessarily create true, lasting change. Karr's point, Johnson said, is that some of this frustration comes from people claiming there is change, but over time, what was talked about remains the same. To truly affect change, one has to see if there is a real element of movement or progression on the task.

Assessing Real Change

Questions arose in Burt's group about for whom an assessment is working, especially if it is not culturally and equity focused. "Sometimes the metrics are inappropriate or inappropriately applied," he said. There are also just basic metrics that people do not seem to have, Lunsford said. For example, how many postdocs or graduate students are attending professional development? How often is wellness in any way assessed on campus? Diaz's group reflected that a baseline might need to be reassessed before executing a program. One example of this was a mentorship program for a disenfranchised group, that was based on generalized research, treating that group as a monolith.

Burt asked the Roundtable to describe how we will know when incremental progress or major progress has occurred and if the knowing-doing gap is closing. "Change—true change—is evolutionary," Johnson said. "[It is] sometimes radical, but even within the radical process there is evolution." Describing change as multifaceted, involving many forces from different angles, Johnson identified a sign of true change as shifting from individual silos to a single collective movement.

Burt concurred and noted that he had heard critiques that "we are preaching to the choir…but what if the choir becomes larger and larger and larger over time," bringing in more people into a collective conversation. There needs to be recognition that the gap may never be fully closed, Diaz said, not in a pessimistic way, but simply that some of these issues are continuous. Graduates and postdocs feel "disempowered or underappreciated or have not seen a place for themselves," Smith said, and one way of identifying change would be when they feel like they can persist and be supported in this system, and not be exploited.

Miller added that changes to the knowing-doing gap can be temporal. "A signal that we are making progress or that change is happening [is that] we are engaging in very thoughtful cycles of continuous improvement" where institutions are becoming responsive to the environment. The way some gaps may close may not look like what we envision as success, Black said. People often jump to solving adaptive challenges first, because they feel weighty and the biggest impediment on the system, but both technical and adaptive challenges can improve structures in parallel. "The people who are looking up to the leaders for change want action on the things we can feel right now." Doing both synergistically will help us feel like the gaps are closing.

SYNTHESIS AND ROUNDTABLE DOING

Marner identified key points he took away from the Roundtable discussion, including the importance of access to knowledge for both sides of the relationship, building systems to connect people to that knowledge, and the lack of a single definition for the terms mentorship, well-being, and professional development. "These [terms] are extremely context dependent, and they mean different things to different people," and evolve over time and career stage. He also highlighted working beyond individualized approaches. While the mentor-mentee relationship may be one on one, many elements need to be systemized. Questions remain, though, about how to create templates for effective mentorship and support without losing that individuality.

To conclude the second day, Marner asked Roundtable members what "doing"—that is, what action—they were going to be taking away from this workshop. Lundsford said her lab would be talking about wellness and paying more explicit attention to that. Burt was similarly thinking about what information he shares with his students and his larger sphere of influence, including grad students who are on the job market.

Black noted that while the participation of trainees in the Roundtable was phenomenal, quite a few faculty and leaders were here to learn as well, and the idea that the Roundtable could contribute to leaders making changes was exciting. She is going to make sure the information shared here is accessible to leaders who are ready to engage in that work.

John Boothroyd (Stanford University) said he would be talking to new graduate students and then new faculty about "managing up and managing down" and trying to build in more of the culturally responsive aspects. He had appreciated hearing in breakouts about some of the concrete actions that other people were taking or had observed.

"This is an incredibly rich conversation and really is serving as the foundational start to the activities of the Roundtable over the next 2 years," Black said. Subsequent events will be going more deeply into these topics, start looking at specific groups, and thinking about resources to advance the conversation.

DISCLAIMER This Proceedings of a Workshop—in Brief has been prepared by **Taylor Kate Brown** and **Melissa E. Wynn** as a factual summary of what occurred at the meeting. The committee's role was limited to planning the event. The statements made are those of the individual workshop participants and do not necessarily represent the views of all participants; the planning committee; or the National Academies of Sciences, Engineering, and Medicine. The Proceedings of a Workshop—in Brief was reviewed in draft form by **David Asai,** Howard Hughes Medical Institute, and **Nabila Riaz,** Federation of American Societies for Experimental Biology to ensure that it meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process.

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To watch the recorded webcast of the event, see https://www.nationalacademies.org/event/41011_11-2023_mentorship-well-being-and-professional-development-in-stemm-addressing-the-knowing-doing-gap-a-workshop.

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