

How and why physics faculty share their identities with students: Four personas

Alia Hamdan^{1,*}, Ash Bista,² Dina L. Newman³, and Scott Franklin^{2,†}

¹*Department of Physics and Astronomy, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599, USA*

²*School of Physics and Astronomy, Rochester Institute of Technology, Rochester, New York 14623, USA*

³*Thomas H. Gosnell School of Life Sciences, Rochester Institute of Technology, Rochester, New York 14623, USA*



(Received 12 February 2025; accepted 29 April 2026; published 26 May 2026)

We investigate how faculty share aspects of their identities to foster connections with students, finding significant nuances in what, how and when they decide to share. From interviews with 19 faculty, we identify and develop four personas: Brooke, the Trust Builder, prioritizes creating an environment of trust by openly discussing their identity, aiming to foster student openness. Wray adopts a walled-off approach, separating personal and professional life due to past negative experiences or a belief in the importance of that division. Casey, the Cautious Sharer, expresses concerns about potential alienation or backlash and approaches personal sharing with caution. Finally, Nour, the Identity Navigator, shares personal experiences to assist others in navigating their own identities, acknowledging the challenges of the college years. Communication of shared or adjacent identities is a key step toward developing an empathetic understanding that can facilitate taking appropriate supporting actions, and the nuances of how these identities are communicated add insight into how faculty can work within their comfort zones to better support students.

DOI: 10.1103/tg9n-wphd

I. INTRODUCTION

If we want to even have empathy for something, we have to know if there is a problem, and we should be able to put ourselves in other people's shoes.—Dylan [faculty participant]

Faculty members can be significant catalysts for change at both departmental and institutional levels and help create supportive environments for student success [1–3]. Unfortunately, students often find it challenging to share setbacks with their professors [4,5], creating a barrier that inhibits support. Faculty such as Dylan (quoted above) attempt to lower this barrier by making connections and developing an understanding of the student, which is key to providing appropriate, meaningful support. Faculty, however, are given little training or guidance on how to navigate the process of building effective and meaningful relationships with students.

One way to build such a relationship is to share one's own social identity, and faculty make conscious and unconscious decisions about why, how, and what to share. Self-disclosure, the “conscious and deliberate disclosures about one's self, aspects of one's professional practice, world or personal views, personal history and responses to ongoing classroom events,” [6] is a multidimensional construct [7]. Educator self-disclosure has been found to promote student engagement and attention [8–10], motivate communication with instructors [11,12], and improve student learning [13–15]. Instructor self-disclosure can also improve student and faculty relationships and create safer classroom environments, and students are more likely to take a course with an instructor who self-discloses, even when the disclosed information is not immediately relevant to the course content [16]. Students with overlapping identities also feel affirmed and safer to share their own experiences [17–20].

In this work, we report on faculty interviews that reveal different approaches taken toward self-disclosure. The context of the interviews was a broader study of faculty conceptions of, and experiences with, empathy in the classroom environment [21]. Faculty participants brought up identity sharing as a strategy for building relationships that helped them better understand specific student challenges. We analyzed interviews to address the specific research question “What motivates physics faculty to share or not share personal identity information with students?” and identify four distinct personas—fictional characters that embody common characteristics and experiences—that

*Contact author: hamdana@unc.edu

†Contact author: svfspd@rit.edu

Published by the American Physical Society under the terms of the *Creative Commons Attribution 4.0 International license*. Further distribution of this work must maintain attribution to the author(s) and the published article's title, journal citation, and DOI.

represent the spectrum of faculty behaviors reported. We choose a personas approach as it best captures the complex, holistic nature of faculty decision making by making abstract data more human and highlighting the diversity of experiences. Personas are not attached to individuals; each persona is an amalgamation of faculty narratives, and individual faculty can and do manifest different personas in different contexts.

II. BACKGROUND

Our work is organized around central principles of identity and communication. In this section, we first provide foundational definitions of *identity* and discuss the context of identity sharing between faculty and students. Because identity sharing is necessarily enacted through communication, we review relevant literature on communication models and how these frameworks arise in faculty-student interactions. Taken together, these topics lay the foundation for understanding how faculty and students negotiate and interpret one another's identities.

A. Identity

We see ourselves and others through the identities we embody or take on. A growing body of research seeks to understand identity in the context of science, technology, engineering, and mathematics (STEM) education [22–24]. The construct of identity can be abstract and complex due to its multidimensional and dynamic nature. To support analytical clarity, it is important to define what is meant by identity within research. Broadly, identity has been conceptualized in two main ways: as the narratives individuals construct about themselves [25] or as the actions and performances people enact in specific contexts [26–28]. Sfard and Prusak [25] define identity as the actual stories people tell about themselves. In contrast, Wenger [28] emphasizes lived experience, arguing that identity emerges through meaningful participation in practice rather than solely through discourse. As he states, “These words are important, no doubt, but they are not the full, lived experience of engagement in practice.”

Even within shared experiences, individuals' perceptions of the experience differ, highlighting the value of narrative identity. Narratives allow researchers to incorporate personal meaning-making alongside sociocultural influences, both of which shape identity. While defining identity through narrative may seem limiting, it affords important benefits: it centers student voice, supports agency, and helps researchers engage more deeply with students' lived realities. Holland *et al.* [29] conceptualize identity as having a dual nature, shaped both by how individuals see themselves and how they are recognized by others. Holland also emphasizes that identity is shaped both by how individuals belong to groups and by the ways they see themselves as distinct from others.

In this paper, we engage with Sfard and Prusak's [25] narrative-based definitions of identity as a guiding framework. As we moved through the analysis, we also found ourselves drawn to the work of Holland *et al.* [29], which characterizes identity as both how individuals understand themselves and how they are recognized by others, an idea that resonated strongly with the stories participants shared. Although we did not intentionally design our interview prompts around this dual perspective, they emerged organically in the data. Participants frequently reflected on how they believed others perceived them, and these perceptions played a meaningful role in their decisions about whether, when, and what aspects of their identity to disclose.

Students' identities encompass three key dimensions: personal identity, which reflects their individual characteristics; social identity, which relates to their membership in social groups; and disciplinary identity, which pertains to how they see themselves in relation to a specific academic field or discipline [22]. A student's physics identity refers to the extent to which they see themselves as a “physics person,” someone who is capable of understanding, engaging with, and contributing to physics. This identity plays a critical role in shaping the student's motivation, persistence, and success in physics-related fields [22]. When students feel that they belong in physics and are recognized by others (peers, teachers, and mentors) as competent and capable, they are more likely to stay engaged, pursue further studies, and develop confidence in their abilities [23]. Conversely, students who do not see themselves reflected in the culture of physics or who encounter stereotypes and exclusion may struggle to identify with the discipline, leading to lower participation and higher attrition, particularly among underrepresented groups [30]. A growing body of literature looks at the interaction of students' social and disciplinary identities [31–34].

Teacher or faculty disciplinary identity also plays an important role in their own sense of belonging and continuity in the field [35,36]. Faculty from marginalized identities often take on more unrecognized roles through spending more time on commitments like mentoring and outreach [37,38]. Faculty can also experience a tension between their identities as researchers and teachers, which can affect their willingness to adopt evidence-based teaching practices, especially when those practices conflict with the disciplinary norm [39,40].

Sharing components of one's identity in professional settings is not a trivial task for students or faculty. In STEM, where norms emphasize objectivity and neutrality, revealing aspects of one's personal, cultural, or minoritized identity can be risky and emotionally taxing. For faculty and students from underrepresented groups, disclosing identity can expose them to stereotype threat, bias, or marginalization; yet it can also serve as a powerful tool for building community and fostering inclusive learning

environments [41,42]. Instructors who reveal parts of their personal or minoritized identities—such as LGBTQ+ status, first-generation background, or mental health conditions—may face internal dilemmas and institutional pressures to conform to norms of neutrality [42,43]. Supporting identity self-disclosure in physics requires intentional cultural change that values lived experience as part of academic legitimacy and excellence. Given these dynamics, communication becomes a critical tool, not just for teaching content, but for building trust, connection, and a more inclusive physics culture.

B. Communication

Faculty identity disclosure is deeply intertwined with communication, as sharing personal experiences or identities is itself a communicative process that shapes relationships, signals values, and fosters inclusive learning environments. Communication, as a social process, serves to express thoughts and beliefs, describe events, connect with others, and more broadly, develop social meaning that shapes our understanding of the world [44]. While research on communication lacks a consensus on its definition, models focus on the different processes involved in communication [45].

Faculty and students send both verbal and nonverbal messages in their day-to-day interactions. These messages can either be received and reciprocated or misunderstood, hindering the development of shared meaning. Identity sharing falls under this broad concept of communication. Research shows that effective communication in educational settings involves more than information exchange—it includes interpreting social cues, responding to emotional tone, and navigating power dynamics [46,47]. At its core, meaningful communication in higher education requires empathy, the willingness to listen, interpret, and respond in ways that reflect an understanding of others' perspectives and lived experiences.

The most “linear” Shannon-Weaver model involves a sender, a receiver, and a transmitted message. In this engineering-oriented approach, the receiver is passive, with the possibility of channel noise confusing the reception, and successful communication occurs when the message is transmitted [48]. Interactive models center the active involvement of both sender and receiver, creating a communication loop in which physical and psychological noise may interfere. Physical noise includes environmental factors, such as loud spaces, while psychological noise involves the encoding and decoding of messages by the receiver [48]. Effective communication in this model is the creation of shared meaning as individuals' alternate roles. Transactional models view communication as a process of constructing realities through continuous discourse embedded in social, relational, and cultural contexts. They encompass the interactive model but recognize that all steps occur instantaneously, with messages filtered through participants' experiences. These

models consider how each participant uses the shared meaning developed during communication [48]. Despite its nuanced approach, the transactional model relies on active engagement and a deep understanding of nonverbal and cultural messaging, which may or may not be well understood by participants. Miscommunication arises when messages are not interpreted and used as constructed within the feedback loop.

In this work, we operate from an interactional and transactional perspective, recognizing that faculty messages to students are interpreted by students, sometimes in ways unintended by the faculty. We find evidence of faculty implicitly recognizing this in our personas, particularly in statements that indicate faculty sometimes conceal identity information in order to deemphasize potential differences that lead students to hesitate to reciprocate communication.

III. POSITIONALITY STATEMENTS

The authors' various identities and positionalities played an important role in the development of this research project. Here, we briefly describe our individual positionalities and their role in this research.

Alia Hamdan (she/her) is an early-career researcher who identifies as a Muslim cis-woman. As a student, she rarely attended office hours and often felt like an outsider in the broader physics community. As a visible Muslim, she is aware that colleagues and interview participants may perceive her through that lens, which can affect the direction of her interviews and analyses. Alia participated in all parts of this project, including the design of the interview protocol, data collection, analysis, and writing up the results. At the time of this study, Alia was new to the department and did not know any of the participants before taking part in this study.

At the time of this study, Ash Bista (they/her) was an undergraduate physics major who identifies as a first-generation Nepali-American, queer/bisexual, nonbinary/woman of color from a middle-class background and Hindu family. Ash's experiences center on the current academic cultures at their institution. Throughout their adolescence and higher education, Ash has struggled with mental health disorders. Despite this, they are very involved in their local physics community and work as a learning assistant. Ash knew many of the study participants, having taken classes or worked with them. Ash's intersectional identity, mental health challenges, preexisting relationship with participants, and personal values contribute to their engagement with the project, shaping how they develop interview protocols, conduct interviews, and interpret results.

Dina Newman (she/her) is a white woman and the only nonphysicist of the group. As a biology professor and an outsider to the department, she has a unique perspective on the project—biology has a very different culture from

physics, and she has fewer connections to the participants. Dina switched her scholarship to biology education research (BER) pretenure, about 15 years ago; her research interests are quite broad and reflect her curious and collaborative nature.

Scott Franklin (he/him) is a white, cis-gendered male professor of physics. An early diagnosis of neurodiversity (ADHD) provided a profound experience of feeling different. Scott is Jewish and attended an Orthodox Jewish day school through K-12. This identity took on greater meaning after the October 7 attacks in Israel and the subsequent war in Gaza and campus protests across the United States. These and other identities shape what he notices and his efforts to foster a more inclusive physics environment that supports students of all identities.

Scott and Dina together were co-principal investigators on an HHMI Inclusive project that sought to develop a more inclusive environment in the RIT College of Science. Their work on this project revealed how faculty, students, and staff both earnestly tried and often struggled to understand the experiences of others, and led them to develop workshops and other activities that encouraged perspective-taking in order to develop meaningful empathy. The observation of how different colleagues responded to these activities led directly to this research project, a systematic attempt to understand their participants and develop more effective activities.

The interview protocol was also developed from Alia's interest in supporting students and faculty from international and other identities. Alia drew on her experience of being educated abroad, which allowed her to notice in interviews the effects of different cultures and education systems on faculty responses. Additionally, Scott and Alia's personal connections with Israel and Palestine meant that, for them, the October 7 attacks moved the question of empathy and understanding differences from theoretical to practical, as described in Ref. [49], and both guided the interview protocol toward one that centered participant emotions. Finally, Ash was an active student in the department, and their existing relationships with faculty participants allowed them to notice the role departmental context played in responses and to observe how it impacted the data collected.

IV. STUDY DESIGN AND METHODS

A. Participants

A total of 19 physics faculty from an R2 private university with an enrollment size of about 20 000 undergraduate and graduate students were interviewed as part of this study. The department has 35 faculty members, including lecturers and tenure-track positions. One third (32%) of our sample were female, in line with the department average, and half (52%) were people of color, an overrepresentation compared with the department average.

TABLE I. Participant demographic information.

Demographic information ^a		Percentage of participants ^b (%)
Faculty position	Lecturer	22
	Senior/principal lecturer	16
	Associate professor	32
	Assistant professor	10
	Professor	20
Gender	Male	68
	Female	32
Ethnicity	Historically marginalized	52
	White	48

^aParticipant demographics match those of the physics department from which these data were collected.

^bAll percentages rounded to the nearest 2% range.

Seven participants were non tenure-track lecturers with no research component to their jobs, in line with the institutional average in the college of science for Fall 2024. Demographic data can be seen in Table I. Gender is presented as a binary only because no participants chose to identify otherwise. Participants were asked to select their own pseudonyms, which do not necessarily reflect their actual gender. Some intentionally chose pseudonyms of a different gender or opted for gender-neutral names to further protect their identities. When participants did not provide a name, we assigned one using a random name generator.

B. Data collection

Participants were recruited through e-mails and announcements at faculty meetings to participate in a series of semistructured interviews; interviews were conducted by the first or second author during the 2023–2024 academic year. Interview protocols for two phenomenographic, semistructured interviews were designed, tested, and modified through an iterative process. The first interview was broad and tackled topics such as identity, conceptual understanding of empathy, how empathy manifests in classroom and research settings, students' struggles in the classroom, and actions taken. During this first interview, the interviewer focused on developing a rapport with the faculty members and probing interactions on a general scope. The second interview was more focused and used instances mentioned in the first interview to more closely investigate thoughts, communication, and actions when dealing with student struggles. Each interview lasted 30–60 min. A total of 19 faculty participated in the first interview. Seven of these were selected for the second interview based on the richness of their initial responses, which included specific examples rather than general statements, as well as scheduling availability. After the interviews, participants were sent a copy of the transcript

and given the opportunity to modify (remove, edit) any part of the conversation, although none did. Pseudonyms were generated at random to maintain anonymity for faculty who did not choose their own name; any gender association with a particular pseudonym is accidental and not affiliated with the gender of the participant. Participants quoted were also sent a draft of this article to confirm the accuracy of both words and meaning (member-checking). One participant chose to elaborate further on their thoughts, so this paper includes the new meaningful information.

The study was approved by the RIT Institutional Review Board (IRB 32827). All participants provided informed consent and were free to withdraw from the study at any time. The research was conducted in accordance with RIT, New York State, and federal policies and laws regarding human subjects research.

C. Data analysis

Data analysis used an emergent coding/constructivist grounded theory approach [50]. The first two authors independently created memos after each interview and again after the initial analysis. We adopted a dual-level approach, beginning with a vertical analysis of summaries of individual participants, followed by a horizontal analysis to identify themes across participants. We represent our findings using personas [51], showcasing themes through fictional characters that embody common characteristics and experiences in a humanlike manner that aligns with the multifaceted aspects of identity [52–54].

The process of creating personas involves several steps. First, we identify and create skeletons—simplified representations of individuals based on coded data for each participant. We then looked at vertical analyses, identifying common thoughts and worries and characteristics associated with concrete actions. Skeletons are prioritized, guided by the framework of Adlin *et al.* [55], and developed into personas according to similarities and differences in identity sharing and teaching values (described in more detail in the next section). Personas are filled in with details derived from coding summaries, capturing commonalities among participants. The first two authors independently coded participant quotes and compared results to identify inconsistencies for an interrater reliability reported as a percent agreement [56]. Initially, 70% of the quotes were agreed on, with all but one disagreement attributed to variations between the Brooke and Nour personas, and differences resolved through discussion. One excerpt remained partially agreed on, due to the overlapping nature of the personas; dual coding was applied to that excerpt. Personas are context-dependent, and a one-to-one mapping to individual faculty undermines their purpose and use. We therefore instead used them as flexible analytic tools, coding transcript *excerpts* according to the persona best reflected in that localized experience. Each participant,

therefore, can, and in most cases does, align with multiple personas within a single transcript. We count the frequency with which each persona appears both in each participant (vertical analysis) and across participants (horizontal analysis).

1. Persona development

Two categories of observation emerged that illustrate instructors' motivation for communication and action and form the basis of the personas.

Identity-sharing habits in the classroom, research, and with colleagues. Participants were asked to identify and discuss different parts of their identity, and we coded when and why those were disclosed. Identity sharing ranged from discussing their academic background to personal examples of hardship they experienced, such as facing discrimination or bullying in academic spaces. We noted in particular with whom the information was shared and in what context, noting that some chose not to bring to light their identities while others shared readily, regardless of the setting.

Teaching values and expectations of the faculty role. The second theme was related to participants' teaching values. Some participants valued clear content delivery, while others emphasized building meaningful connections. Eighteen different codes were identified and divided into four categories as follows:

1. Growth mindset [57] codes include teaching students about growth mindset, normalizing failure, and that struggle is a part of learning.
2. Safe teaching spaces codes focus on creating a safe, inclusive learning environment, compassion, and students being comfortable asking questions.
3. Teaching practices codes focus on practices that participants find notable, like clearly delivering information or being well prepared for class.
4. Sociocultural constructs codes aim at helping students think critically about their roles in society, such as teaching students to think critically about their future jobs and their influence on society.

V. RESULTS

We begin by examining how faculty gather information about students, exploring the contexts in which physicists choose to self-disclose and the mechanisms they use to learn about their students' backgrounds. We then present four personas derived from our data, summarized in Table II, and elaborate on the distribution of these personas within our dataset (Fig. 1). In addition to highlighting the prevalence of each, we provide an illustrative example of one participant, Joe, who exhibits different personas depending on the context (Fig. 2). Finally, we examine how the depth of understanding manifests and varies across the different personas.

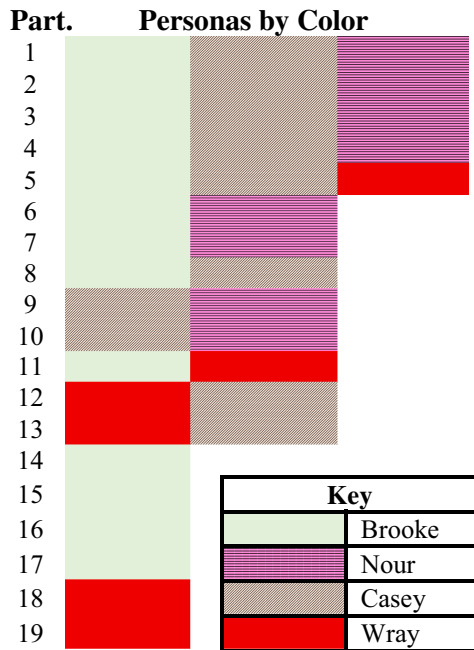


FIG. 1. Distribution of personas in participants. Coding of individual participants by persona. The most common combination of personas was a mix of Brooke, Casey, and Nour, which is examined through the example of Joe in Sec. IV C. Six of the participants were coded for only one persona.

A. Who communicates first?

Gaining contextual information is instrumental to identifying and providing appropriate support. We find that faculty frequently struggle to notice nonacademic issues that students face and thus do not obtain the contextual information needed to even begin working towards building empathy. Faculty commonly rely on students to come to them and communicate their needs to work toward a resolution. Some faculty members do mention being proactive about reaching out to students if they notice mainly academic changes.

So sometimes I'm perceptive enough that I can try to keep track of most of my students. And, you know, if someone hasn't been showing up for class, often; I mean sometimes it's just a lazy student who can't reach them and that's it. But oftentimes, perhaps even the majority of times, there's usually a reason why someone's not showing up for class. And so you try to seek out this person, and say, what's going on, why is this happening? And other times, you know, a student will just come and say, this is, this is something that's happened. At one point a student told me that a family member just died and not because they're trying to get out of a homework

TABLE II. Summary of faculty personas.

Brooke	Nour	Casey	Wray
Trust builder Facets	Identity navigator Facets	Cautious sharer Facets	Walled off Facets
• Using self • Using proxy	• Role model • Parental	• For self • For students	• By value • By experience
Identity sharing	Identity sharing	Identity sharing	Identity sharing
• Intentionally shares in order to build trust with others • Recognizes the role Identity plays in the classroom • Create a classroom norm of open communication	• Intentionally shares about themselves in order to help students navigate the challenges of growing up • Recognizes the role identity and social issues play in learning • Create a classroom environment focused on personal growth	• Carefully decides what to share and what not to share about themselves • Worried of possibly alienating students or themselves • Create a classroom environment that minimizes tensions	• Intentionally does not share with others • Values a distinct disconnect between personal and professional life • Create a classroom environment where students can focus on the material
Teaching values	Teaching values	Teaching values	Teaching values
• Values creating safe spaces for students to be able to participate • Values utilizing active learning methods	• Regards teaching students about the intersection of society and self as key to their teaching practices	• Values utilizing active learning methods	• Values utilizing active learning methods

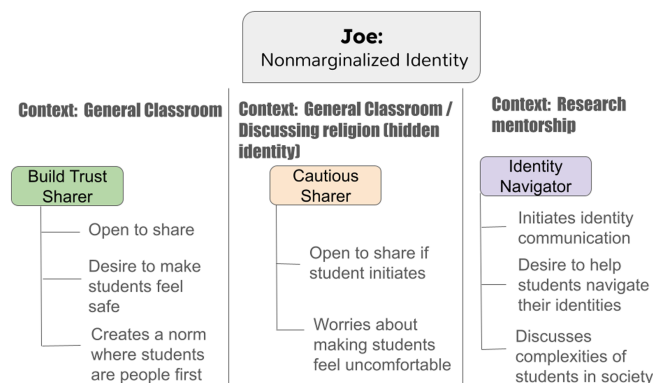


FIG. 2. Joe (participant 1 in Fig. 1) as an example of the context-dependent nature of personas. This figure outlines the contexts in which Joe embodies his three personas (Brooke, Casey, and Nour).

assignment, but because a family member just died ... Likewise, I'm not that perceptive. So I don't want to say, oh, it's, I can read all the students in the room. Or, you know, if anything I'm more clueless than perceptive.—Logan

This quote illustrates two mechanisms through which faculty obtain information about students. They can either notice academic changes (e.g., missing class or homework) and then proactively reach out to students for contextual information, or students can initiate direct communication with the faculty when they experience personal issues. This quote also illustrates that even the most attentive instructors may not be aware of their students' situations.

Faculty report feeling that students do not communicate with them and that this prohibits them from helping even if they want to.

One of the main obstacles I see is the students are not very open with faculty members. Maybe obviously because they don't want to discuss their issues that might be going on with the faculty member. If they can discuss openly with a faculty member, then we could, you know, try and help them go through the situations. Yeah, that's the obstacle. I guess the students are not very open to discussing the problem they're having.—Kali

Some faculty members address this by intentionally creating opportunities for students to reach out.

There is also something of a soft middle road as well that some of us employ. I semi-regularly will include a question on my homeworks or even quizzes along the lines of: "How are things going? Is there anything you'd like to tell me about? Feel free to use this space if there's

something you'd like to mention. We can discuss it further in person if you wish, or just set up a time to chat if you prefer." That kind of thing seems like it's somewhere in between. i.e., it's not that I've noticed a change or something of concern, but it's also not entirely just upon the student as it's an open invitation.—Logan

We see that faculty still hold students responsible for communicating their struggles, but facilitate the communication by showing that they value this information and explicitly asking about it.

We asked faculty to recall a time they noticed a student was struggling outside of the classroom setting and were surprised to find that some could not recall an example. There was a strong correlation between faculty who were open to discussing themselves and those who stated that students came to them for support or advice when dealing with nonacademic issues. The majority (80%) of participants who were open about their identities with students were able to recall examples of students coming to them with issues. Five participants could not tell us about a nonacademic struggle a student discussed with them.

B. Faculty identity-sharing personas

We embody faculty responses in four personas. Participants embody multiple personas, adapting to different contexts as needed. In the following section, we delineate the distinctive qualities of each persona and elucidate their nuanced nature. Finally, we explore the correlation between these personas and students' willingness to bring issues to faculty members. Personas are assigned gender-neutral names, and we utilize (they/them) pronouns for all, ensuring inclusivity and neutrality in our characterization.

Brooke, the "Build Trust Sharer," strategically shares elements about themselves to establish a foundation of trust with students, fostering reciprocal sharing. Brooke worries about students' feelings of safety in the classroom and looks to build space and opportunity for students to bring their whole selves. They take a holistic approach to learning and want students to ask questions both in and out of class. When speaking about their connection with students, they say things like

The hope is that I have a good enough relationship with students so that they don't shy away from telling me things. And generally, that seems to be true. Because I might know all the ones that have an attention problem or anything else, because I freely admit, during orientation, that I have [mental health] problems. Over the last 20 years, I've gotten far more blatant about it.

For Brooke, having a good relationship with students is critical. They value knowing personal issues about their

students, such as mental health or neurodiversity, and see this information as instrumental to their teaching practices. Brooke finds sharing their own personal details relevant to the classroom and uses their voice to inspire students to open up about themselves. Brooke is also aware of the power dynamics in the classroom and recognizes their role in trying to alleviate barriers students might face. Brooke is insistent on creating a safe environment where everyone can ask questions and fostering a growth mindset in their students.

Brooke sometimes uses *proxy* narratives to build trust. Since they are aware of their identity in learning spaces, they bring others from diverse backgrounds into their teaching space, for example, involving undergraduate teaching or learning assistants:

Although, one thing I am aware of is that even if I don't feel like I'm engaging these identities, I am, necessarily just by being in the space. And so I want people from different backgrounds to feel comfortable asking questions. And that is why I really, really liked working with the TAs or the learning assistants. And sometimes I feel like it's better if the learning assistant or the TA is a woman rather than another man, because my hope is that for some of the female students who would maybe feel intimidated by me, that they feel more comfortable talking to both someone closer in age up here, and also [for] the woman undergraduates ... woman who's going through a similar sort of experience with them. So that is something that I am cognizant of. Where I tried to be maximally welcoming by myself. But I know that that's not always going to hit for everybody, for whatever reason. So if I can have an assistant who represents different life experiences, that's nice, because that covers more backgrounds, and maybe makes some people more comfortable.

Brooke values students being comfortable to ask questions and feel safe. They recognize that their visible identity might be intimidating to some students, so intentionally seek out folks from different backgrounds to help alleviate that potential issue with students.

Nour the Identity Navigator positions themselves as a guide, assisting students in navigating their identities throughout college. They may assume a parental role or act as a role model, believing it is essential to discuss their own identities for the benefit of students. Like Brooke, Nour acknowledges the importance of identity within their profession, but they also reflect deeply about their identity and their students' identities as they navigate the college space. They see themselves as a mentor inside and outside of the classroom to students who might not even be in their classes. They want to help students grow into themselves and think critically about their place within society.

Nour sometimes takes a role model approach or a parental one. Nour discusses the importance of identity sharing in their classroom while taking a role model approach, they say,

I will say whatever prompts I'm giving them [about student identity], and they can share as much or as little about them as they want But I told them that okay, I will first answer the prompts before they do it. So that, you know, I have to lead by practicing what I'm asking them to do. So then I share things about me, you know, my identity and other things.

We see Nour role modeling the identity assignment, setting up the norm for future classes, and making their identity open to all students. Other times Nour takes on more of a parental approach, as illustrated below with Nour talking about research students.

So when I think about students, you know, I try to remember that, like, all the people I'm interacting with, they're like, someone's mom or dad or their daughter or son or child, you know, and that helps humanize them. Oftentimes I've thought like, "Alright if my own kids were going here, what would I want this place to be?" And that kind of makes it real. Because it's like, I wouldn't want my kids to have to put up with that [an issue]. I mean, granted, like, that might be kind of normal, but doesn't mean it's good. And I think we can do better.

Here, Nour talks about how they think of their own kids when they interact with students. These actions allow them to humanize the students and recognize that they are more than just students; they are people navigating their own identities and family dynamics. Nour also illustrates that they do not want to stick to the *status quo* and want to make things better for students. Nour talks about building a safe community as an important teaching practice, but also highlights larger-scale cultural issues that students will have to navigate either in college or in their lives after graduating. Faculty embodying the Nour persona were the only ones to discuss theme 4 of the teaching values, which centered on topics like fostering students' awareness of their societal roles and encouraging them to contemplate their personal ethics and community impact while paying attention to and acknowledging the interaction with their identities.

Casey, the "Cautious Sharer," is willing to share identity-related information, yet exercises caution due to apprehensions about causing harm or fostering distance between themselves and students. When analyzing the data, two distinct facets emerge: being cautious for the sake of the students and/or being wary of potential backlash to self.

Casey also worries about creating a safe and inclusive environment for their students and does not want to do anything that could potentially jeopardize students' sense of safety.

Casey can be cautious for their students or worried for their own sake when talking about different parts of their identity. Thinking about talking about religion in a classroom setting is one of the main issues Casey faces, as illustrated by the following quote.

Religion is not something I address in the class at all, just it's not the subject of the class. And then employment-wise, I don't think I should be talking about my religion in class.

They say it would not be smart for their career to speak about religion. Casey sees religion as a sensitive part of their identity and thus chooses not to talk about it. Casey also views religion as a tricky topic when trying to connect with students.

I think there's some things I could say that would encourage a subset of students to be like, oh, yeah, I can kind of connect with that. And there'd be like, other people that will be like, Wow, now I just realized how much more different than you are, you are than me ... things like religion and family have always been compartmentalized ... like in the sense that you're on campus and there's just not that much space to talk about those things.

Here, Casey wonders about the impact self-disclosure may have on students' ability to relate to them. They see religion as an important part of their identity, but don't feel like there is space for it on campus.

Furthermore, Casey can also be cautious about making jokes in class and the backlash that might have on how students see them in relation to their identity and the cultural norms of physics as a discipline, stating:

It's mostly on us—on the faculty, because we are expected to figure out where the students are comfortable, and then allow something like a culture to play a role. But it doesn't really happen with the students in class. So things that are cultural, that's why we don't come out funny, like a lot of professors, because we have to figure out which one is funny in this culture versus our culture. And also, there is a gender issue if women are funnier in class, they sound goofier. And they, the students, lose respect.

Finally, Wray assumes a “walled off” approach, consciously refraining from sharing personal details within professional settings, maintaining a distinct separation between private life and interactions within the classroom

or with fellow faculty members. Wray is motivated by two factors that sometimes intersect. They feel their personal life is not relevant to their professional activities and value the affordances that come along with having a professional identity in the workplace. Sometimes, Wray also had negative past experiences with sharing that prompted them to now keep these aspects separate. This could be in the form of feeling uncomfortable when boundaries get crossed or facing external repercussions from choosing to share.

An example of intrinsically valuing the separation of personal and professional lives not wanting to get involved in students' lives, Wray says, “So usually, I didn't go too personal with my students But I don't ... [discuss students' personal issues]. [I] just do our standard policy.”

Wray refers to “standard policy” to decide what to do when faced with student issues. They try not to get too involved as they do not see it as their place as an instructor. On the other hand, Wray can also be motivated to stay distant by past experiences.

Those things [social research group events] get very firewall for me. I don't. I have had parties to celebrate, you know, people were graduating or whatever at my house. I would say in general, that makes me very uncomfortable when I do. I don't do it anymore.

This quote illustrated how Wray tried something in the past and then realized they were not comfortable with that experience (in this case, celebrating with students), so decided not to continue doing it moving forward. While they do not value sharing their personal lives in a professional setting, Wray cares about using effective teaching practices. Wray thinks the most important qualities of teaching are “being well prepared” and “making the subject (physics) interesting,” which were sorted and themed under theme 3, teaching practices. When thinking of teaching, Wray cares about putting a personal effort into the subject and trying to keep students' attention.

Table II summarizes the key characteristics of the four personas, including how they share identity and their particular teaching values.

C. Distribution of personas

Personas do not map directly onto interview participants but rather categorize motivation and decision making in a way that depends heavily on context. The number of participants contributing to the development of each persona is depicted in Fig. 2. Specifically, Brooke was represented in 13 interviews, Wray in 6, Casey in 10, and Nour in 8. This distribution highlights that Brooke and Casey were the most frequently coded personas within our dataset. Most participants displayed more than one persona when talking about their experiences and how they chose to interact. Figure 1 also shows which personas arise in each

participant, with 13/19 participants displaying aspects of at least two personas.

Faculty manifestations of personas are context-dependent. For example, one participant, Joe (participant 1 in Fig. 1), exhibits aspects of three distinct personas in interviews, embodying aspects of Brooke, Casey, and Nour in different contexts. Figure 2 shows a synopsis of Joe's depiction of his three different personas and the specific contexts in which each appears. In the classroom, Joe primarily adopts the personas of Brooke, intentionally sharing about himself to help students trust him, and Casey, exercising caution when discussing concealed identities such as religion. Conversely, in a research mentor setting, Joe exhibits traits of Nour, engaging in discussions about identity within the disciplinary (physics) culture while collaborating with his students.

In the context of the classroom, Joe uses sharing to build trust, wanting to create a safe environment for his students to bring up issues they are facing both in and outside of the classroom. He is cautious when it comes to speaking about his religion as he worries it might alienate some students. He embodies Nour when taking on research students and in a one-on-one setting, where he places emphasis on students' identities and reflects on how best to help them navigate their future career choices and academic journeys.

D. Personas and depth of understanding

We find that persona groups do not differ dramatically in the general categories of support offered. However, the *depth* and *focus* of their understanding do appear to vary. This is seen in how readily faculty members recall specific examples of students struggling. Brooke and Nour, for instance, had little difficulty recounting rich, detailed scenarios of student hardship and the ways they responded with care. In contrast, Casey and Wray offered fewer concrete examples when prompted, instead speaking more generally about supporting students. While this difference is not intended to suggest a causal relationship, it does raise the possibility that identity sharing between faculty and students may influence the degree of access faculty have to students' lived experiences. This, in turn, has implications for whether and how faculty gain sufficient background information about students' situations in order to develop meaningful, supportive actions.

There are several limitations to this section that should be acknowledged. The interviews were personal and narrative-driven, so participants may not have had sufficient time to build trust with the researchers or to reflect on specific examples beforehand. This could have made it harder for them to recall instances of students struggling in nonacademic ways. Additionally, since our categorization of personas is context-dependent, we cannot map each participant directly onto a single persona. As a result, it is challenging to form a complete picture of how each persona develops and expresses empathy. This section highlights

general trends rather than offering a comprehensive analysis.

Brooke describes an emotionally charged example of individualized concern. They recalled a student whose behavior raised serious mental health concerns:

I was just talking to him that you need to rely on [a] medical provider ... maybe you need a second opinion. Because it's really hard to find ... good doctors ... That was my concern. Because we have young people commit suicide, and it's completely unnecessary ... Life is very stressful, we don't need to add to [that].

Here, Brooke not only expresses concern for the student's academic standing but also engages with their emotional and mental well-being, despite the limits of their professional role. Brooke continues to describe their own experience with mental health and how this grounds the development of their empathy with the student. This suggests a level of understanding rooted in both attentiveness and shared vulnerability.

Similarly, Nour described patterns of disengagement among their students and how they responded with proactive outreach:

But I want them to know that they're a good student, and I know that they have the ability to perform well, and they've done that in different classes. I want to give them the opportunity to let me know if something's missing in the class that I can change. So I always reach out to them, I ask them, is everything going okay? I noticed that you've missed a few classes, or you have been late to a few assignments, what's happening? Like, is there anything that I can help with?

In this example, Nour demonstrates that they are noticing both students' academic and other behaviors in their classroom. Their willingness to interpret behavioral cues and initiate contact reflects a form of individualized understanding that opens space for students to disclose struggles, and they are willing to take actions in order to better support the students.

On the other hand, Casey also communicates about helping students navigate their workload. They state:

This happens maybe like every other semester or a couple times a semester. I'll write an email to somebody to the effect of like, this is what you're looking at ... I could work with you to extend this stuff ... But is it worth your time to try to handle this class? Or would that be interfering with other classes that you could salvage more clearly?

Casey's comments reflect care and concern, particularly in wanting students to make informed academic decisions.

However, their approach is framed primarily through logistical and academic terms, with less indication of a deep personal connection to the student's life circumstances.

Wray offered a similar level of general concern, emphasizing the importance of recognizing students as whole people:

I've had students who've had challenges outside of physics, in the sense that I didn't feel that the student would not be able to tackle the assignment that I gave them if they had the time. So we have to be cognizant of the fact that we are human beings and not just machines, and we have lives outside of our professional sphere. So I've had some some cases of that and, you know, that just requires stepping back and allowing them time and the proper resources so they can cope with whatever is happening in their lives.

Although less personalized, Wray's framing acknowledges student struggles and underscores the human dimension of teaching. Despite the variation in access to student narratives, it is important to note that Casey and Wray still demonstrated care for their students and expressed a strong desire to help.

We organize the *depth* and *focus* of recalled understanding into two levels:

1. Level 1: Community-oriented

At this level, faculty sought to understand and respond to the classroom as a collective. They invested time in designing policies or resources that addressed anticipated challenges students might face. For example, several faculty described proactively including information about extensions, academic support, or mental health resources in their syllabi. These efforts reflect a commitment to inclusive teaching, although they remained at a structural or policy level.

2. Level 2: Individual-oriented

Faculty at this level shared more personal and individualized accounts of supporting students in moments of need. These examples, more commonly associated with the Brooke and Nour personas, involved faculty taking initiative to reach out to students, respond to unspoken needs, or mobilize institutional resources. For instance, Nour recounted a case in which a student's financial aid had fallen through just before graduation; they responded by advocating for the student, securing departmental support, and offering a temporary stipend. Similarly, Brooke described emotionally nuanced interactions with students facing serious mental health concerns, including navigating complexities of medical trust and institutional limitations.

VI. DISCUSSION

A. Personas and teaching values

We identified four primary themes about teaching values that informed our personas: (1) fostering a growth mindset, (2) establishing safe spaces, (3) refining teaching practices, and (4) understanding sociocultural constructs. The four personas developed all emphasize the importance of enhancing teaching practices, and the concept of a growth mindset was common across all personas, aligning with its widely recognized significance in effective learning. We originally expected that the majority of participants would discuss (3), as it pertains to individual teaching practices, such as being well prepared for class, a trend evident in our data. Only two participants deviated from this expectation: one focused on discussions about students rather than his teaching practices, while the other briefly touched upon the topic before transitioning to mentorship. This is not too surprising given the semistructured nature of the interview protocol and thus not a meaningful anomaly. Creating safe spaces was a common theme among all personas except for Wray (the walled off) and was particularly prevalent in Brooke (Build trust). Most intriguing, the exploration of sociocultural constructs was evident only in Nour (identity navigator). Faculty who share their identity to assist students in navigating their own identities also value integration of students and physics within a broader sociocultural context. Nour embodies a goal for conveying not only subject matter but also societal implications. Consequently, faculty members embodying characteristics akin to the Nour persona can play a crucial role in integrating social justice principles into teaching and mentoring practices.

B. Fluidity of personas

Personas are dynamic constructs, and faculty transition between personas depending on context, mirroring the dynamic nature of identity, influenced by time, experiences, external recognition, and personal emotions [52–54]. It is plausible to assume that faculty manifestations of personas evolve in time as faculty gain experience in teaching and mentoring and interact with more students. Faculty may become more aware of student circumstances and notice issues that might previously have gone unseen. As faculty grow, they may also become more or less comfortable sharing things about themselves.

C. Personas and student interactions

We emphasize that all faculty interviewed expressed genuine concern for their students' well-being and recounted multiple episodes in which they interacted with students in supportive ways. Interestingly, the different ways in which the faculty engaged with identity sharing, i.e., which personas they manifested, correlate with the nature of interactions they recalled. Students' willingness to

share their own experiences. All five faculty who described being explicitly open in sharing their identities reported that students often approached them with personal issues. On the other hand, four out of the six participants used in developing Wray's walled-off persona could not recollect *any* occasions when students approached them to discuss nonacademic matters.

It is reasonable that even well-intentioned faculty members rely on students to initiate discussions. This responsibility falls heavier, however, on vulnerable or marginalized students, who often hesitate to speak up due to discomfort or perceived power imbalances [58,59]. If faculty wish to support students in non-academic issues it becomes important to develop relationships that invite the initial contact. We do not argue that faculty must assume a sharing persona in order to do this. Rather, faculty who were more comfortable with less-open personas could intentionally identify acceptable alternatives. For example, a participant mentioned incorporating check-in type questions within the course homework and quizzes as one way of lowering student hesitancy in reaching out. The value of the personas research is that it enables faculty to concretely articulate their natural preferences and mindfully formulate an appropriate complementary action to achieve their ultimate goals of supporting students.

D. Limitations

There are several potential limitations in the design of this study and in using personas as an analytical methodology. Our findings are limited to what faculty chose to share with the research team, and although we tried to steer interviews away from specific names and times, faculty sometimes indicated that they felt uncomfortable disclosing information that could be identifiable. There were also overlaps in faculty's views of themselves and their teaching values, and choices were made about how to categorize teaching values in ways that did not focus solely on pedagogical tools. The most frequently coded personas in the data were Brooke and Casey, which may reflect a selection bias, as these individuals might have been more likely to participate in interviews. Our four personas reflect the characteristics and context found within our sample of physics faculty. One general limitation of qualitative studies is that they are context-dependent and not intended to produce broad generalizations. Instead, they offer an evocation of what is possible in a particular setting. Faculty in different communities or contexts may express empathy in different ways. While we intentionally sampled faculty at different career stages, the data were weighted toward early-career faculty. Our analysis does not specifically look into the culture of physics, but is set in the context of physicists. The nature of our results suggests some generalizability across other STEM disciplines, but more work would be needed to evaluate each context. The prevalence

of Brooke as a persona might be an indication of the department valuing being open with students as a norm.

VII. CONCLUSIONS

This research provides insight into physics faculty attitudes toward sharing information about themselves within differing contexts. In deciding what personal information to share with students, instructors navigate a tangled web of pedagogical changes and efforts to make the classroom welcoming to all students, regardless of their background. Our findings indicate that physics faculty rely on distinct motives when determining how and when to share aspects of their identities. These motives (personas) are fluid, with faculty moving between different personas depending on context. We found four distinct personas (Brooke, Wray, Casey, and Nour) and illustrated similarities and differences between them. Brooke, the Trust Builder, prioritized creating an environment of trust by openly discussing their identity, aiming to foster student openness. Wray, adopting a walled-off approach, separated personal and professional life due to past negative experiences or a belief in the importance of that division. Casey, the Cautious Sharer, expressed concerns about potential alienation or backlash and thus decided not to share elements of their identity. Nour, the Identity Navigator, shared personal experiences to assist others in navigating their own identities, acknowledging the interaction between self, culture, and society.

The personas elucidate student-faculty interactions as an instructional process reliant on two-way communication. Each embodies specific values guiding considerations such as appropriate discourse, teaching priorities, fairness, and support for students in need. Obtaining contextual information is instrumental to the development of empathy with all personas, indicating they mainly rely on students approaching them with their issues, creating a potential barrier to faculty empathy and, in retrospect, meaningful action.

Given the diversity in faculty identity sharing, it is reasonable to expect variations in how empathy is developed and perceived within higher education. Further studies need to look at students' perceptions of faculty roles and empathy. It is important to build an understanding of why students decide to share with their faculty, and how much goes unsaid. It is equally as important to investigate faculty members' conceptualizations of empathy and the factors shaping their perspectives, as well as what factors influence their decision making. With more information, faculty can do a better job at perspective taking and imagining what it might be like in their students' shoes. More work needs to be done in expanding the participant pool to include STEM faculty from other disciplines as well as faculty from different types of academic institutions. Because faculty work within broader institutional frameworks, their actions are shaped not only by personal dispositions but also by the policies

established at the college and university levels. Future research should investigate how these policies' structure faculty-student interactions and identify the ways in which they can support or limit the development of empathetic communication.

Pop culture likes to throw around the word empathy as the perfect answer to building a kinder, more just world; however, as Dylan alluded to, developing empathy is hard and requires open communication from all parties. This is often difficult to do given the hierarchical nature within academia. We believe this work is a first step toward understanding practical steps that can be taken to help elucidate empathy in the classroom. Most critically, our results point toward the interaction between identity sharing, gaining student information, and the development of empathy, as well as highlighting the complexities involved in identity sharing. While the idea of empathy has gained traction in higher education, without further exploration of the steps and factors contributing to empathy development, it becomes challenging to devise and apply practical tools

effectively for leveraging empathy as a catalyst for fostering change.

ACKNOWLEDGMENTS

This work was supported by the NSF under Grant No. DGE2222337. We would also like to thank the CASTLE members for their insight and ideas. We appreciate the RIT Capstone initiative which allowed for meaningful undergraduate research.

The authors report there are no competing interests to declare.

DATA AVAILABILITY

The data that support the findings of this article are not publicly available because they contain sensitive personal information. The data are available from the authors upon reasonable request.

-
- [1] G. D. Kuh, J. L. Kinzie, J. A. Buckley, B. K. Bridges, and J. C. Hayek, *What Matters to Student Success: A Review of the Literature* (National Postsecondary Education Cooperative, Washington, DC, 2006), Vol. 8.
 - [2] R. H. Macdonald, R. J. Beane, E. M. D. Baer, P. L. Eddy, N. R. Emerson, J. Hodder, E. R. Iverson, J. R. McDaris, K. O'Connell, and C. J. Ormand, Accelerating change: The power of faculty change agents to promote diversity and inclusive teaching practices, *J. Geosci. Educ.* **67**, 330 (2019).
 - [3] M. D. Cox, 5: Faculty learning communities: Change agents for transforming institutions into learning organizations, *Improve Acad.* **19**, 69 (2001).
 - [4] A. L. Meluch and S. C. Starcher, College student concealment and disclosure of mental health issues in the classroom: Students' perceptions of risk and use of contextual criteria, *Commun. Stud.* **71**, 768 (2020).
 - [5] S. A. Myers, A longitudinal analysis of students' motives for communicating with their instructors, *Commun. Educ.* **66**, 467 (2017).
 - [6] B. M. Rasmussen and F. Mishna, A fine balance: Instructor self-disclosure in the classroom, *J. Teach. Soc. Work* **28**, 191 (2008).
 - [7] J. L. Cayanus and M. M. Martin, Teacher self-disclosure: Amount, relevance, and negativity, *Commun. Q.* **56**, 325 (2008).
 - [8] M. Jebbour, University students' perceptions of the effects of teacher self-disclosure in the English language classroom, *J. Engl. Lang. Teach. Linguist.* **3**, 275 (2018).
 - [9] G. S. Goldstein and V. A. Benassi, The relation between teacher self-disclosure and student classroom participation, *Teach. Psychol.* **21**, 212 (1994).
 - [10] E. McWilliam and P. Taylor, Teacher self-disclosure: Why, when and how do effective teachers do it, *Educ. Res. Appl.* **24**, 1 (2017).
 - [11] S. Zhang, Q. Shi, S. Tonelson, and J. Robinson, Preservice and inservice teachers' perceptions of appropriateness of teacher self-disclosure, *Teach. Teach. Educ.* **25**, 1117 (2009).
 - [12] J. L. Cayanus, M. M. Martin, and A. K. Goodboy, The relation between teacher self-disclosure and student motives to communicate, *Commun. Res. Rep.* **26**, 105 (2009).
 - [13] J. L. Cayanus, Effective instructional practice: Using teacher self-disclosure as an instructional tool, *Commun. Teach.* **18**, 6 (2004).
 - [14] C. Sim, The personal as pedagogical practice, *Teach. Teach. Educ.* **10**, 351 (2004).
 - [15] K. Hartlep, Self-reference and instructor self-disclosure: Is gossip easier to remember, *Online J. Teach. Learn. CSU* **63**, 1 (2001).
 - [16] E. G. Holman, M. S. Paceley, and C. L. D. Courts, "I Share to Help Them See": A mixed-method analysis of faculty use of self-disclosure in diversity courses, *J. Soc. Work Educ.* **59**, 772 (2023).
 - [17] S. L. Craig, G. Iacono, M. S. Paceley, M. P. Dentato, and K. E. H. Boyle, Intersecting sexual, gender, and professional identities among social work students: The importance of identity integration, *J. Soc. Work Educ.* **53**, 466 (2017).
 - [18] P. Newman, M. Bogo, and A. Daley, Self-disclosure of sexual orientation in social work field education: Field instructor and lesbian and gay student perspectives, *Clin. Superv.* **27**, 215 (2008).

- [19] T.G. Gates, Coming out in the social work classroom: Reclaiming wholeness and finding the teacher within, *Soc. Work Educ.* **30**, 70 (2011).
- [20] A. Brown, Out in the classroom: Self-disclosure as a “pedagogical tool”, *Afr. J. Career Dev.* **6**, 142 (2024).
- [21] A. Hamdan, A. Bista, D. Newman, and S. Franklin, Conceptual framework for understanding empathy in physics faculty, *Phys. Rev. Phys. Educ. Res.* **20**, 020148 (2024).
- [22] Z. Hazari, G. Sonnert, P.M. Sadler, and M. Shanahan, Connecting high school physics experiences, outcome expectations, physics identity, and physics career choice: A gender study, *J. Res. Sci. Teach.* **47**, 978 (2010).
- [23] H.B. Carlone and A. Johnson, Understanding the science experiences of successful women of color: Science identity as an analytic lens, *J. Res. Sci. Teach.* **44**, 1187 (2007).
- [24] A. Simpson and Y. Bouhafa, Youths’ and adults’ identity in STEM: A systematic literature review, *J. STEM Educ. Res.* **3**, 167 (2020).
- [25] A. Sfard and A. Prusak, Telling identities: In search of an analytic tool for investigating learning as a culturally shaped activity, *Educ. Res.* **34**, 14 (2005).
- [26] J. Butler and G. Trouble, *Gender Trouble: Feminism and the Subversion of Identity* (Routledge, 1990).
- [27] J.E. Stets and P.J. Burke, Identity theory and social identity theory, *Soc. Psychol. Q.* **63**, 224 (2000).
- [28] E. Wenger, *Communities of Practice: Learning, Meaning, and Identity*, 1st ed. (Cambridge University Press, Cambridge, England, 1998).
- [29] D. Holland, *Identity and Agency in Cultural Worlds* (Harvard University Press, Cambridge, MA, 2001).
- [30] J. Cribbs, K. Piatek-Jimenez, and J. Mantone, The relationship between mathematics identity and personality attributes with students’ career goals, in *North American Chapter of the International Group for the Psychology of Mathematics Education* (Michigan State University, East Lansing, MI, 2015).
- [31] A. Y. Kim, G. M. Sinatra, and V. Seyranian, Developing a STEM identity among young women: A perspective, *Rev. Educ. Res.* **88**, 589 (2018).
- [32] A. Mattheis, D. C.-R. De Arellano, and J. B. Yoder, A model of queer STEM identity in the workplace, *J. Homosexuality* **67**, 1839 (2020).
- [33] S. Rodriguez, A. Pilcher, and N. Garcia-Tellez, The influence of familismo on Latina student STEM identity development, *J. Lat. Educ.* **20**, 177 (2021).
- [34] L. G. McDermott, N. A. Mosley, and G. L. Cochran, Diverging nonlocal fields: Operationalizing critical disability physics identity with neurodivergent physicists outside academia, *Phys. Rev. Phys. Educ. Res.* **20**, 010111 (2024).
- [35] M. A. Arroyo, The social, and emotional issues of teacher’s professional identity development, in *Advances in Educational Technologies, and Instructional Design*, edited by T. Madden-Dent and D. Oliver (IGI Global Scientific Publishing, Hershey, PA, 2021), pp. 101–118.
- [36] M. Wilson, S. Ghosh, and K. Jason, Understanding sense of belonging of faculty and staff in higher education, *Equal. Divers. Incl. Int. J.* **45**, 146 (2025).
- [37] R. Rideau, “We’re just not acknowledged”: An examination of the identity taxation of full-time non-tenure-track women of color faculty members, *J. Diversity Higher Educ.* **14**, 161 (2021).
- [38] H. R. Gordon, K. Willink, and K. Hunter, Invisible labor and the associate professor: Identity and workload inequity, *J. Diversity Higher Educ.* **17**, 285 (2024).
- [39] G. Gibbs and M. Coffey, The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students, *Active Learn. High. Educ.* **5**, 87 (2004).
- [40] D. L. Reinholz and N. Apkarian, Four frames for systemic change in STEM departments, *Int. J. STEM Educ.* **5**, 3 (2018).
- [41] K. Rainey, M. Dancy, R. Mickelson, E. Stearns, and S. Moller, Race and gender differences in how sense of belonging influences decisions to major in STEM, *Int. J. STEM Educ.* **5**, 10 (2018).
- [42] K. M. Cooper and S. E. Brownell, Coming out in class: Challenges and benefits of active learning in a biology classroom for LGBTQIA students, *CBE Life Sci. Educ.* **15**, ar37 (2016).
- [43] C. A. Busch, P. B. Bhandari, K. M. Cooper, and S. E. Brownell, Few LGBTQ+ science and engineering instructors come out to students, despite potential benefits, *CBE Life Sci. Educ.* **23**, ar17 (2024).
- [44] U. Narula, *Communication Models* (Atlantic, New Delhi, India, 2006).
- [45] K. Betts, Lost in translation: Importance of effective communication in online education, *Online J. Distance Learn. Adm.* **12**, 1 (2009).
- [46] L. L. Pogue and K. Ahyun, The effect of teacher nonverbal immediacy and credibility on student motivation and affective learning, *Commun. Educ.* **55**, 331 (2006).
- [47] P. Schrod, Content relevance and students’ comfort with disclosure as moderators of instructor disclosures and credibility in the college classroom, *Commun. Educ.* **62**, 352 (2013).
- [48] *Theories and Models of Communication*, edited by P. Copley (de Gruyter Mouton, Berlin, 2013).
- [49] A. Hamdan and S. V. Franklin, A collaborative duoethnography of two academics in diaspora amidst the Palestinian/Israeli catastrophe, presented at PER Conf. 2024, Boston, MA, [10.1119/perc.2024.pr.Hamdan](https://doi.org/10.1119/perc.2024.pr.Hamdan).
- [50] J. Mills, A. Bonner, and K. Francis, The development of constructivist grounded theory, *Int. J. Qual. Methods* **5**, 25 (2006).
- [51] T. Huynh, A. Madsen, S. McKagan, and E. Sayre, Building personas from phenomenography: A method for user-centered design in education, *Inf. Learn. Sci.* **122**, 689 (2021).
- [52] L. Avraamidou, Science identity as a landscape of becoming: Rethinking recognition and emotions through an intersectionality lens, *Cult. Stud. Sci. Educ.* **15**, 323 (2020).
- [53] A. Calabrese Barton, H. Kang, E. Tan, T. B. O’Neill, J. Bautista-Guerra, and C. Brecklin, Crafting a future in science: Tracing middle school girls’ identity work over time and space, *Am. Educ. Res. J.* **50**, 37 (2013).

- [54] H. B. Carlone and A. Johnson, Understanding the science experiences of successful women of color: Science identity as an analytic lens, *J. Res. Sci. Teach.* **44**, 1187 (2007).
- [55] T. Adlin, J. Pruitt, K. Goodwin, C. Hynes, K. McGrane, A. Rosenstein, and M. J. Muller, Putting personas to work, in *Proceedings of the CHI'06 Extended Abstracts on Human Factors in Computing Systems* (Association for Computing Machinery, New York, NY, 2006), pp. 13–16.
- [56] N. Gisev, J. S. Bell, and T. F. Chen, Interrater agreement and interrater reliability: Key concepts, approaches, and applications, *Res. Soc. Adm. Pharm.* **9**, 330 (2013).
- [57] C. S. Dweck and D. S. Yeager, Mindsets: A view from two eras, *Perspect. Psychol. Sci.* **14**, 481 (2019).
- [58] J. McLeod, Student voice and the politics of listening in higher education, *Crit. Stud. Educ.* **52**, 179 (2011).
- [59] N. S. Nasir and P. Cobb *Improving Access to Mathematics: Diversity and Equity in the Classroom*, edited by N. S. Nasir and P. Cobb (Teachers College Press, New York, 2007).