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Faculty-Student Interaction and Its Impact on Well-Being in Higher Education for STEM

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Faculty-Student Interaction and Its Impact on Well-Being in Higher Education for STEM

This research paper highlights the findings and recommendations for engineering education derived from a study of faculty-student interaction and its impact on well-being among 5 professors and their students at Colorado School of Mines. As a researcher, I came to this study with experience as both a struggling student in my freshman year of college and as a flailing faculty member when my husband sustained a debilitating traumatic brain injury. I knew through these experiences that the key factor in my success despite significant obstacles was strong relationships with caring colleagues and students during those tough times. As I was experiencing overwhelm and burnout, I observed the ways in which my students were struggling with rigorous curriculum and social pressures to perform, and I realized that my low bandwidth as a professor in crisis was not serving my students well. I became curious about other professors' experiences with working through challenging phases of life and how their teaching was impacted by these pressures. In addition, I wanted to know more about my students' experience of interacting with professors when they were grappling with the struggles in their lives because I had been in that position too.

Study Rationale

My curiosities led me to research faculty-student interaction in higher education with an eye toward engineering programs and curricula in particular. Because of the uniquely rigorous curriculum of STEM programs, students tend to have excellent academic track records before college, so any challenges they experience academically can have a more severe impact on their well-being and mental health. Warshaw explains that with competitive academic programs, students work hard to get in and even harder to remain, and "the competitiveness of these programs adds an overbearing pressure on students that is hard to manage while trying to establish a balanced college life." She argues that while some students thrive in competitive environments, many others turn to unhealthy behaviors to cope, especially self-medicating and skipping necessary sleep [1]. Lipson, et al. found that business and engineering students show "a significantly decreased likelihood" to seek out mental health services compared to other disciplines; less than a quarter of the engineering students "with apparent mental health problems have sought help" [2, p. 36]. Rigorous academic programs and their impacts on student well-being can also be an additional barrier to first-generation and underrepresented students, potentially hampering diversity and inclusion efforts. In fact, Jack and Sathy call rigor "an exclusionary concept" that promotes "preferential practices" and call for major reforms in how we design and teach curricula in order to meet all students' academic needs [3]. My study sought to explore the challenges of students and faculty navigating stressful academic demands, and to understand how the faculty-student relationship can add to or detract from individuals' sense of well-being.

Literature Review

Researchers have shown the positive impacts of faculty-student relationships on students' self-concept [4], self-confidence [5], and aspirations for academic achievement [6] as well as on belonging, engagement, and motivation [7]. Others have studied STEM programs in particular

and found that students perform worse in barrier classes when professors emphasize rigor and 'weed-out' culture [8, p. 235]. Vogt showed that students struggle with grades or even leave STEM programs when there is "faculty distance," but that students feel supported and persist through programs when faculty are "personally available" [9, p. 27]. Christe's literature review, "The Importance of Faculty-Student Connections in STEM Disciplines," makes the case that "STEM disciplines must seek a change in academic culture away from survival of the fittest to a nurturing experience that supports achievement" [10, p. 22]. The competitive nature of STEM programs is rewarded with higher pay post-graduation, but these economic drivers come with additional pressure to perform well. Even in the best of circumstances, challenging academic environments like engineering create academic pressures that lead to more struggles with anxiety and depression for students [11]. Faculty and students alike have long faced strong pressures in academia to achieve, to produce, and to compete, but the onset of the Covid-19 pandemic exacerbated these pressures because most of the expectations remain, while the ability to meet those expectations was dramatically challenged. Barbieri, et al. found that depression among college students was 36% higher in spring 2021 than it was during the onset of the pandemic in spring 2020 [12]. Faculty have also experienced drastic decreases in well-being. The Chronicle's report on faculty well-being after the pandemic shows that 69% of respondents had considered switching jobs, retiring, or leaving higher education altogether because of increased workloads and responsibilities and "mental exhaustion" [13, p. 9].

Because of the unique circumstances of the pandemic and the consequent pressures on faculty and students, the need for a focus on well-being and care in education research is more pressing. Gilligan's ethic of caring for oneself and society [14], Tronto's model of caring relations [15], and Knoblach's distinction between instrumental and relational care [16] can all inform our current efforts to understand how care us connected to faculty-student well-being in higher education. Examples of institution-wide well-being efforts have proven successful in improving learning, in addition to benefitting the mental health of faculty and students [17], [18], 19]. Whether studied quantitatively or qualitatively, researchers have shown that caring is important in higher education, both to faculty [20], [21], [22], [23], [24] and to students [25], [26], [27]. However, universities have rarely incorporated the time needed for care work in assessment of faculty workloads [24]. Despite the importance of care and well-being to all parties in the university system, we do not understand the impact of faculty-student interaction on well-being, so this study seeks to provide insight and action steps to center care within our classrooms and campuses.

Methods

Case and Light argue that engineering education research needs to incorporate more methodological frameworks from the general field of education [28], and this study offers an example of how qualitative inquiry and action research can advance engineering education research, in particular in regard to curriculum studies. This action research study and educational criticism, based on the work of Eliot Eisner [29], contributes new knowledge to the field of engineering education by looking closely at particular experiences of veteran faculty at an institution and their students.

The study was conducted in the spring of 2020 at Colorado School of Mines to better understand the impact that faculty-student interaction within the learning environment has on individual

faculty and student intentions and perceptions. I was inspired by the thinking of Nel Noddings in *Happiness and Education* [30], in which she argues that schools and classrooms should be places that foster happiness, leading me to focus on well-being. Maxine Greene's call to "examine together" the interactions and community of the classroom [31, p. 106], and bell hooks' notion of engaged pedagogy that honors the voices and experiences of students [32] influenced my interest in faculty-student relationships and interactions. These influences shaped the formation of the study idea, and Eliot Eisner offered the educational criticism framework for the study design that allowed me to incorporate my institutional knowledge and teaching experience (what Eisner calls connoisseurship) to inform my observations and analyze the data collected [29]. The value of educational criticism in this study is that Eisner offers methods of observation that allow for lived experience to inform analysis, and that invite new ways of seeing what we may have observed or experienced before. Eisner argued that the purpose of school reform should be "trying to understand such process as how teaching takes place in particular fields, what constitutes the implicit as well as the explicit norms of school, the sense that students make of what they study, the aims that teachers say are important and the relationship of those aims to what they do in their classrooms" [33, p. 144]. Eisner also believed that student academic performance is not all that matters and promoted the approach "that attention be devoted to the quality of life students experience in school" [34, p. 367]. This concept of valuing the non-academic outcomes for students echoes Noddings' argument that we should care about whether students and teachers are happy within the school environment and that education "should help people to develop their best selves" [30, p. 23]. Educational criticism and connoisseurship is a methodology well-suited to draw out findings about well-being for faculty and students because it values keen observation and individual experiences.

In addition to the educational criticism framework, I positioned this qualitative study as an action research project because, as Glesne notes, action research has "the intent to change something, to solve some sort of problem, to take action" [35, p. 18]. Furthermore, it was important for me to position myself as a research practitioner and study my own practice. Bullough and Pinnegar suggested self-studies should "seek to improve the learning situation not only for the self but for the other" and "attend carefully to persons in context or setting" [36, p. 17-18]. I intend to apply these findings to my own practice and hope to influence the practices of other individual professors and to other programs or institutions as I collaborate with peers and disseminate my findings. Stringer argues that "by working collaboratively, participants develop collective visions of their situation that provide the basis for effective action" [37, p. 67], and I wanted my work to include both perspectives and outcomes from a variety of participants in my institution.

Because this study was motivated by faculty and students' experiences with overwhelm and burnout in STEM programs, I investigated how our interactions with each other can help or harm during these times. I structured research questions with Uhrmacher, McConnell, and Flinders' instructional arc, which describes the intentional, operational, and received curriculum in classrooms as both a before-during-after model and a representation of relationship between what teachers intend and what students receive through the actual happenings in the classroom [38]. I expanded the model to include student intentions and faculty perceptions of student behavior so a more reciprocal understanding of interactions in classrooms could be rooted out. To this end, I posed the following research questions:

Q1: What are the qualities of faculty-student interactions and relations that support care and well-being?

Q2: What intentions do faculty hold for their interactions with students?

Q3: How do students perceive faculty intentions and interactions?

Q4: What intentions do students hold for their interactions with faculty?

Q5: How do faculty perceive student intentions and interactions?

When Covid-19 shuttered college campuses, some of the planned classroom observations and in-person interviews shifted to be conducted via Zoom, and an additional research question was added to assess the impact of pandemic teaching on faculty-student interactions and well-being:

Q6: How did remote learning during Covid-19 shutdowns impact faculty-student interaction and faculty and student well-being?

Figure 1 shows these research questions mapped on to the instructional arc and illustrates how the intended curriculum, operational curriculum, and received curriculum form a foundation for assessing faculty and student intentions and perceptions of their interactions within the classroom. What we want to happen, what actually happens, and how we respond to or feel about what happens are all distinct and useful lenses for considering the impact of interactions on the personal well-being of students and faculty.

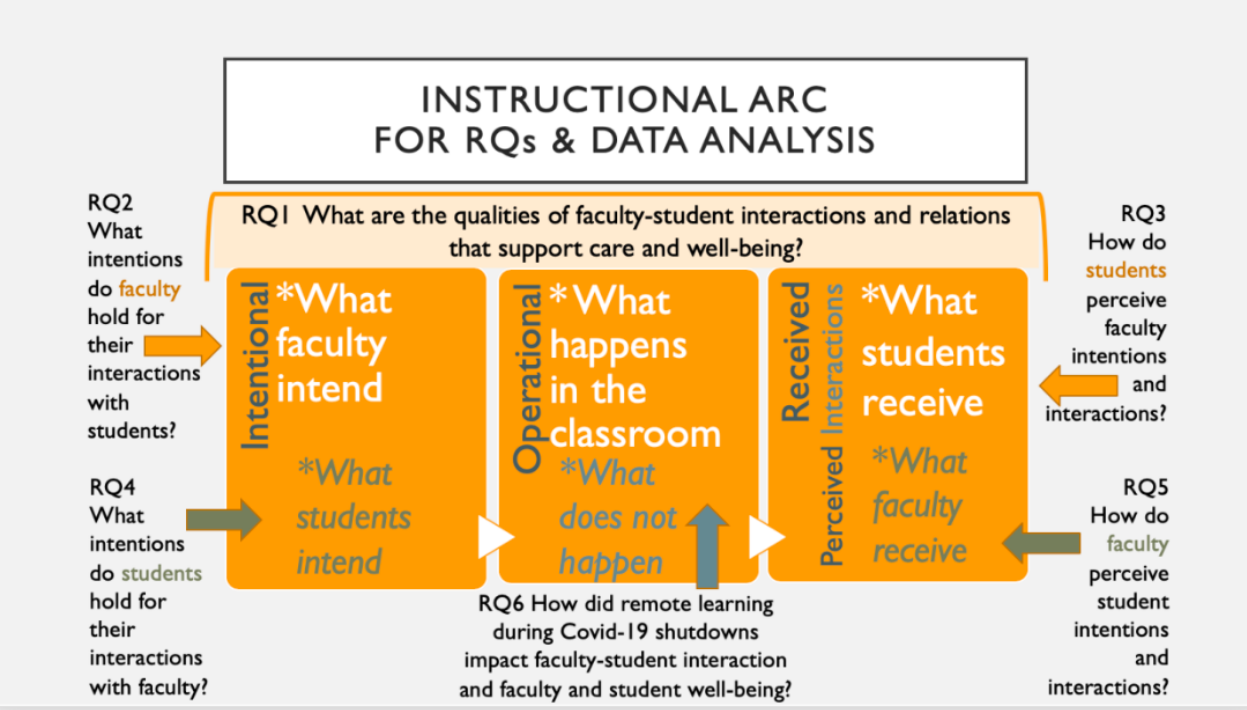

Figure 1. Instructional arc for research questions and data analysis.

Data Collection

Data were collected at Colorado School of Mines which has about 5500 undergraduates and 1600 graduate students, with 33% women, 28.5% underrepresented students, and 15.4% first generation students. This setting provided a group of high-achieving students and faculty in a high-pressure academic environment with whom I could explore the impact of faculty-student interaction on well-being in these conditions. I was a participant researcher as a faculty member from the humanities and I recruited 4 additional faculty members from STEM disciplines (chemistry, physics, math, and chemical engineering) through convenience sampling. All have taught at the institution for many years (between 8 and 21) and have taught courses in the core curriculum and upper-level undergraduate classes. Faculty participated in interviews at the beginning and end of the semester, and I observed their teaching and classrooms 2 or 3 times throughout the semester. They also completed a log of their interactions with students, classifying them by type, outcome, and impact. In addition, I recruited undergraduate students from each of our classes to participate in the study through one of two methods: 1) focus groups (16 participants) that met two or three times throughout the semester and 2) a student questionnaire (with 73 respondents) circulated at the end of the semester.

All participants gave informed consent for this IRB-exempt study and the named participants from interviews and focus groups were invited to member check my analysis to confirm the accuracy of my use of their ideas and stories. For educational criticism, the important validity factors are structural corroboration and referential adequacy. Uhrmacher et al. described structural corroboration as an analysis that "makes sense" and provides "a coherent, persuasive whole picture" [38, p. 59]. Confirming my stories with the participants through member checking and considering the outliers in my data analysis helped me formulate and reflect on the findings. Referential adequacy means readers could draw connections to their own experiences and situations through the new understanding I explore in the discussion. To this end, I contextualized and connected my interpretations to ensure a "consensual validity," what Eisner called an "intersubjective agreement among a community of believers" [34, p. 237]. My work with faculty and students in this study also helped me achieve validity measures for action research outlined by Herr and Anderson [39]. Dialogic validity derives from peer review of methods and findings, process validity from a study design that encourages learning, and democratic validity from involvement of relevant stakeholders and incorporation of insider concerns [39]. Action research validity is also built into the approach itself—as the researcher takes action on the findings, a new cycle of observation, reflection, collaboration, and action is generated [28, p. 197].

Data analysis

Quantitative data from interviews and focus groups and open-ended questionnaire responses were transcribed and then coded for themes in the data for each research question. After the initial thematic coding, I reviewed the data again to confirm or modify the original themes and categorize them for each research question. Since this data is part of a larger study for my dissertation [40], the following analysis will focus on the parts of the study that are most relevant to faculty and researchers in engineering education and STEM programs in general. Specifically, I will discuss the general themes of supportive and unsupportive interactions between faculty and students at Colorado School of Mines and highlight what these responses mean for teaching

classes, budgeting time, reforming curriculum, and supporting institutional change that addresses mental health challenges and supports overall well-being for both faculty and students.

The most important data to summarize here for the purposes of this paper are responses of participants regarding Q1, the overarching question of the study: What are the qualities of faculty-student interactions and relations that support care and well-being? After sorting the participant responses into categories on type of response, I reviewed and coded the data again, defining sub-categories of the supportive and unsupportive interactions described by participants. I classified responses by type and the categories can be seen in Table 1, along with a representative quotation from a participant. Participant responses indicated that there are some consistent aspects of interaction that impact well-being, but there are many different ways to give and receive care that vary among individuals. Faculty well-being is impacted by the institutional factors of their work environment, personal factors of life circumstances, temporal factors of schedules and available time, and interpersonal factors of relationships and support. Students clearly delineated the differences between caring and unsupportive faculty and between caring and unsupportive types of interactions they have experienced [40].

Table 1

Supportive and Unsupportive for Faculty and Student Well-Being

Theme	Representative Quotation
Faculty responses	
Institutional factors	“The workload was oppressive”
Personal factors	“There were some dark days”:
Temporal factors	“There’s just not enough time”
Interpersonal factors	“I want to know them more”
Student responses	
Unsupportive faculty	“You don’t have to degrade me”
Caring faculty	“You have no idea how much it meant to me”
Caring interactions	“That really encourages a closer relationship”
Unsupportive interactions	“Okay, I'm never gonna talk to you"

While most of this analysis discusses the areas in which faculty and students are struggling or needing more support, it is important to note that all participants also had successful and supportive interactions to report as well. Students often mentioned the care and support they

receive in office hours when they seek help for particular problems with the material. Caring professors were described as "relatable, helpful, sincere, and knowledgeable," and students appreciated that interaction leads professors to "learn more about my learning style and how to teach me best." Faculty also reported their positive interactions with students, especially those who are struggling with the content and reach out for help. When faculty work with students during class or in office hours, they have an opportunity to refine their teaching and witness "more engagement and confidence" from their students. This kind of individualized attention is most supportive for students, yet students also notice general caring attitudes and approaches of faculty. Several student participants mentioned professors that "want all students to succeed" and others highlighted qualities such as patience, trust, friendliness, and desire for connectedness. Faculty participants value students who exhibit engagement, responsibility, and respect for the working relationship.

Alongside these positive experiences and relationships, participants also highlighted specific ways that relationships are stilted or interactions that damage overall well-being. Faculty report that some students are disengaged and unreachable, that some students just "don't want to speak up," and others resort to cheating which damages trust and learning. Dealing with academic misconduct is "so draining" and takes time away from helping all students learn. Students share experiences of being dismissed, ignored, or made to feel stupid. One student said of a STEM professor that "he looked off-put and said it was a dumb question, which discouraged me from asking things in the future." Another student described a class in which he struggled because the professor did not "quite fully grasp the situation of the students well enough." Condescending attitudes toward student knowledge and ability can be especially damaging, as one participant described the frustration of "some grad student who just thinks they're better than you all the time" and another student recalled a professor who "told me I should just figure it out for myself." No student participants reported that they had solely negative experiences with professors, while at least one student reported all positive experiences with faculty. Although student participants were able to highlight their qualified, engaging professors, each of the negative experiences students described have deep and lasting impacts, sometimes causing them to change majors, and in some cases, prompting students to leave the school entirely when there are barriers to their well-being from faculty members. In the limited space of this paper, I cannot share exhaustive findings on all the research questions, but see [40] for more depth. The findings for overall well-being indicate that there is a lack of care being shown to individual students and faculty within the system. Collecting data during the pandemic brought unique challenges and modes of interaction into the study, and it is my hope that engineering educators can implement pedagogical and curricular change based on the lessons we learned from a time of collective stress and trauma.

Flow of care model

The findings of this study call for both a language and a system for expressing care needs in higher education, through better valuing of relationships and teaching, that can support faculty and students in their academic pursuits. When faculty and students feel supported and experience caring interactions, they are better able to care for themselves and have more balance and bandwidth to show care to others in the system. However, when care does not flow from administrators to faculty or from faculty to students, individuals can quickly become overwhelmed and move away from interactions that demonstrate care. Lack of care in one sector

can impact the flow of care to others. I created the flow of care model shown in Figure 2 to express the ways in which supportive care can either be blocked or allowed to flow throughout the hierarchy of higher education. The model suggests that our focus for reform should emphasize how care flows down from administrators to faculty to students to the world beyond campus. All of these relationships can involve reciprocal care, but by definition, there are responsibilities of the higher tiers to the lower tiers. Incorporating care and support for faculty and students will move engineering education toward a stable and healthy foundation that is supportive for all, one that centers and prioritizes well-being.

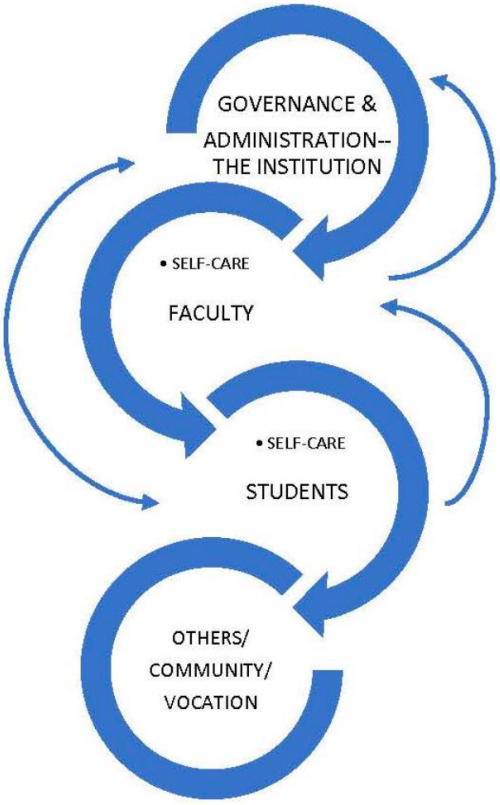

Figure 2. The flow of care model.

Obstacles to care in STEM programs

Engineering education and STEM programs may face particular obstacles to increasing the flow of care within the institution. Traditional pedagogies, such as lecture and high-stakes tests, are often standard in STEM fields. The concepts of rigor and competition are often deeply ingrained in STEM curricula and pedagogy. Jack and Sathy argue that the concept of rigor leads us to plan classes like “an obstacle race: You, as the instructor, set up the tasks and each student has to finish them (or not) to a certain standard and within a set time. If only a few students can do it, that means the course is rigorous” [3]. Such "rigorous" approaches privilege students who already have high academic literacy or who are already adept at managing higher education's unofficial rules, routines, and structures - also known as the hidden curriculum. An emphasis on rigor does not necessarily build academic literacy or unpack the hidden curriculum for students

without that privilege [3]. Some practices in higher education, especially those in rigorous STEM programs, have traditionally centered on a 'sink or swim' or 'weed out' mentality, and this "hinders efforts to attract more women and minorities into those fields, say the chairs of science departments at U.S. universities." [41, p. 1333]. Education is "unavoidably normative in both its means and ends" [38, p. 15], so any negative mindsets, overworked campus members, weed-out cultures, or unrealistic expectations infect the mission and outcomes for all participants in the university system. The antidote to traditional practices that create barriers to students' success is a focus on care and well-being that seeks to break down the barriers.

Another challenge that STEM programs may face that can impede focus on teaching, learning, and relationships is the dual mission of research production and the competitive nature of the academy. Heavy emphasis on research dollars and research projects can be supportive to the few students who get to participate, but it also means that graduate students and faculty with large research responsibilities have to make tough decisions about how to prioritize their time. Students in my study perceive the split focus of their professors and teaching assistants and often feel deprioritized when those tasked with teaching lack the bandwidth to actually teach well. When professors and students are constantly competing for accolades and grades and quality time to connect, additional stressors layer on top of those demands. To be sure, some students and faculty thrive in competitive environments, but for many others, these pressures can shut them down and rapidly deplete their energy and mental health. The Higher Education Research Institute's (HERI) survey of faculty found significant differences between STEM and non-STEM faculty in how professors perceive their responsibilities to students. STEM faculty felt more responsible for preparing students for careers and graduate school, but they reported less responsibility to consider emotional or moral development and to foster tolerance and learn about difference [42]. Because of these perceptions of faculty, students may struggle in STEM environments to be respected as whole people from diverse backgrounds who are multi-faceted learners and thinkers.

STEM fields continue to face problems with diversity and inclusion and with achievement gaps for underrepresented groups, despite widely adopted missions to improve these conditions. Gonzalez, Hall, Benton, Kanhai, and Nunez report that "diverse environments yield better science and knowledge outcomes, which has motivated public and private foundations to invest billions of dollars in efforts to diversify STEM spaces and make them more inclusive" [43, p. 446]. However, these investments can fail to show results and can backfire when white participants feel attacked or take a victim stance [44]. Furthermore, "most inclusion efforts are too short and too shallow to grapple with deep cultural and structural change" [43, p. 447]. Even defining problems with diversity and inclusion can be a challenge for campuses: the HERI survey of American university faculty found that 42.5% of Latino/a faculty and 39.2% of Black faculty report significant racial conflict on their campus, compared to 25% of white faculty. Women were also more likely to report racial conflict than men [42]. Gonzalez et al. found that in a collaboration of stakeholders to discuss increasing diversity and inclusion in STEM, participants were unwilling to take about difficult issues of racism, sexism or other exclusionary structural systems. They established that participants in diversity and inclusion efforts have a limited bandwidth for change and prefer the comfort of the status quo [43]. Gonzalez, et al. argue further that "inclusion work inevitably requires the redistribution of power, resources, and opportunity" because its goal is to create new policies and practices that result in the belonging of historically underrepresented groups [43, p. 457]. The challenge to universities is to act boldly

in these efforts that indeed make some people uncomfortable, but that are necessary to move toward true equity and accessibility in higher education.

Administration supporting faculty well-being

College administrators can take several steps toward showing higher levels of care to their faculty to support their well-being. Easing pressures on schedules and expectations for output of research or credit hours delivered requires major shifts in how funding is distributed and how programs are run. However, making such shifts will allow for understanding about individual challenging circumstances that faculty may face. HERI's (2016) survey of faculty found that women and faculty of color report having to work harder to meet expectations than their white male colleagues [42]. Especially since the onset of the pandemic, the cracks in our systems have been laid bare. A recent article in the *Chronicle* reported the challenges of an assistant professor and her adjunct husband during the pandemic who had trouble getting timely healthcare and maternity leave [45]. Doherty goes on to emphasize that professors can delay their desires to be parents and other major life choices based on the level of demand from their university [45]. Universities cannot afford to face an exodus of faculty in the wake of the pandemic. If we desire a professoriate who can manage the demands of their positions, the institutional systems must make way for effective mechanisms for supporting faculty as whole people who have rich and complicated lives off-campus that cannot be fully separated from their work on-campus.

In addition, we can place more emphasis on fostering good teaching by valuing it differently in our hiring, annual review, and promotion and tenure processes. Observation and assessment of classroom teaching can become a more integral part of expectations for faculty in the service of continuing improvement in practice and outcomes. A crucial aspect of valuing teaching in a robust way means that professors and graduate students who are shown to be ineffective teachers or who simply do not like or want to teach are assigned to research responsibilities that take them away from the classroom. One student in my study reported that graduate student teachers "were just extremely disrespectful in terms of like interactions… just like condescending." Another said this about going to office hours: "I always felt uncomfortable there for some reason, as if I wasn't welcome or I was being dumb" [40, p. 151-2]. We need to rethink standardized expectations for teaching loads to assure that students are having supported, valuable learning experiences in all classrooms. Considering who is *allowed* to teach versus who is *required* to teach can be a way to begin reframing our value for teaching.

Faculty supporting students' well-being

In higher education, and particularly in STEM programs, I argue that faculty can mitigate unsupportive experiences and feelings of overwhelm by implementing new policies and practices to better support well-being of faculty and students. Both students and faculty emphasize quality time in supportive, engaged relationships as beneficial to their well-being. This means that professors need to rethink how we create schedules, make time for relationship-building, and create opportunities for positive interaction in and out of the classroom, ideally with the strong support of our administration. When we know that faculty need more support in balancing personal lives and self-care with their professional responsibilities, we can adjust workload expectations to allow for more time for relationship-building with students. Basko emphasizes that relationship-building is one of the big six college experiences students need to have to live a

good life during and after their time in college, so this shift in priorities for faculty time would also benefit students significantly [46]. Gallup found that only 27% of graduates report having professors at college who care about them as a person [47], so there are many more students to reach.

Another major area for reform considering these findings is the need to assess and revise curricula in a comprehensive way. Curriculum is not simply a list of content. It is how and why we teach what we do; it is both what is intended and what is accidental or ancillary. Davey, Salazar Luces, and Davenport found that a student-centered pilot course supported learning and belonging in a diverse engineering class [48]. They advocate for a series of approaches to pedagogy and communication with students to enable flexibility in course design to meet the needs of the individual students in the classroom. Their suggestions fall into two categories: introducing the course by "creating an inclusive environment" and then observing carefully to understand and meet student needs [48, p. 10]. In this way, curriculum becomes fluid and reflective and welcoming, as it accommodates for the students in the class. Specifically for students with care responsibilities and/or who are neurodiverse, Davey, et al., recommend the following actions for faculty:

- "Observe whether anyone obviously struggling to participate or be in the classroom
- Check in with students
- Allow some absences if appropriate
- Provide flexibility in attendance/requirements/deadlines
- Set clear expectations and curriculum structure within the flexible framework
- Clearly indicate the start and end of each activity
- Provide downloadable/on demand content
- Allow assistive devices
- Discuss group work in advance if appropriate" [48, p. 12].

Another way faculty can tailor language to show care to students and help create an inclusive environment is to reconsider how we describe and frame our course expectations within the syllabus document. Supiano argues that we must move away from the syllabus as a list of rules or prospective punishments and create syllabi that are inviting, inclusive, transparent, and that show trust for student decisions and priorities [49]. Students will always come to faculty with a variety of challenges and subplots to their lives, so inclusive language and flexibility will support their success.

Curricular reform for well-being cannot omit reflecting on and revising our assessment practices. Blum argues that we should consider reforming grading and assessment practices to be oriented toward growth, collaborative thinking, and reflection instead of all-or-nothing achievements and exams. She suggests that putting less pressure on students for perfection or competitive grade-grubbing makes it easier for them to engage in the work and learn more [50]. In STEM programs, the drive for rigor means it is common to use curves to rank and sort students before grading them. Jack & Sathy argue that when we grade this way, we "communicate exclusion" [3]. Furthermore, we understand the impact of high pressure academics on well-being and mental health. Cruwys, Greenaway, and Haslam show that "educational bottlenecks are associated with reduced student wellbeing. Higher-achieving students, those who feel little control over their

academic outcomes, and those who lack social group memberships are at highest risk" [51, p. 372]. Their findings are even more stark in light of current mental health statistics for college students. The American Public Media documentary, *Under Pressure: The College Mental Health Crisis*, reports that in 2021, 40.3% of students reported depression, 34.2% anxiety, and 13.2% suicidal ideation [52]. Certainly, students are experiencing mental health challenges for a variety of reasons and circumstances, but rethinking assessment can create space for well-being and diversity and inclusion efforts to flourish.

Encouraging pedagogical reform that respects individual circumstances and supports caring interactions can come in many forms and would help foster faculty-student interaction and well-being. Mondelli and Tobin edited an open-source collection of resources for designing, teaching, collaborating, and assessing within pedagogies of care, in which a variety of contributors describe how they are making learning more meaningful and getting students more invested in the classroom by making more mindful choices about goals and practices [53]. Demonstrating pedagogy of care means engaging in clear communication, showing faculty are approachable and adaptable to arising student needs, and being flexible in the face of potential drastic change, such as we have experienced throughout the Covid-19 pandemic.

Feminist pedagogy is also instructive in reforming our approaches to prioritize well-being. Shrewsbury encourages us to see classrooms as "persons connected in a net of relationships with people who care about each other's learning" [54, p. 6]. In this model, students "learn to respect each other's differences rather than fear them" and their experiences and perspectives are invited to build shared goals and a sense of democracy and mutual value [54, p. 7]. Furthermore, Shrewsbury argues that feminist pedagogy seeks a transformation of the academy by fostering empowerment, community, and leadership to break through old patterns of oppression within the institution [54]. Adopting feminist and care-based pedagogies is crucial to making strides in our diversity and inclusion efforts by mitigating student experiences with unsupportive faculty interaction.

There is so much more to be said on the subject of care in higher education that I cannot address in this short paper, but I would be remiss if I did not point to some of these connections at least briefly. We cannot make substantial change to the university system unless we consider how care work is defined and gendered within an institution, especially regarding contingent or non-tenured faculty and faculty across the gender spectrum. It is no secret that female faculty and faculty of color often take on or are given roles that involve more time and caring work in comparison to white or male faculty. Shalaby, Allam, and Buttorf share one female professor's rendering of the problem: "We are fighting racism and sexism in our institutions, all unpaid service, while senior men sit back and plan to ride it out. Our service burdens are enormous anyways, especially given student support. Our students rely predominantly on female faculty and BIPOC faculty for mentorship" [55]. The authors argue that the disproportionate share of "invisible labor" that these faculty members take on impacts their well-being as well as their career advancement; therefore, we need to value institutional service more fairly to account for this essential work [55]. Furthermore, the HERI faculty survey finds that white and male faculty perceive more fairness in their institutions' treatment of women and faculty of color than other groups perceive and report experiencing [42].

To summarize this analysis, I return to Christe's literature review on faculty-student connections in STEM disciplines [10]. She emphasizes faculty's negative impact on persistence [5] and partially blames the lack of pedagogical innovation in these fields [56], often because faculty were not rewarded for teaching innovation [57]. Christe argues that STEM programs reward research prowess over teaching ability, which exacerbates the disconnect between faculty and students [58], [59]. To combat these challenges for STEM-focused institutions, we can move our focus away from rigor and competition toward fostering the flow of care throughout the institution. It is a complex proposition to attend to care for individuals in a large system, but we must start somewhere. As Basko notes, "You can't anticipate or compensate for every potential storm, but you can give a ship an anchor" [46]. There are several anchors administrators and faculty can provide. We can create time and space for relationship-building between faculty and students. We can honor excellent teaching and thoughtful pedagogy and inclusive curricular design by prioritizing them in our planning and evaluation. We can rethink our approaches to grading and assessment and eliminate the deleterious concept of rigor. We can incorporate pedagogies of care and feminist pedagogy as we reinvent curriculum to enhance learning for all students. We can move beyond lip service to confront the challenges of faculty and student burnout and poor mental health in high-pressure academic environments by acknowledging changing needs and adapting to them.

Action plan and future research

As an action research study, my work on this project goes beyond the completion of this study. The ongoing pandemic has intensified the need for these findings to circulate more widely and for reforms to be envisioned and implemented more urgently. I am working to revise my curriculum and evolve my pedagogy in response to these findings and sharing them broadly with other education researchers and professors. On my own campus, I am conducting a faculty workshop and meeting with small groups of faculty and administrators to collaborate on ways to create pedagogical and curricular change and enhance faculty-student interaction on our campus. In addition to action steps in my personal sphere, I invite collaboration with other researchers and institutions as we continue to ask questions about how to enhance well-being for faculty and students.

Future studies should examine faculty-student interaction among different types of faculty (adjunct, research, lecturer, tenured) or levels of students (first-year, seniors, graduate). There may be important distinctions among different combinations of faculty and students than the ones I studied here. The demographics of my institution and the focus of my research questions prevented me from meaningfully addressing several important aspects of interaction and well-being for this study, especially the impacts of various discriminatory practices and institutionalized racism on interaction and well-being. Additional studies should be designed to explore the impact of interaction on the well-being of people of color, underrepresented groups, and marginalized populations. Discourse analysis can add layers of depth to our understanding of faculty-student interaction because so much power in relationship rides on what we say and how we say it. Further action research in curricular reform is necessary to achieve progress toward equity and access outcomes and to support both faculty and student well-being in higher education.

References

[1] Warshaw, A. (2017, October 25) "Students Should Prioritize Their Well-being, Even in Rigorous Programs". *The State Press.* https://www.statepress.com/article/2017/10 /students-should-prioritize-their-well-being-even-in-rigorous-programs.

[2] Lipson, S. K., Zhou, S., Wagner, B., Beck, K., & Eisenberg, D. (2016). Major Differences: Variations in Undergraduate and Graduate Student Mental Health and Treatment Utilization Across Academic Disciplines. *Journal of College Student Psychotherapy*, *30*(1), 23–41. https://doi.org/10.1080/87568225.2016.1105657.

[3] Jack, J., & Sathy, V. (2021, October 15). It's Time to Cancel the Word "Rigor." *Chronicle of Higher Education*, *68*(4), 8.

[4] Kim, Y. K., & Sax, L. J. (2014). The effects of student-faculty interaction on academic self- concept: does academic major matter? *Research in Higher Education, 55*(8), 780–809. https://doi.org/10.1007/s11162-014-9335-x

[5] Micari, M., & Pazos, P. (2012). Connecting to the professor: Impact of the student–faculty relationship in a highly challenging course. *College Teaching*, *60*, 41–47. https://doi.org/10.1080/87567555.2011.627576 .

[6] Kim, Y. K. (2010). Racially different patterns of student–faculty interaction in college: A focus on levels, effects, and causal directions. *Journal of the Professoriate*, *3*(2), 161–189.

[7] Zumbrunn, S., McKim, C., Buhs, E., & Hawley, L. R. (2014). Support, belonging, motivation, and engagement in the college classroom: A mixed method study. *Instructional Science*, *42*(5), 661–684.

[8] Suresh, R. (2006). The relationship between barrier courses and persistence in engineering. *Journal of College Student Retention: Research, Theory and Practice*, *8*(2), 215–239. https://doi.org/10.2190/3QTU-6EEL-HQHF-XYF0.

[9] Vogt, C. (2008). Faculty as a critical juncture in student retention and performance in engineering programs. *Journal of Engineering Education*, *97*(1), 27–36.

[10] Christe, B. (2013). The importance of faculty-student connections in STEM disciplines: A literature review. *Journal of STEM Education: Innovations and Research, 14*(3), 22–26.

[11] Adlaf, E. M., Gliksman, L., Demers, A., & Newton-Taylor, B. (2001). The prevalence of elevated psychological distress among Canadian undergraduate: Findings from the 1998 Canadian Campus Survey. *Journal of American College Health*, *50*(2), 67–72.

[12] Barbieri, P. N., Giuntella, O., Saccardo, S., & Sadoff, S. (2021). Lifestyle and mental health 1 year into COVID-19. *Scientific Reports*, *11*(1). https://doi.org/10.1038/s41598-021-02702-4

[13] *The Chronicle of Higher Education*. (2020). *"'*On the Verge of Burnout': Covid-19's impact on faculty well-being and career plans." https://connect.chronicle.com/rs/931-EKA-218/images/Covid%26FacultyCareerPaths_Fidelity_ResearchBrief_ v3%20%281%29.pdf

[14] Gilligan, C. (1982). *In a different voice*. New York: Harvard University Press.

[15] Tronto, J. (1994). *Moral boundaries: A political argument for an ethic of care*. New York: Routledge.

[16] Knobloch, N. A. (2004). *Exemplary teaching professors' conceptualizations of care*. Paper presented at the 2004 American Education Research Conference, San Diego, CA.

[17] Murphy, G. (2015). Connecting the dots: Facilitating a positive university educational journey with an organisational mental health and well-being strategy. *Journal of the Australian and New Zealand Student Services Association, 46*, 20–28.
[18] Simon Fraser University. (2015). *Embedding conditions for well-being in academic settings*. Retrieved from http://www.sfu.ca/healthycampuscommunity.
[19] Foster, J., Allen, W., Oprescu, F., & McAllister, M. (2014). Mytern: An innovative approach to increase students' achievement, sense of well-being and levels of resilience. *Journal of the Australian and New Zealand Student Services Association*, *43,* 31–40.
[20] Fitzmaurice, M. (2008). Voices from within: Teaching in Higher Education as a Moral Practice. *Teaching in Higher Education, 13*(3), 341-352.
[21] Lincoln, Y. (2000). When research is not enough: Community, care, and love. *The Review of Higher Education, 23*(3), 241-256.
[22] Murray, J. (2006). Constructions of caring professionalism: A case study of teacher educators. *Gender and Education, 18*(4), 381–397.
[23] O'Brien, L. (2010). Caring in the Ivory Tower. *Teaching in Higher Education, 15*(1), 109-115.
[24] Walker, C., Gleaves, A., & Grey, J. (2006). A study of the difficulties of care and support in new university teachers' work. *Teachers and Teaching, 2,* 37–41.
[25] Bandura, R., & Lyons, P. (2012). Instructor care and consideration toward students – What accounting students report. *Accounting Education, 21*(5), 515–527.
[26] Lee, O., & Ravizza, D. (2008). Physical education preservice teachers' conceptions of caring. *Education, 128*(3), 460–472.
[27] Rossiter, M. (1999). Caring and the graduate student: A phenomenological study. *Journal of Adult Development, 6*(4), 205–216.
[28] Case, J. M., & Light, G. (2011). Emerging methodologies in engineering education research. *Journal of Engineering Education*, *100*(1), 186–210. https://doi.org/10.1002/j.2168-9830.2011.tb00008.x
[29] Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice.* New York: Macmillan.
[30] Noddings, N. (2003). *Happiness and education*. New York: Cambridge University Press.
[31] Greene, M. (1978). *Landscapes of learning*. New York: Teachers College Press.
[32] hooks, b. (1994) *Teaching to transgress.* New York: Routledge.
[33] Eisner, E. (1992). Educational Reform and the Ecology of Schooling. *Teachers College Record*, *93*(4), 610–627.
[34] Eisner, E. W. (1994). *The educational imagination: On the design and evaluation of school programs* (3rd ed.). New York: Macmillan.
[35] Glesne, C. (2016). *Becoming qualitative researchers.* (5th ed.). Boston: Pearson.
[36] Bullough, R. V, & Pinnegar, S. (2001). Guidelines for quality in autobiographical forms of self- study research. *Educational Researcher*, *30*(3), 13–21.
[37] Stringer, E. T. (2007). *Action research* (3rd ed.). Thousand Oaks, CA: Sage.
[38] Uhrmacher, P. B., McConnell-Moroye, C., & Flinders, D. (2017). *Using educational criticism and connoisseurship for qualitative research.* New York: Routledge.
[39] Herr, K., & Anderson, G. L. (2015). *The action research dissertation: A guide for students and faculty* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.
[40] Holles, C. E. (2021). *Faculty-Student Interaction and Impact On Well-Being in Higher Education*. https://digscholarship.unco.edu/dissertations

[41] Mervis, J. (2011). Weed-Out Courses Hamper Diversity. *Science*, *334*(6061), 1333. https://doi.org/10.1126/science.334.6061.1333.
[42] Bara Stolzenberg, E., Eagan, K., Zimmerman, H. B., Berdan Lozano, J., Cesar-Davis, N. M., Aragon, M. C., & Rios-Aguilar, C. (2016). *Undergraduate Teaching Faculty: The HERI Faculty Survey 2016-2017*. www.heri.ucla.edu
[43] Gonzales, L. D., Hall, K., Benton, A., Kanhai, D., & Núñez, A. M. (2021). Comfort over Change: a Case Study of Diversity and Inclusivity Efforts in U.S. Higher Education. *Innovative Higher Education*, *46*(4), 445–460. https://doi.org/10.1007/s10755-020-09541-7
[44] DiAngelo, R. (2018). How white people handle diversity training in the workplace. *GEN*. https://gen.medium.com/how-white-people-handle-diversity-training-in-the-workplace-e8408d2519f
[45] Doherty, M. (2021, October 15) The Quiet Crisis of Parents on the Tenure Track. *Chronicle of Higher Education, 68*(4).
[46] Basko, A. (2021, December 10). Have We Gotten Student Success Completely Backward? *Chronicle of Higher Education*, *68*(8).
[47] Gallup (2014). "Great Jobs, Great Lives: The 2014 Gallup-Purdue Index Report". Available at https://www.gallup.com/services/176768/2014-gallup-purdue-index-report.aspx
[48] Davey, T., Salazar Luces, J. V., & Davenport, R. (2021). Individual-Centred Approaches to Accessibility in STEM Education. *Education Sciences*, *11*(10), 652. https://doi.org/10.3390/educsci11100652
[49] Supiano, B. (2021, December 10). The Student-Centered Syllabus. *Chronicle of Higher Education*, *68*(8), 8.
[50] Blum, S. D. (2020). *Ungrading: Why Rating Students Undermines Learning (and What to do Instead).* Teaching and Learning in Higher Education Series. West Virginia University Press.
[51] Cruwys, T., Greenaway, K. H., & Haslam, S. A. (2015). The stress of passing through an educational bottleneck: A longitudinal study of psychology honours students. *Australian Psychologist*, *50*(5), 372–381.
[52] Aslanian, S. & Roth, A. (2021). *Under Pressure: The college mental health crisis.* American Public Media.
[53] Mondelli, V., & Tobin, T.J. (2020). *Pedagogies of Care.* West Virginia University Press. https://sabresmonkey.wixsite.com/pedagogiesofcare.
[54] Shrewsbury, C. M. (1987). What Is Feminist Pedagogy? *Women's Studies Quarterly*, *15*(3/4), 6–14. http://www.jstor.org/stable/40003432
[55] Shalaby, M., Allam, N., & Buttorf, G. (2020, December 18) "Gender, COVID, and Faculty Service". *Inside Higher Ed.* https://www.insidehighered.com/advice/2020/12/18/increasingly-disproportionate-service-burden-female-faculty-bear-will-have.
[56] Jamieson, L., & Lohmann, J. (2012). *Innovation with impact: Creating a culture for scholarly and systematic innovation in engineering education*. Washington, DC: American Society for Engineering Education. Retrieved from http://www.asee.org/about-us/the- organization/advisory-committees/Innovation-With-Impact/Innovation-With-Impact-Report.pdf
[57] Mastascusa, E., Snyder, W., & Hoyt, B. (2011). *Effective instruction for STEM disciplines: From learning theory to college teaching*. San Francisco, CA: Jossey Bass.

[58] Kokkelenberg, E. C., & Sinha, E. (2010). Who succeeds in STEM studies? An analysis of Binghamton University undergraduate students. *Economics of Education Review*, *29*(6), 935-946.
[59] Seymour, E., & Hewitt, N. (1997). *Talking about leaving: Why undergraduates leave the sciences*. Boulder, CO: Westview Press.