Highlighting Gaps in Engineering Education through Emotional Safety in Student Staff

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I. Introduction: Emotional Safety and the Hidden Curriculum

An increasing body of engineering education scholarship focuses on cultural dimensions of student experience and engineering identify formation. Much of this work is attentive to systemic barriers to broadening participation in engineering and considers how cultural reproduction mechanisms implicitly but systematically reinforce patterns that lead to exclusion or de-identification with engineering. One important mechanism of cultural reproduction in engineering education is what education scholars call "the hidden curriculum", which can be defined as "the set of structured learning experiences or conditions that occur beyond design intent and apart from the explicit curriculum" [1]. Engineering education scholars have explored different ways the hidden curriculum manifests and impacts student experiences [2] [3], giving special attention to impacts on underrepresented and marginalized student groups [4] [5].

This paper derives from a larger project exploring cultural reproduction in engineering with a focus on how engineering students and recent graduates think about individual and professional ethics [6]. That project has considered some of the contradictions that arise in students' education surrounding ethics, including how engineering instructors often allude to the importance of ethics in engineering practice but then avoid explicit discussion of ethical matters that arise in the context of students' coursework. This type of contradiction served as a catalyst for our thinking about some of the other ways in which engineering students receive and cope with conflicting messaging across their educational experience, especially where implicit practices regularly contravene explicit messages. As with the hidden curriculum scholarship in engineering education generally, we are interested in how implicit messaging undermines efforts to create more inclusive, more authentic educational experiences, particularly among those students who may struggle to identify as engineers.

Engineering education scholars have recognized the hidden curriculum as foundational to engineering students' overall learning as well as the development of their professional identities [2][4]. Compared to the explicit curriculum, the hidden curriculum is unintentional, unplanned, and less "controllable": seemingly irrelevant to formalized learning outcomes. Its hiddenness makes it difficult to assess—or even anticipate—how it impacts students' development and even more difficult to align with desired learning outcomes. Nevertheless, as engineering education scholars have shown, the hidden curriculum consistently places performance or "learning" expectations upon students the same as the explicit curriculum, and the impact of these expectations disproportionately penalizes students who are less familiar with or who do not share the implicit assumptions conveyed via the hidden curriculum, that is, students from social groups already marginalized by and underrepresented within engineering [7]. In this analysis, we focus specifically on emotional safety messaging and students' learning experiences outside of the formal classroom.

In school environments, emotional safety is developed through supportive relationships, being valued and treated with respect, and clear boundaries and support for students to achieve their

potential academically, socially, and personally. Despite efforts to promote emotional safety in engineering, veneration of engineering's "hardness" persists, including as symbolically yet potently represented through the endurance of weed-out culture. At our institution, discourse around engineering's inherent difficulty, a celebration of our students' "grit" in the face of academic adversity, and a hazing-like narrative around student "suffering" all endure despite extensive, systematic attention to student mental health and the importance of "work-life balance" across the university community. Research indicates that emotionally unsafe environments lead to stress, lower attendance at school, and less engagement in learning, whereas emotionally safe environments are related to more positive identity development, better learning experiences, and greater feelings of self-worth [7]. Emotional safety in engineering education has been explored in the context of leadership development [8], impact on productivity [9], emotional intuition [10], and the conflict between welfare and safety [11]. The concept of hidden curriculum directs our attention beyond the classroom to other sites of structured learning for engineering students. As a Resident Assistant, this paper's first author has extensive experience with emotional safety training in our STEM-focused university's Residence Life department.

II. Background: Emotional Safety within Residence Life

This paper's analysis focuses on student learning within our university's Residence Life, specifically exploring training experiences of undergraduate student resident assistants (RAs). Residence Life leadership recognizes the importance of emotional safety to promote the department's goals: Engagement and passion with their work can improve the interactions RAs have with the students they supervise, improve retention rates by helping to prevent burnout, and support the professional and social development of student staff. Through presentations and activities that imitate classroom learning, student staff are explicitly taught Residence Life's policies and expectations. As suggested by the hidden curriculum framework, RAs also come to learn the set of moral values and norms they are expected to uphold and abide by. We seek to understand how emotional safety is taught, learned, and internalized through Residence Life trainings; how RA experiences align with ways the hidden curriculum plays out in traditional classrooms, and the broader set of educational outcomes associated with students' residential experience within universities.

The most comprehensive definition of emotional safety is by Wang and Degol, who define emotionally safe schools as having: school-based mental health services, caring and supportive staff, an absence of verbal bullying or harassment, and students/staff who are able to effectively interact and "express feelings without fear or antagonization" [8]. The first dimension is school-based mental health services, which includes access to mental health professionals, such as school psychologists or counselors, who can provide support and guidance to students who may be experiencing emotional distress. These services can also include mental health education and training for students and staff, as well as crisis response plans for addressing mental health emergencies. The second dimension is caring and supportive staff, which includes teachers, administrators, and other school personnel who are empathetic, responsive, and nurturing toward

students. Caring and supportive staff can create a positive school climate where students feel valued, respected, and supported in their academic and personal pursuits.

The third dimension of Wang and Degol's framework for emotional safety is an absence of verbal bullying or harassment. This includes creating a safe and respectful school environment where students are not subjected to verbal abuse, teasing, or harassment by their peers or by staff within the school community. The fourth dimension is the ability to express feelings without fear or antagonization, which includes promoting open communication and emotional expression among students and staff, and creating a culture where emotional vulnerability is valued and respected. By focusing on these four dimensions, educators can create emotionally safe learning environments that promote the mental health and well-being of students and staff. It is important to note, according to Wang and Degol, that different schools and communities may prioritize different dimensions depending on their unique needs and circumstances. For example, schools with high rates of bullying may need to focus more heavily on creating an environment free of verbal harassment, while schools in low-income areas may need to prioritize access to mental health services. Ultimately, by prioritizing emotional safety, educators can create a culture of empathy, kindness, and support that fosters academic success and personal growth for all students.

Residence Life training at our institution is broad in scope, covering supervision practices, crisis management, alcohol and drug abuse, mental wellness, the institution's judicial review process, diversity and inclusion expectations, campus housing policies, and a wide range of related topics. These trainings are intended to prepare RAs to address any of the diverse challenges that tend to arise among their residents. In addition to the challenge of Residence Life trainings that are broad in scope, many RAs are young adults who themselves have yet to work through and effectively manage some of their own life-challenges. This creates an opportunity for dissonance between an RA's individual identity development and their preparation to assist other students in managing the challenges they face adapting to university life. Despite this gap, Residence Life trainings do not attend to RA emotional development needs and focus exclusively on preparing RAs to support their student residents.

III. Methods: Exploring Resident Assistant Experiences with Emotional Safety

In order to better understand the RA experience with emotional safety in the context of Residence Life trainings, the research team conducted semi-structured interviews with 9 participants to understand their perspectives on and experiences with emotional safety. Interviewees were selected from among student RAs during the 2022-2023 academic year, a majority of whom were returning staff, meaning 2022-2023 was not their first year as staff members and so they had participated in prior trainings. Training sessions are conducted each regular academic semester, so twice a year. Interviewees were recruited for participation through email and word-of-mouth. Members of the extended research team occasionally attended RA staff meetings to extend an open invitation for participation in this project, and volunteers were asked to reach out to the first-author directly. The study was approved by our university's institutional review board.

The student staff interviewed had all been RAs at least once during their time at the institution, with standard academic year appointments. According to the university's posted job description: "A Resident Advisor (RA) is a student hired to provide leadership and carry out the Residence Life mission on a part-time basis in the residence halls. RAs specifically engage students in personal development while promoting an inclusive, safe, and academically conducive environment for students who live in the [institution's] Residence Halls and Apartments." For remuneration, "Resident Advisors receive a stipend of $200 per month, plus room and a chosen Residence Life student staff meal plan."

The RA job description lists a total of 32 responsibilities. A few of these responsibilities that are notable for our analysis include:

- Assist residents to accept responsibility for control of their behavior (e.g. quiet hours, alcohol consumption, and visitors) and physical maintenance of the hall.
- Confront and document violations of Student Code of Conduct and Residence Life Hall Handbook when encountered. Follow up appropriately when necessary.
- Conduct a minimum of three community meetings per semester – introductory, check-out, and pre-health and safety meetings – to ensure that residents are informed of policies, procedures and scheduled activities.
- Staff required desk hours at assigned residence hall on your assigned duty night. Desk hours are from 6PM-8PM each night, including weekends.
- Maintain confidentiality of information with which Residence Life Staff and students have shared while being sensitive to information which necessitates consultation with other staff members.
- Serve as a mandatory reporter and campus security authority.

Mandatory-reporter status legally requires that RAs, typically students and occasionally minors, report known or suspected incidents of child abuse, child neglect, suicide ideation, and Clery Act crimes, such as stalking, rape, fondling, burglary, and assault.

IV. Findings

Using Wang and Degol's framework for emotional safety as an organizing device, the RAs interviewed for this project elaborated on three key dimensions of emotional safety from their experiences as RAs within our institutional context: mental health services, staff supportiveness, and fear-free environments. Each of these will be elaborated in the following sections.

A. School-based Mental Health Services

Interventions targeted at reshaping engineering identity to support mental health related help-seeking could increase student success and retention, particularly for at-risk students. To accomplish this, it is important to first understand how the engineering-student experience influences student mental health and the beliefs students hold that influence their help-seeking [9]. Because of the stigma attached to seeking help and the strain on campus mental health resources of extensive utilization, these issues manifest in ways that are challenging to the residential community and those who work in campus housing. While the stigma associated with

help-seeking is decreasing, it continues to be important for Residence Life to participate in campus efforts to support students in creating a culture of openness and support of help-seeking behaviors. Residence Life staff can approach this issue from multiple fronts: the well-being of students; providing appropriate training and support to staff; supporting staff who themselves may experience mental health concerns intersecting with their work roles, including secondary trauma; and tending to their own individual well-being [10].

Concepts of mental health also encompass well-being, perceived self-efficacy, autonomy, competence, and the student's recognition of their ability to realize both their intellectual and emotional potential [11]. Many mental health concerns do not manifest until emerging adulthood, and the significant life changes of adjusting to living on campus frequently amplify psychological stress [12]. This stress often transfers to RAs, who share responsibility for the wellbeing of their residents, as described by a Residence-Life Coordinator:

> A lot of my RAs, like…, I needed to get them some [support] because they definitely had a lot of stress with the job and their duty situations that they responded [to].

Our interviews echoed prior research that engineering programs are characterized by a culture of stress [13], which often results in normalization and trivialization of mental health challenges. Normalizing the "culture of stress" leads to a presumption that high-stress levels are both common and acceptable—that engineering students are typically stressed out, and RAs even more so due to their extra responsibilities—decoupling stress from addressable challenges to mental health. Further, we noted the normalization of pervasive-stress suggested that any one person's struggles were interpreted as "just like everyone else," and therefore it was reasonable for that stress "not to be taken seriously." As a result, students, faculty, and counselors alike struggled to distinguish potential mental health challenges from the stress engineering students frequently experience and, presumably, should be able to handle.

Interviewees also reported that the trivialization and normalization of mental health challenges occurs through students making jokes about mental health. As one RA noted:

> Even the students who [say], "Ah, I am on six Red Bulls today." I'm, like, "Bruh, how is that healthy? Let's stop."

Joking about evidently unhealthy strategies to manage workload and overall stress is pervasive on campus. While making such jokes partly acknowledges the unhealthy behavior, it can also trivialize unhealthy decision making and gloss coping mechanism that could indicate in need for help. RAs struggled to negotiation the boundary between participation in engineering educational cultures that celebrated stress and knowing when and how to intervene to direct students to supporting resources.

In addition to being an important resource for individual students, school-based mental health services can also benefit the engineering education community as a whole by promoting a culture of openness and support that responds to engineering education's normalization of stress as well as individualized coping mechanisms. For engineering students, normalization of high-stress can negatively affect their ability to attend to their own mental and emotional needs and seek help

from outside resources. This stress can manifest in a variety of mental health and learning challenges, including burnout. Without adequate mental health support, engineering students may struggle to succeed in their coursework and may even drop out of their programs. This can be particularly true for underrepresented students, who may face additional challenges related to learning such as imposter syndrome and stereotype threat, both typically reinforced by engineering's hidden curriculum. Engineering educators should be particularly concerned about these issues, as they have a responsibility to ensure that all students have access to the resources they need to succeed. By taking institutional mental health resources and approaches to intervention seriously, engineering educators could help to create a more inclusive and supportive learning environment that benefits everyone involved.

B. Caring and Supportive Staff

While mental-health resources are a critical component of emotionally safe campuses, particularly for responding to students experiencing acute emotional disruption, professional mental health staff are necessarily a backstop in a long-chain of student relationships and supporting resources. In every educational institution, front-line staff across campus units provide distributed, high-impact interactions with and support of students. This is true as well of RA trainings conducted by our Residence Life.

Of the incoming RA staff in the 2022-2023 academic year, fewer than 20 were new to the role. This results in each incomer having access to at least one returning staff member to provide mentorship support. New RAs indicated that this staff was integral to their understanding and well-being in the role.

> I talked to my [student staff supervisor] all the time, in a mental health capacity, just as somebody who could relate to our specific struggles and successes and highs and lows and everything like that related to school.

> I think what I see different in the RA community that maybe isn't as prevalent in the student community is the level of support that RAs give to one another in these situations, to give opportunity and time to talk about it. You know, to [be able to] yell about it [to] get it off your chest.

Professional staff also contributed to RAs' support networks. Some professional staff lives on campus, and they meet with each member of their team throughout the semester. These meetings may relate to RA discipline or work responsibilities, but they are also a prime opportunity for RAs to receive necessary support and to experience mutually caring relationships.

> I appreciated that during training, [my boss] took us aside and was very clear about: "Hey, of course, do everything you can to support your residents. But if anything goes wrong, you should know that it's not your fault. Here's the extent of your responsibilities. Your goal is to connect them to resources, not to be their only resource."

Schools characterized by high-quality interpersonal relationships are better able to support student psychological needs and promote optimal development in academic domains [8]. This

characterization includes communication, cohesiveness, and belongingness between students and their instructors as well as other university support staff.

A caring and supportive community for engineering students includes not only peer support networks and professional staff who can provide support, mentorship, and guidance but also care and support from instructors and learning mentors. The unique learning challenges that engineering students face, particularly in terms of stress and mental health concerns, make it essential for educators to prioritize creating a culture of caring and support. By fostering positive interpersonal relationships between students and instructors, universities can help to promote both academic success and optimal emotional development of their students. Unfortunately, engineering students often do not have access to such relationships. Were engineering educators to better recognize the importance of these relationships and contribute to creating such a community, they could help to ensure engineering students were able to thrive academically and emotionally.

C. Absence of Harassment and Expression without Fear

In the United States, harassment is a growing problem in science, technology, engineering, and mathematics (STEM) fields [14]. Harassment can be verbal, physical, or sexual and include any unwelcome or unfavorable behavior due to one's identity (e.g., gender, race, age, religion). Harassment has adverse impacts on career outcomes: it reduces productivity, reduces job satisfaction, restricts opportunities for advancement, diminishes scientific recognition and achievement, and creates emotional distress. The climate and structure of STEM academic departments are conducive to high rates of harassment, due to norms that favor competition and individualistic practices, overwhelmingly male leadership, and stereotypically masculine occupational cultures. Additionally, structural power differentials among group members can contribute to harassing behaviors, while also hindering help-seeking [14].

Harassment entails a legal threshold for inappropriate pressure or intimidation. Shy of harassment exist a variety of lesser infractions that also result in varying degrees of intimidation, including working and learning environments that pressure participants to suppress sharing of their experiences, perspectives, or identities. While our research did not uncover any experiences with harassment per se, it did capture participants' experience of fear over expressing their true experiences. For example, RAs referenced their fear of retaliation and reluctance to perturb those in positions of power over them.

> I do find myself hesitating if I do have any negative feedback to a superior. And I think very carefully about, "Is it worth saying?"

> I was just never going to rock the boat, because I do not want to do anything that explicitly or implicitly, whatever made it, any of the professional staff feel anything other than great about promoting me…. I was told from the CDs [Community Directors] last year,… "Don't mention anything that might be even remotely critical about the RLM [Residence Life Manager] if you've wanted this position," because there is such a large focus on this, what we do. This is so much what our founding department is based on.

The fear of expressing negative feedback to a superior, formal or informal, can be a significant barrier to creating a supportive and inclusive community. At their extreme, toxic work environments—where individuals do not feel comfortable expressing their concerns or providing feedback—can negatively affect the mental health and well-being of everyone involved. In contrast, work environments that promote open and honest communication, encourage the expression of diverse perspectives, and actively work against fear-based deliberations maximize the potential of individuals and the overall group.

Similarly, when students feel free to express themselves without fear, when they are valued and supported, they are more likely to engage as active participants in their learning environments. They are more likely to engage their studies, take risks, and pursue opportunities that challenge them to grow academically and personally. Conversely, when students feel marginalized, unsupported, or harassed, they are more likely to struggle academically, withdraw from courses, or even leave the field entirely. This not only negatively impacts their personal lives but also limits the pool of talented individuals pursuing engineering. Engineering educators should be invested in fostering learning communities that do not tolerate harassment, surely, but also go further to invite diverse expression without fear of reprisal or reprimand. This can include implementing classroom policies that promote respectful communication and interactions, explicitly stating expectations university learning environments, and actively working to solicit diverse perspectives among students and the entire university community. By doing so, educators can help ensure that engineering education is a welcoming and inclusive environment where everyone can thrive and reach their full potential.

V. Discussion: Establishing Emotional Safety in Engineering Educational Environments

Shean and Mander define an "emotionally safe" school as "one where there are systems and structures that provide boundaries and self-worth in students; which results in the students feeling connected, respected, and valued; and through those feelings they are able to fully engage in relationships and learning, and express their true self" [7]. This is a complex definition to address. During a role-playing activity that was part of RA training, for example, one RA confirmed the struggle of negotiating the boundaries of effective engagement: "people didn't know what their boundaries were, [and didn't know] if they could step in and [say], 'This is actually how you do it.'" When interrupted during the activity, students would become less confident and would have less opportunity to develop the intended competencies.

One challenge to establishing emotional safety is having individuals aware of those situations that are unsafe for them. This is easier for more experienced participants. In our study, this applied to returning RAs, who had experienced traumatizing situations and were clearer about the activities that might resurface that trauma. Identifying and avoiding unsafe experiences requires emotional maturity that many RAs are still developing and that professional staff is better capable of addressing. They are usually further removed from the traumas experienced by RAs and have more experience navigating the range of responses available to them. Professional staff can also be the first introduction to boundary-setting for their students, for example by asking if particular students may want to step out during a difficult scenario. Navigating difficult circumstances is aided with knowledge of students' previous traumas and challenges, which

requires students' trust or some other documentation of the trauma in instances where it has happened on the job. Trauma-informed staff can more effectively lead a session by demonstrating boundary setting and preemptively predicting discomfort in students. As one RA mentioned,

> I think [what] would be very beneficial after QPR [suicide prevention training], after the Title IX scenarios is in having a trauma presentation: ... how you as an RA may be affected in these situations, especially after being taught about QPR and stuff, and then how you as an RA can get the resources that you need.

Being emotionally mature, recognizing and setting appropriate boundaries, and having professors who are informed of their students' circumstances are all advantageous to engineering education. First, emotional maturity helps students to manage stress, collaborate better, and communicate more effectively. It also enables them to regulate their emotions and maintain a positive outlook, both of which are important to problem-solving and innovation. Recognizing boundaries is also important in engineering education because it helps students to understand and respect ethical and professional norms. This includes respecting the intellectual property of others, avoiding conflicts of interest, and promoting ethical behavior in the workplace. Lastly, well-informed mentors and instructors can provide students more personalized support and guidance. This helps students to feel valued and secure, thereby encouraging deeper engagement with their learning. Overall, emotional maturity, recognition of boundaries, and strong relationships between mentors and students are all essential for a successful and rewarding engineering education.

To maintain emotional safety and trust, educational leaders can "tap into" the core values of their staff to build comradery. Aligning organizational goals with members' personal values helps to creates buy-in from employees and fosters commitment that increases competency. Our interviewees noted that mandatory training activities helped them to develop boundaries by encouraging them to engage with the "why" behind their boundaries. Understanding community members' motivations and experiences contributes to building an emotionally safe environment. A professional staff member in Residence Life their core motivation this way:

> I think having more intentional opportunities for us to express what's useful in practice goes a long way, not only towards feeling heard and welcome and as a valuable part of Residence Life staff, but also towards making training the best that can be.

In engineering, emotional safety and trust are critical components for successful collaboration and problem-solving. Engineering departments can encourage staff to identify and express their values and beliefs, which can help to build stronger relationships among team members. By sharing common values, engineering educators can establish a sense of shared purpose and work more effectively together. Furthermore, a strong sense of shared values can help to promote inclusivity and diversity within the department, ensuring that all team members feel valued and respected. By tapping into the core values of its staff, engineering department can foster a positive and supportive work environment, which is essential for creativity, innovation, and success.

VI. Conclusion

In the field of engineering education, creating a positive and emotionally safe learning environment can have significant impact. Academic stressors such as harassment, peer conflict, and negative help-seeking beliefs can negatively influence student outcomes. While institutions and the educators within them may not be able to directly influence all these factors, for instance barriers related to support from those outside the university community (e.g., family members, community health providers), significant opportunity exists to developing more positive learning environments. Engineering educators can make structural and cultural shifts to address the stressors students face and promote the development of inclusive learning environments that benefit all students.

The major themes identified within this study have the potential to be addressed through structural or cultural shifts within the engineering community, including especially through how hidden curriculum messaging shapes the student experience, both within and beyond their coursework. School climate is malleable and can serve as a high-impact, if often elusive, target for intervention. A crucial goal for effective educational reform is to identify diverse dimensions of the learning environment that can be altered to improve student outcomes. For instance, faculty have considerable control over the tone set in their classrooms around the appropriateness of asking for assistance, for setting assignment flexibility policies and responses, and for attending to students' learning *experiences* in addition to their learning outcomes. Faculty can be strategic and thoughtful about expectations and demands on student time both inside and outside the classroom. Faculty can also model wellness and appropriate boundary setting in their interactions with students: They can communicate explicitly about care for student well-being in the classroom, opportunities for support for physical and mental health, and performance expectations detached from students' whole identity or fitness for engineering.

There is empirical support for the importance of school-place emotional safety in promoting students' overall well-being. A recent meta-analysis of social and emotional learning interventions aimed at improving school safety and reducing problem behaviors found enhancements in social and emotional skills, attitudes toward self and school, and positive social behaviors [8]. In the same vein, student perceptions of the fairness of classroom rules, discipline, and general school safety are negatively associated with psychological distress, including loneliness, anxiety, and depression. Emotional safety among engineering students can assist them to work more effectively in teams, overcome obstacles, and build positive relationships with others. These skills are essential for success in the engineering profession, and can ultimately lead to greater job satisfaction, career persistence and advancement, and impact on the field.

By studying students' perceptions of their learning environments, which are acquired in part through the implicit messaging conveyed by the hidden curriculum, we can not only study and view students' emotional safety but also influence it. This has been shown to have positive effects on the learning environment and academic results. By understanding the hidden curriculum, we can understand how to more effectively intervene in emotionally unsafe learning environments in order to improve emotional safety and academic metrics as well. Ultimately, this can have a positive impact on the future of engineering as a discipline, producing graduates

who are not only technically proficient but also emotionally mature, socially responsible, and effective problem solvers. It can also increase identification with engineering among groups unrepresented in STEM fields by increasing opportunities to enhance belongingness.

The implications of emotional safety for engineering education could be significant. Creating a positive and emotionally safe learning environment can lead to better outcomes for students, including improved social and emotional skills; improved attitudes toward self, school, and profession; and positive social behaviors within the educational setting. This can also have a positive impact on careers. As engineer practice typically requires collaboration, it is essential that engineers develop the interpersonal skills to work effectively in teams, overcome obstacles, and build positive relationships with others. Additionally, by understanding the hidden curriculum and how it impacts students' perceptions of their learning environment, engineering educators can make structural and cultural shifts to address the stressors students face and promote a more supportive learning environment.

Engineering educators can play a central role in creating an emotionally safe learning environment by setting appropriate expectations and demands on student time, modeling wellness and appropriate boundary setting, and communicating care for student well-being. By promoting emotional safety in educational spaces and creating positive learning environments, engineering educators can produce graduates who are not only technically proficient but also emotionally mature, socially responsible, and effective problem solvers. Ultimately, this can have a positive impact on the future of engineering as a discipline, leading to greater job satisfaction, career advancement, and impact in the field.

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