Board 67: Shame in Engineering: Unpacking the Expectations that Students Co-Construct and Live Within

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I am an undergraduate mechanical engineering major anticipating graduation in May of 2019. I am a member of the Beyond Professional Identity research group based in Harding University located in Searcy, Arkansas. I plan to further my studies in engineering education in graduate school particularly in regards to equipping students to work in development and sustainability.

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Dr. Nicola Sochacka is the Associate Director for Research Initiation and Enablement in the Engineering Education Transformations Institute (EETI) in the College of Engineering at the University of Georgia. Her research interests include interpretive research quality, systems thinking, diversity, STEAM (STEM + Art) education, and the role of empathy in engineering education and practice. Her work has been recognized through multiple best paper awards and keynote presentations at international and national conferences and workshops.

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Dr. Joachim Walther is an Associate Professor of engineering education research at the University of Georgia and the Founding Director of the Engineering Education Transformations Institute (EETI) in the College of Engineering. The Engineering Education Transformations Institute at UGA is an innovative approach that fuses high quality engineering education research with systematic educational innovation to transform the educational practices and cultures of engineering. Dr. Walther's research group, the Collaborative Lounge for Understanding Society and Technology through Educational Research (CLUSTER), is a dynamic interdisciplinary team that brings together professors, graduate, and undergraduate students from engineering, art, educational psychology, and social work in the context of fundamental educational research. Dr. Walther's research program spans interpretive research methodologies in engineering education, the professional formation of engineers, the role of empathy and reflection in engineering learning, and student development in interdisciplinary and interprofessional spaces.

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Shari E. Miller is an Associate Professor and the Associate Dean of the School of Social Work at the University of Georgia. Her research focuses broadly on social work education and the social work profession with specific areas ranging from educational innovation, thinking in and for social work, development of theory, inter- and trans-disciplinary and inter-professional education and practice, and professional socialization. She has experience teaching across the social work education continuum, with an emphasis on theory, practice, and the relationship between theory, research, and practice. She is engaged in an ongoing collaborative research program with colleagues from engineering to develop inter-disciplinary approaches to education for reflective inter-professional practice in a global society. She also collaborates with colleagues from multiple disciplines on community engaged projects focused on sustainability.

Shame in Engineering: Unpacking the Expectations that Students Co-Construct and Live Within

This paper summarizes the major research activities and outcomes within the second year of our investigation of shame in the engineering context, a study that was funded through the NSF EEC RFE program (1752897). Shame is an emotional construct represents a ubiquitous yet seemingly invisible phenomenon that pervades both the individual experience and the overall culture of engineering programs. More specifically, based on suggestive evidence from prior engineering education research, we maintain that shame is likely a key mechanism that undergirds socialization processes related to inclusion and exclusion within engineering programs.

In this investigation, as informed by literature in psychology and sociology [1-4], we define shame to be a strikingly painful emotion that occurs in the sociopsychological interaction between sociocultural expectations and an individual's global devaluation of failing to meet the real or perceived. In particular, we find that the study of shame is critical against the backdrop of critical investigations that comment on the formation of identity in engineering students [5-8]. While much of the extant literature in engineering education research regarding identity might inform mechanisms by which institutions can instill a commitment to the engineering profession, our investigation examines the overall well-being and psychological health that occurs in the identity formation processes that undergird engineering education. Thus, we have organized this study around the following research questions:

RQ1: How do students psychologically experience shame in the context of engineering education?

RQ2: How are these experiences located and socially constructed within the institutional cultures of engineering programs?

RQ3: In the context of engineering education, how do individual, psychological experiences of shame interact with perceived cultural expectations?

We approached the research questions with a cohesive pairing of qualitative methods. We investigated the internal experience of shame in engineering students (RQ1) using interpretative phenomenological analysis (IPA) to conduct and analyze in-depth interviews with 9 White male engineering students from two distinct institutional contexts: a research-focused, public university and a teaching-focused, faith-based university [9, 10]. Additionally, we facilitated 10 focus groups with a total of 38 students, stratified across both institutions. Half of the focus groups were maximally diverse in relation to race and gender and the remaining half were homogeneous in that all participants identified as White and male. The transcripts of focus groups were analyzed using ethnographic methods in order to probe the sociocultural expectations of dominant cultures that often induce shame in engineering students (RQ2) [11, 12]. At the conclusion of both qualitative studies, we will intentionally synthesize the thematic psychological insights from the IPA study and themes from the ethnographic study that describe the sociocultural expectations of what it means to become and be an engineer (RQ3). This synthesis will result in a comprehensive model of shame in the context of engineering, as understood from both the embodied individual and the sociocultural realities of engineering students.

Due to the limited scope of this conference paper, we focus primarily on summarizing the results of the IPA investigation (RQ1), and we comment on the tentative connections to preliminary findings from the analysis of the ethnographic focus groups (RQ2 and RQ3).

Summary of IPA Findings: We have completed the IPA study for the 9 White male engineering students from the two institutions previously described. The findings of this in-depth qualitative investigation depict four patterned themes that represent the experience of shame among these students. Although these themes will be fully described in forthcoming publications, they are summarized as follows:

Theme 1 – Negotiating the global identity in engineering*:* The participants of the study connected with their professional identities as engineering students (or engineers) in complex ways that they negotiated in order to form global identities. On one hand, they aspired to be engineers, connecting their participation in the profession as something that signified their overall individual importance to society. On the other hand, they were motivated to distinguish their own identities from features of engineering that they perceived to be undesirable (e.g., socially awkward, imbalanced in career pursuits).

Theme 2 – Encountering professional shame in threats to the global identity in engineering*:* Having established a complex sense of global identity through their activity in engineering education, the participants also encountered threats to these identities, which led to their experiences of shame. Specifically, they encountered threats to their identities when failing to achieve a perceived standard in intellectual performances (i.e., grades, design contests). They also felt threats to their identities when they felt as if they were not seen as achieving a rigorous work ethic. Finally, they encountered threats to identity when imagining, with anxiety, the perceived gap between the theoretical activities of their education and the envisioned pragmatic realities of their future workplaces.

Additionally, we also noted that the participants tended to feel shame when non-engineering peers would heap praise on them as engineers, a remarkably commonplace yet profound experience in each of our participants. While they recognized that their peers were well-intentioned, they tended to leave these mainstay moments feeling socially disconnected from their interpersonal relationships.

Theme 3 – Lending credibility to the shame experience through maladaptive responses*:* While Theme 2 describes the ways that participants experienced shame in engineering contexts, Theme 3 & 4 describe the patterned responses of the participants. In the present theme, we noted responses that only serve to perpetuate shame—both for the individual who experienced it and (likely) for the social environment that encompassed that individual. In particular, we found that the participants typically responded to shame in ways that tended to magnify the social expectations that they felt as if they had failed. For example, the participants often sought to hide their shame by not disclosing it to others and often by physically removing themselves from a setting in which they felt the shame. Additionally, the participants would seek to "move on"—and quickly—disengaging from the emotional experience altogether.

In this theme, we also identified two more patterns that might be connected to White, male engineering students in particular. First, when the participants experienced shame, they tended to externalize their emotion into targeting others who failed the same (or similar) expectations. Second, the participants tended to identify ways that they experienced pride in engineering, that is an emotion derived from positive evaluations of the self via social comparison. In both of

these patterns, the participants created scenarios where they were more prone to feel shame because they were amplifying the social expectations that they had felt as engineering students. However, beyond only feeling the failure to meet these expectations within themselves, they also considered how others were also failing to meet these expectations. In this regard, it is likely that shame, as experienced by an individual, motivated behaviors that caused others to feel shame.

***Theme 4 – Repairing the self through cognitive reconstructions and social connections**:* Although the participants engaged in maladaptive behavior when attempting to resolve their experiences of shame, they also engaged in reparative behavior. These patterns were encouraging to find as they indicate latent processes that students might have to positively respond to shame experiences. First, the participants cognitively reconstructed the event that led to shame. They would, for example, reframe the explanation of how they failed to meet a certain expectation to be focused on behaviors (e.g., I *did* poorly on an exam) rather than an overall devaluation of their self (e.g., *I* did poorly on an exam). Additionally, the participants would reconstruct the overall significance of the expectation, realizing that, perhaps, the weight of the expectations were not as heavy as they originally had felt. Finally, the participants tended to connect to others, making known their shame to classmates, professors, or parents. By making known their shame to others, they reduced the potency of the emotion by allowing themselves to be relationally connected to others in their environment.

Connections to Ethnographic Focus Groups: As might be readily recognized in the summary of the IPA findings, shame is an emotion that is potent alongside sociocultural expectations related to identity. While the emotional construct is certainly experienced within individuals, the sociocultural expectations that are perceived are also co-created by collective groups. The ethnographic analysis of the focus groups allows us to better see how engineering students co-create these social expectations that then create powerful moments of shame within individuals. Synthesizing the findings from both of these qualitative methods, which will occur over the final year of the investigation, will enable us to develop a comprehensive theoretical model of how shame undergirds processes of inclusion, exclusion, and socialization in engineering contexts.

Broader Significance: These findings are encouraging as they provide insight into the reparative and maladaptive processes that individuals might enact in order to meet their own emotional needs. By understanding how students maladaptively repair their identities in experiencing shame, we might gain better insight into mechanisms that lead to harmful processes which marginalize others. Additionally, by understanding students' latent capacity to process shame in ways that are healthy for them (and others), we might strategically promote templates for students to recognize and reframe shame as they develop in their identities.

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