

Exploring Shame in Engineering Education

James L. Huff¹ & Jeremiah Sullins²
Department of Engineering and Physics¹
Department of Behavioral Sciences²
Harding University
Searcy, Arkansas, USA

Nicola W. Sochacka³, Kathryn M. Youngblood³,
Kerby M. Wood³, Shari E. Miller⁴, &
Joachim Walther³
College of Engineering³
School of Social Work⁴
University of Georgia
Athens, Georgia, USA

Abstract—Individual experiences of inclusion or exclusion are increasingly recognized for their relevance in relation to attracting and retaining diverse students in engineering programs. Referring to this emerging body of work, this article explores the emotion of shame as a psychological and sociological construct that might underpin student experiences of inclusion, exclusion, or belonging in engineering majors. To begin unpacking this underexplored concept in the engineering context, we draw on literature from psychology that conceptualizes shame as a construct of emotion with dynamics that greatly affect an individual's perceived experience. We also examine sociological perspectives on shame that attend to how this emotion exists in an intersubjective reality between an individual and his or her social context. Finally, we review the sparse literature in engineering education that explicitly mentions shame and examine a larger body of literature that suggests how engineering student experiences that can be understood as phenomena related shame. This survey of the literature points to the importance of considering shame in engineering education and, in its synthesis, provides the theoretical basis for future empirical studies.

Keywords—shame, inclusion, emotions

I. INTRODUCTION

Um, when I first left [the civil engineering program], I thought that, you know, “nobody’s smarter than an engineer. I must be stupid.” You know, there’s that thought process because, you know, engineering was just so built up to me and was like, “This is the best thing possible, you know, [Midwestern University] engineering is the best, we’re the best people on campus, what are you doing at [Midwestern University] if you’re not an engineer?” And at first, I was like, “Oh my god, I can’t be this.” (Jenny [pseudonym], a second-semester sophomore)

Jenny voices a powerful yet nearly invisible emotion that, we contend, many students experience in the course of pursuing an engineering degree. In this excerpt, selected from an interview that was conducted in a separate study on engineering identity [1,2], the participant expresses how she felt a strong sense of *shame* leading up to her decision to transfer out of the civil engineering major.

To some, Jenny’s quote might appear to be an unusual or embellished representation of how many students emotionally

experience aspects of their engineering education. But a growing body of engineering education research suggests that similar emotional phenomena could be related to how persons feel included (or not) within institutional structures of engineering. Much of this research attends to two broad categories. First, several informative studies have thoughtfully unpacked the experiences of engineering students belonging to specific social groups as defined by gender, race, or other demographics, thereby making these experiences visible to engineering educators [3-5]. Other studies have critically evaluated the culture of engineering institutions (i.e., workplaces, degree programs) in order to promote more inclusive structures toward specific social groups [6-8]. This body of research highlights a need to investigate psychological and sociological perspectives of emotion that underpin student experiences within engineering degree programs.

In this work-in-progress paper, therefore, we explore how shame, as a psychological and sociological construct, might relate to forms of inclusion and exclusion in engineering. To examine this relationship between shame and student experiences and feelings of inclusion, exclusion or belonging, we review literature related to shame in multiple disciplinary domains. First, in order to establish a theoretical understanding of shame, we discuss psychological and sociological literature related to this phenomenon. Second, we examine research in engineering education that has indirectly approached the topic of shame, including prior work that has pointed to the role of this emotion in hindering efforts of institutional inclusivity.

We conclude this work-in-progress paper by considering how shame might affect efforts to promote inclusivity in engineering programs. We also discuss, based on extant research, how these programs might instead create cultures of resilience and inclusion to help students overcome their experiences of shame. This paper represents the first phase of a study that is intended to qualitatively investigate experiences and institutional cultures of shame in engineering education.

II. LITERATURE REVIEW: SHAME IN PSYCHOLOGY AND SOCIOLOGY

Though psychological research paints a nuanced picture of shame, some clear definitional patterns emerge across existing literature. Psychologist Helen Block Lewis

described shame as a strikingly painful, self-conscious emotion that involves a global devaluation of the self [9-10]. In her grounded theory investigation, Van Vliet conceptualized shame “as an assault on the self, where the individual’s self-concept, social connection, and sense of power and control come under attack” (p. 233) [11]. Wong and Tsai further describe that shame “is associated with the fear of exposing one’s defective self to others” (p. 210) [12].

Collectively, prior literature in psychology has established a consistent framework to understand shame. Feelings of shame are triggered when a person perceives or imagines possible negative evaluations from others. More specifically, perceived expectations of others are subjectively constructed from the social setting and, in turn, internalized as a standard for equally subjective, oftentimes harsh, and self-defeating judgments of one’s own ability, standing, acceptance by, or belonging to the social group [10, 13]. In this way, shame leads to feelings of powerlessness and isolation [10, 11, 13]. The person who feels shame is motivated with “the desire to hide, escape, or strike back” (p. 25) [10]. Additionally, when feeling shame, one’s sense of identity is fractured into split forms of self. One form of self adopts the role of a critical observer, while the other self is observed and subjected to an attack on their sense of identity [9, 10].

Psychological theory on shame is best understood when compared and contrasted with guilt, a related but distinct emotional construct [9, 10, 12]. Both shame and guilt are characterized as self-conscious emotions that are related to situations where one feels negatively evaluated. However, they are notably different in relation to the focus that accompanies each of them. Whereas shame involves a negative focus on oneself, the experience of guilt causes one to focus on specific actions [10]. For example, an engineering student who receives a failing score on an exam might feel *shame* if he perceives this event as threatening to his sense of self (i.e., “I am not smart.” or “I do not belong in this engineering program.”). In contrast, a student in the same situation might feel *guilt* if she focuses on her behaviors (i.e., “I procrastinated my studying” or “I wish I had sought tutoring before the exam.”). This scenario is somewhat oversimplified as it does not account for how individual differences might explain how two students differentiate the same situation. However, we use this example to highlight important theoretical distinctions between shame and guilt. By experiencing guilt, the latter student might be motivated to seek reparative actions to improve her situation. However, the former student, through his experience of shame, would be motivated to actions of hiding (e.g., by not seeking help [27]), escaping (e.g., by withdrawing from the course or program), or externalizing his pain (e.g., by blaming the course instructor) [10].

Although psychological theory on shame might help us understand the individual and internal experience of

shame, this emotion does not exist in a social vacuum. Indeed, sociologist Thomas Scheff conceptualizes shame as an emotion that results from “a threat to the social bond” (p. 255) [14]. In other words, from Scheff’s sociological perspective, shame broadly encompasses the interaction between a society’s messages toward an individual and the individual’s emotional response toward these messages. Findings from marketing research would align with this framework of shame. Recent studies have found that, when presented with a message intended to influence behavior through inducing shame, consumers do not respond with the intended behavior change. Rather, reacting in shame, they defensively process the information and negate the message in order to protect the self [15, 16].

With a coupled sociological and psychological perspective of shame, we revisit Jenny’s experience of leaving the civil engineering program. She likely felt, in part, an internal experience of shame (i.e., “I must be stupid”) that aligned with the psychological frameworks that we earlier discussed. However, she goes on to describe how “engineering was so built up to” her. And she portrays this perceived view of engineering as a direct message from her unspecified social world: “This is the best thing possible, you know, [Midwestern University] engineering is the best . . .” In this regard, shame could be understood as being induced from messages in Jenny’s social world, i.e., her civil engineering degree program.

In summary, shame might be robustly understood as both a psychological and a sociological construct. In the context of engineering education, then, we might understand shame as both a phenomenon that can be experienced by individual actors (e.g., students, faculty, practicing engineers) and as threats to social bonds that are fostered by institutional and informal structures. As we review in the next section, there is a dearth of research on shame in engineering education. However, several studies related to emotion, inclusivity, and ethics in engineering education point to the relevance of studying shame.

III. LITERATURE REVIEW: SHAME IN EDUCATION RESEARCH

Shame has been discussed explicitly in engineering education literature only in very limited cases. We have found that it is referenced in a study on academic dishonesty, alongside guilt, as part of self-reported hesitations that engineering students have when deciding whether or not to engage in academic dishonesty [17]. While this study on academic dishonesty generated strong knowledge claims and did not claim a specific focus on the study of shame, the operationalized understanding shame and guilt as nearly synonymous constructs does not align with earlier reviewed literature in psychology [10]. Moreover, we have found shame to not be directly examined in other studies within engineering education research. Thus, the dearth of investigations in engineering contexts that directly examine shame, combined with how it is understood in the one study on academic dishonesty [17], suggest the lack of unified

theory and thorough study of shame within engineering education research.

Shame, along with other emotional constructs, have been studied in the field of educational research more broadly. For example, the Achievement Emotion Questionnaire, an extensive survey developed by researchers to gauge the emotional experiences of students as related to their academic success, includes shame as one of the dozen emotions measured. In the broader theory of achievement emotions, shame is understood as a negative activating outcome emotion: this defines shame as a retrospective (outcome) emotion associated with personal failure (negative) that drives students to some sort of reactive response (activating). Unlike negative, deactivating emotions (e.g., hopelessness), which are known to be detrimental to student learning, negative activating emotions like shame and anxiety promote more complex responses [18]. Shame can, for example, “undermine intrinsic motivation, but can [also] induce strong extrinsic motivation to invest effort to avoid failure, implying that the effects on students’ overall motivation to learn and invest effort need not be negative.” (p. 38) [19]. Pekrun also suggests that competitive experiences in the academic world can cause students to experience greater degrees of shame: “if these learning environments represent too much of a challenge for the individual student, or provide unfavorable social comparison as provoked by cooperating with gifted peers, control appraisals can suffer, and negative emotions like anxiety, hopelessness, and shame can be induced” (335) [18]. Applications of this method to assess student emotional experiences in engineering are rather sparse, though the effectiveness of the AEQ to study student emotions was tested on a group of engineering students in Buenos Aires, Argentina. The study successfully identified experiences of shame among the 450 engineering students surveyed, and further research will look to explore emotions in relation to engineering students’ learning processes [20].

Most references to shame in engineering education literature are more implicit than the extensive studies on student emotional states that have occurred in other disciplines. For example, in studies on retaining diverse groups of students in engineering programs, feelings of marginalization are regarded as important factors that explain why some students from underrepresented social groups either leave or struggle in the engineering field [3, 21]. While these studies do not make direct mention of shame, the emotional experiences of the students interviewed in these studies might reasonably be interpreted as an experience of this emotional construct. As the multi-minority female student interviewed by Foor, Walden, and Trytten said in describing her experiences with engineering education, “I just wish that I belonged more in this whole engineering group, with the students and the teachers. I never got that feeling. It might be me, I don’t know” (p. 104) [3]. Notably, the student in this research attributes her lack of belonging in engineering to a negative evaluation of her sense of self (i.e., “It might be me”), aligning with our understanding of how shame is experienced.

Emerging work on stereotype threat also seems to tie this phenomenon to underlying emotional experiences of shame. Stereotype threat, the fear that one will be judged negatively due to a stereotype about one’s group, is essentially an

internalized fear of aligning with negative public expectations. Stereotype threat has been shown to have negative effects on women’s performance on math tests when they are told their abilities are less than those of their male counterparts [21], which seems to point to the latent potential for shame to influence students’ academic success.

Other emerging work examines self-efficacy as a construct to explain why some engineering students are successful and some leave their programs for perceived “easier” majors. Self-efficacy, as students’ beliefs in their ability and potential to succeed, is understood as a major factor in student retention [22-24]. Educational studies on student learning more broadly have found a negative correlation between shame and self-efficacy [10, 25], a potential link that further corroborates shame as an important, if relatively unstudied, factor in student experiences in engineering educational institutions.

IV. FUTURE DIRECTIONS

While existing literature in engineering education certainly suggests the relevance of examining shame, there is a clear gap in how we understand the individual experiences and institutional cultures of shame. Thus, in order to address this gap, we are at the beginning stages of a research project that seeks to qualitatively examine how engineering students experience shame and how these lived experiences interact with institutional messages.

However, while this study might generate novel theoretical insights, we are committed to this investigation for reasons of broader significance. It is well known that structures of engineering, such as degree programs and workplaces, are characterized by a conspicuous exclusion to those who do not align with the dominant White, male images of engineering [6, 7]. While considerable research has made us aware of how engineering students from underrepresented social groups navigate these institutional cultures, we have not fully considered how inclusivity (or lack thereof) might relate to well-established research in shame.

Scheff noted that shame is the “master emotion of everyday life but usually invisible in modern society because of taboo” (p. 239) [14]. Similarly, we believe that shame—while perhaps “invisible”—is most likely a pervasive experience in the professional formation of engineers who are often met with implicit and explicit messages of meeting high performance standards. By examining how engineering education programs might unintentionally generate messages of shame, we seek to provide fresh insight on how these institutional structures could be inclusive of persons that are historically underrepresented in engineering.

Further, by studying internal experiences of shame, we may better understand how to cultivate *resilience* within our students, or more broadly, bring more awareness on how processes of healthy emotional regulation might relate to professional formation. Existing research proposes that resilience, or “the ability to maintain a stable equilibrium” (p. 20) [26], plays an important role in one’s journey to overcome negative effects of shame [11, 13]. While conversations of

resilience might be a well-received contribution to engineering education practice, we cannot advance this desirable outcome unless we first understand how shame manifests within engineering programs and students. The overview of the literature we present in this paper represents our first step in framing an empirical investigation in this area.

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