

Negotiating Identity as a Response to Shame: A Study of Shame within an Experience as a Woman in Engineering

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Negotiating Identity as a Response to Shame: A Study of Shame within an Experience as a Woman in Engineering

Abstract: This research paper presents the findings of an interpretative phenomenological analysis (IPA) case study of the experience of shame in a woman engineering student. Our overarching research question that framed this study was: How do woman students with multiple salient identities psychologically experience shame in the context of engineering education? We present findings derived from in-depth analysis of an interview with a single case: A White, female student-athlete who majored in mechanical engineering at a private, liberal arts university (pseudonym: Nicole). We selected Nicole as a case in order to critically examine the tensions experienced among multiple salient identities in women engineering students. The findings demonstrate how the study participant internally negotiated the expectations of others with her own self-concept. That is to say, in reaction to a shame experience, the participant evaluated and often adjusted the value she ascribed to the expectations of others and the ways in which those expectations fit into her core identity. Overall, the findings provide a sensitive description with which connections can be forged between broader discussions of engineering education and how cultural expectations manifest within the lived experience of the individual student.

Introduction

So I think I failed making my pen holder like two times. . . I had to restart. I was like, “. . . No one else made this mistake, but of course, I’m the one who does it.” People would make jokes, and my professors make jokes. It’s all in good fun and I definitely don’t take it the way I used to. They’re like, “Come on, [Nicole], . . . why would [you] do that?” I’m like, “Well, I didn’t know any better. How am I supposed to know not do that?” I guess any time I have to go to the [engineering workshop], which has become a lot, I walk in there and I automatically feel like the high schoolers in there have more experience in there than I do. I just feel like, “Ugh—Can I go to back to my classroom where I can write an equation down?”

The above quote displays Nicole’s experiential distress in negotiating internal expectations, which was guided by her engineering identity and evaluations based on the expectations of others. In this narrative, Nicole experienced a moment of *shame*, a pervasive phenomenon within engineering education that lacks explorative depth within existing research. Within this one experience of negative self-evaluation, one can easily see how the emotional experience of shame has a broad impact on engineering education. In an engineering workshop, when assigned to make a pen holder in the lab portion of the class, failure results in deeper feelings of failure within the education system (“but of course, I’m the one who does it”) and, as a classical marker of shame, creates a desire to hide from the new experience (“Ugh—Can I go to back to my classroom where I can write an equation down?”).

In the present study, we define shame to be the socio-psychological integration between cultural expectations and an individual’s internal evaluations of how they meet these expectations [1-5]. This operational definition synthesizes extant understandings of shame from both psychological and sociological perspectives. Specifically, as oriented toward individual psychological experiences, shame is understood to be a strikingly painful emotion that arises from holistic self-devaluations in relation to social expectations [2,3]. From sociological perspectives, individual experiences of shame are understood to be related to threats to interpersonal relationships [4,5]. From these perspectives, it is easily seen how this phenomenon is pervasive in all elements of the

engineering discipline which prides itself on rigor. Even more, the understanding from outside the discipline of engineers as possessing some sort of unattainable intelligence further proliferates high expectations that lead to a pervasive experience of shame. Although the present study decisively explores psychological features of shame in the case of a woman engineering student, we recognize that this construct operates in relation to Nicole's intrapersonal domains and in her engineering social environment. At the same time, as will be clearly evidenced later in the data presentation, Nicole's experience of shame within the context of engineering is somewhat specific to her gender-identity. The logic of this specificity is backed up by theoretical understanding which is more thoroughly documented in the following section addressing multiple identities. Knowledge of practice and theory both claim that the experience of a woman engineering student is different than that of a man and thus, it logically follows that her experience of shame within the context of engineering will be as well. There is both a sense in which Nicole's experience of shame is lived by her and a sense in which her engineering environment establishes the context for her to live in the experience of shame. Our previous research [1,6,7] has provided a more extensive review of how shame has been examined in prior education research.

With this individual-in-environment connection in mind, we chose to examine Nicole's case of experiencing shame within the context of engineering education. Nicole, who identifies as a White woman, was a junior-level mechanical engineering student at the time of our interview. She also holds an identity as a student-athlete at the university. These multiple identities are present in different social situations in varying degrees. It is important to note, however, that while these identities have distinct features of their own, they ought to also be thought of as cohesive. Further, at the time of the interview, Nicole was positioned to discuss her initial formations of engineering identity and how, through the educational process, those original formations have adapted to her current sense of self.

Background: Multiple Identities

Because shame involves the emotional experience in relation to one's individual sense of self-evaluation to social expectations, we contend that this phenomenon is related closely to processes that undergird identity formation in engineering education [8-13]. Prior identity research in engineering education has illuminated the internal processes that engineering students employ when making sense of their own identities. Much of this research is written with the underlying aim of diverse individuals developing an informed commitment to their identities as engineers [14] and thus enhance the engineering profession through their participation. Although the authors personally resonate with the goal of a diverse engineering workforce, in the present investigation, we set aside the presupposition that achieving an engineering identity is something that the participant should desire. Instead, we are oriented to understand the mechanisms of identity formation that promote well-being and psychological health.

Consequently, we investigated moments of shame in Nicole in order to critically examine how she formulates her identity—both in and beyond her professional domain of being an engineering student. Taking this perspective recognizes that she personally experienced multiple domains of identity, beyond that of being an engineering student or that of being a woman. Prior research has often examined the complex processes that lie at the nexus of gender and professional identities for women engineers and women engineering students [15-17]. Certainly, we attended to these critical identities in the present study, but we also engaged multiple forms of identity that individuals recognize to be salient. To do so, we considered the lens of *contextual*

identity integration, which Syed and McLean [18] defined to involve “the fit of multiple identity domains that individuals either consider important to who they are, or are forced to deal with due to social-structural factors” (p. 111). This framework suggests that individuals engage with their social environment where they both choose salient identities and are left with no choice on certain identities. It also suggests that individuals are motivated to develop some cohesion among multiple identities in ways that connect domain-specific identities (e.g., engineering student) with identities that are more global.

Research Questions and Methods

Against the theoretical backdrop of contextual identity integration, we investigated the overarching research question “How do women students with multiple salient identities psychologically experience shame in the context of engineering education?” We approached the study using interpretative phenomenological analysis (IPA) to carefully examine the nuances of the contextual embodiment of shame. IPA is a qualitative research method that closely examines the experience within the person of certain phenomena while maintaining contextual sensitivity and theoretical coherency [19-21]. In the context of the present study, using IPA enabled close examination of the participant’s lived experience of shame so that connections could be forged between the authentic experience of the individual and extant psychological theory. This study was approved by the IRB offices of both the authors and the study participant.

Position of authors in relation to study

An IPA study is delineated as a comprehensive process of interpretation that investigators use to generate knowledge claims that are true to the data. The role of the investigators is to make sense of how individuals are making sense of a particular lived experience within the studied phenomenon. Thus, in this study, we analyzed how Nicole understood her experience of shame in the context of her role as a mechanical engineering student.

However, as investigators, we varied in our closeness to Nicole’s overall experience as an engineering major and in our experience with using IPA. Thus, we make explicit our respective positions in relation to the study. Mackenzie, James and Benjamin are all members of the same research lab, directed by James. The research interview was conducted by Benjamin and Mackenzie, neither of whom had met Nicole previously. Mackenzie led all efforts related to data analysis, under the close mentoring and supervision of James, who is well-versed in conducting and mentoring IPA research. Nicola and Joachim contributed to the theoretical framing and provided critical questioning and insights on the findings from this study.

Data collection

We began the data collection by sending an online sampling survey to all junior mechanical engineering majors at a private, liberal-arts university. The survey requested that respondents identify their race and gender (open-ended items) and provide a long-form response to two questions: (1) What types of things do you believe are expected of you as an engineering major? and (2) Can you describe a time that you felt you did not meet these expectations? Additionally, they were asked to provide their email address if they consented to the possibility of being interviewed for our project. Nicole was one of 21 individuals who responded to this sampling survey to indicate her willingness to participate in the study.

Mackenzie and Benjamin jointly interviewed Nicole at a location on her campus. Benjamin adopted a leading role in conducting the interview while Mackenzie asked questions in line with

the study's objectives and within the flow of the interview. Benjamin and Mackenzie practiced these interviewer roles in an earlier, unanalyzed pilot interview to ensure that their speaking and presence was coordinated in a way that made the interview a welcome and empowering space for research participants. In the interview, a semi-structured approach to determining the participant's overall experience of shame in engineering was adopted. While guided by a general protocol, data was elicited related to Nicole's overall self-concept, social expectations of what it meant to be an engineer, and the individual responses to these expectations. The interviewers ensured that the participant guided the interview and focused each of promptings to enriched descriptions of episodes where she indicated emotions related to shame. Toward the end of the interview, the explicit focus of our study and elaborated on how we were defining shame was disclosed and opportunity was given for Nicole to comment on the interview based on her understanding of experiential shame and to share any new insights. The interview lasted one hundred minutes.

Data analysis

Although Nicole's interview was professionally transcribed, Mackenzie began her role as primary data analyst in the study by completing a second iteration of transcribing the audio file to ensure that the authenticity of the interview event was well-represented in the transcript. In accord with best practices of IPA research, she then completed thorough annotations of the transcript, noting descriptive, linguistic, and conceptual comments throughout [19,20].

After performing this level of analysis, designed to critically engage her with Nicole's experiences in shame, Mackenzie then annotated emerging themes, which captured connections between Nicole's contextual experience and broader theoretical models found in psychological literature. From this analysis, Mackenzie generated fifty-five emerging themes, which are connected directly to the text and then organized those themes based on their contextual similarity into overarching themes. This process of data analysis is more thoroughly documented elsewhere [20]. Under the close mentorship of James, Mackenzie completed multiple in-depth, analytical passes through the transcript, with each iteration prioritizing a different feature of the sense-making process of IPA. Finally, all of the paper's authors contributed to interpreting and connecting the findings to extant literature in psychology and engineering education research.

Case Selection

We chose to present Nicole's case of shame as a mechanical engineering student because it highlights the reality and relevance to broader research regarding the complex processes of identity formation through education that women engineering students undergo. Nicole identified as a high-performing student who decisively identified as an engineering student at the time of the interview. Additionally, she identified as a person with salient connections to her family, her faith, and her intercollegiate sports team. This made her case all the more important for two reasons. First, due to her high performance in engineering coursework activities, her case brings recognition that deep processes of shame do not exclusively occur within women students who show clear signs of self-doubts or thoughts of leaving an engineering program. Rather, shame occurs in all women engineering students, even those who present as successful and resilient. By studying a case like Nicole's, we are able to better make broader claims that cannot be as easily dismissed as extenuating circumstances.

Second, we sought to interview Nicole because she provided an ostensible case of how a woman in engineering would experience shame among salient identities in multiple contexts. She

demonstrated strong identity commitment in multiple domains (e.g., family, sports, engineering). However, as the findings illuminate, Nicole's experience of shame amid her multiple salient identities did not occur with her multiple domains of identity clearly and consistently delineated. Rather, she framed her participation in multiple contexts as cohesive to features of her identity that she framed to be core to understanding her global sense of self. It is important to note here that the generalizability of a qualitative case study is distinct from that of quantitative research. The idiographic findings of the present offer generalizability in that it describes a "worldly and relational" phenomenon [19]. The generalizable value of qualitative case study research is that it offers a conceptualization that is nuanced in a way that more wholly reflects what it means to be a person when compared to the compartmentalized conceptualization of the quantitatively researched individual. We maintain that this case provides transferrable insight into considerations of the role that shame plays among individuals who seek cohesion across identities in multiple domains.

Findings

In order to cohesively and comprehensibly present Nicole's rich experience of the shame experience, the findings of this study have been delineated in five themes presented in Table 1 below. First is a description of characteristics of Nicole's identity to set the basis for her internal expectations. Second, we presented Nicole's internal dialogue of distress as her identity is met with evaluations of cultural expectations. Third, we observed Nicole's reaction to this distressed characterized by the emotional experience of shame. Fourth, the alleviation of this distress by negotiating internal expectations guided by identity or the importance previously given to cultural expectations. Fifth is a presentation of this process, as described by the previous themes, intensified within the context of being a woman engineer.

Theme 1: Identifying as a "people pleaser"

Nicole demonstrated a strong identification as a "people pleaser". Her initial descriptions of self-centered around her positioning to others. Understanding is a critical first step in the findings of this research because it heavily influences how Nicole relates to the expectations of others, and thus, experiences shame. The presence of the people-pleasing identity led to a high awareness of others, their expectations and her own evaluations of how she met those expectations. Rooted in the people-pleasing identity, she even sourced this part of her identity from what individuals say about her: "Like I said, I named, I mean, when I think about myself, I go to the thing that people point out most about me, and it's that I'm a people-pleaser."

Further, this awareness of others' expectations and a core desire to meet them were experienced as primary determinants for cognitions and behaviors. In an experience of failure, the initial thoughts were about the assessments of others. For example, describing a time where she failed an exam, she stated:

But I definitely, like that was the first thing that hit me when I saw my test. I saw the red, I was like, "He probably is so upset with me." He wasn't. He knows that . . . I have a lot going on. I definitely put more expectations in my head than they have for me. Um—but I do feel different as one of the only females in the class because I do feel like I'm held to a higher standard. Whether I am or not, I'm probably not. But I do feel like I've set a standard. I don't want to fall short of it.

Table 1: Themes and Example Quotes

Theme 1: Identifying as a people pleaser

But I definitely, like that was the first thing that hit me when I saw my test. I saw the red, I was like, “He probably is so upset with me.” He wasn’t. He knows that we have a—I have a lot going on. I definitely put more expectations in my head than they have for me. . . I do feel different as one of the only females in the class because I do feel like I’m held to a higher standard. . . I don’t want to fall short of it. (lines 1062 – 1072)

I usually set my expectation that I want to—I will honestly set them too high sometimes and know that I’m probably not going to meet them. But I think it’s shoot for the moon and you’ll land on the star—No. Shoot for the stars and you’ll land on the moon? One of the two, one of those. I’ve always kind of thought that way as you set your expectations really high, and if you fall short, well, you’re still going to do a really good job. (lines 766 – 775)

Theme 2: Experiencing internal conflict through the “people-pleasing” identity

I was like, “What am I doing here?” But I definitely didn’t want to let down my teammates . . . I think more than anything, me being a people-pleaser is the reason I stayed in engineering more than for [intercollegiate sports team]. But I did consider transferring and not playing [sports] and staying with engineering. (lines 397 – 413)

They’re like, “It’s okay if you get a B.” I’m like, “No, it’s not.” But it is. It’s very much okay. (line 111-113)

Theme 3: Reacting to dissonance through a shame experience

I felt bad for feeling bad because I know that there are people that have it so—They’re in so much worse situations with their grades. They’re trying to get jobs, but they have too low of a GPA or they’re trying to pass a class. I’m over here upset about a B . . . I know how ridiculous that sounds. That’s why I try to keep them as internal thoughts. I don’t want everyone else to hate me when I say them out loud I don’t like talking about it because it does make me feel bad for feeling bad, if that makes sense. (lines 926 – 937)

But I remember walking down the stairs. I walked past the fountain. I had my head down because I had tears in my eyes. I was like, “I need to get back to the room.” I walked with my head down and did not want to talk to anyone. (lines 976 – 981)

Theme 4: Alleviating the shame experience by negotiating a change of identity or relation to expectations

I remember texting one of the guys in my class. I was like, ‘I got a 57.’ And he was like--he is like the smartest person I know. He was like, ‘I didn’t do well either.’ He was like, ‘I don’t think anyone did.’ He was like, ‘Maybe he’ll curve it.’ (lines 966 – 971)

So I think I failed making my pen holder like two times. . . So I had to restart. I was like, “Oh my gosh. No one else made this mistake, but of course, I’m the one who does it.” People would make jokes, and my professors make jokes. It’s all in good fun and I definitely don’t take it the way I used to. (lines 1725 – 1736)

I’m not going to overstress about school. And that only came from me oversteering about school so many times. And so just realizing that it was not worth it. If I would’ve gotten a B a couple semesters ago, it probably would’ve been better than the stress I put myself through and maybe the years I lost on my life. (lines 1882 – 1889)

Theme 5: Experiencing gender identity as primary in negotiations of identity and expectations

When I started in engineering, some boys did not know how to talk to me in the class. I was like, ‘Guys.’ I told them, I said, ‘Treat me like a boy because we cannot have a conversation.’ . . . But a lot of them didn’t know how to take me like—I remember some kind of made sexist jokes freshman year. I didn’t know them well enough to know that they were joking.” (lines 542 – 555)

Honestly, I just felt more pressure on myself, like well I’m standing for all girls in engineering. . . I have to do better. And I definitely did put more pressure on myself. I mean, I still do. I feel like a responsibility to represent—to try and represent women in engineering as well as I can, which is not a bad thing. I don’t think—it can be, and I definitely put a lot of pressure on myself for that. (lines 599 – 608)

Here, the professor's apparent emotional assessment and her standing with him was the first concern. Those concerns are then immediately related back to the expectations she perceived others held for her as a student and, especially, as a female engineering student. The primacy of these cognitions, driven by the people-pleasing desire and perceived expectations, then led to setting a higher standard for herself. Because she perceived expectations and felt pressure to meet them, she set a higher standard for herself and Nicole initiated behaviors in order to enact and preserve the people-pleasing identity. Even with understanding that the expectations she held were likely not held by others and were too strenuous, the people-pleasing identity presented itself in the experience of failure as a personal falling short in the presence of others.

Theme 2: Experiencing internal conflict through the “people pleaser” identity

Nicole's desire to meet the expectations of others demonstrated as an identity feature that was dominant over other features. This is exhibited as she made choices that, though they conflicted with other pieces of the self, satisfied what she believed would best fit with what others expected of her. In discussion of her commitments as an engineering major and to playing intercollegiate sports, she disclosed her conflict of interests:

I was like, “What am I doing here?” But I definitely didn't want to let down my teammates... But to kind of get back to your question, I think more than anything, me being a people-pleaser is the reason I stayed in engineering more than for [intercollegiate sports team]. . . I did consider transferring (to another university) and not playing [intercollegiate sports team] and staying with engineering.

As, exhibited above, Nicole's reasoning for overcoming challenges to her engineering identity rather than giving up was primarily connected to her people-pleasing identity. Thus, as her engineering identity and people-pleasing nature were inextricably linked, the strength of that bond meant that challenges to one of either identity were challenges to the other. Internal conversations about these challenges exhibited the conflict Nicole experienced within these identities and expectations of others. External expectations of others were manifested in an internal voice that conflicted with the articulation of her identity. Nicole disclosed internal conversations such as: “They're like, ‘It's okay if you get a B’ I'm like, ‘No, it's not.’ But it is. It's very much okay.” Within Nicole's experience as an engineer, her perception of external expectations was challenged by the by a conflict between an identity that attempted to please others and the experience of not always being able to do so.

Theme 3: Reacting to dissonance through a shame experience

The discrepancy Nicole experienced between people pleasing identity and her perception of failure to meet expectations lead to an experience of shame. Nicole saw her failure to meet expectations as a deeply personal experience. Within this emotional experience, Nicole surveyed other's expectations for what she should feel. Nicole recounted frustration at moments in which others expected different emotional reactions than what she was experiencing. When well-intentioned others attempted to console her emotional experience by minimizing the failure she felt, she portrayed her frustration.

If people would tell me like, “It's not that big of a deal,” it would make me more angry. I was like, “But it's a big deal to me,” . . . I had that guarded response like no, it's a big deal to me. So you're not allowed to tell me that it's not important.

This frustration further developed into an assumption that her shame experience was another way in which she failed to meet the expectations of others. Since she was a high performing student, Nicole saw her experience as unwarranted. This “compounded failure” was exhibited in a compounded feeling of experiencing shame about experiencing shame.

I felt bad for feeling bad because I know that there are people . . . They're in so much worse situations with their grades. They're trying to get jobs, but they have too low of a GPA or they're trying to pass a class. I'm over here upset about a B.

This “feeling bad for feeling bad” intensified the shame experience. Nicole’s experience was marked by the classic hiding feature of shame. Within the previously discussed account of failing an exam, Nicole physically hid: “I had my head down because I had tears in my eyes. I was like, ‘I need to get back to the room.’ I walked with my head down and did not want to talk to anyone.” The hiding reaction is extended to the compounded shame experience in which, because she felt her shame experience was undue, she hid her emotional reactions. In her portrayal of the shame she felt about her disappointment in a grade that others considered satisfactory, Nicole stated: “I know how ridiculous that sounds. That’s why I try to keep them as internal thoughts. I don’t want everyone else to hate me when I say them out loud I don’t like talking about it because it does make me feel bad for feeling bad, if that makes sense.”

When Nicole hid her physical presence and emotional experiences from others, she distanced herself from others. Through this distancing, Nicole made it further difficult for others to engage with her and potentially lessen the negative experiences brought about by shame.

Theme 4: Alleviating the shame experience by negotiating a change of identity or relation to expectations

The hiding feature of the shame experience effectively inhibited Nicole from alleviation of the negative experiences by participation in relationship with others. Shame, because it is threatening to the social bond, is consequently alleviated by belonging. When others partook in what Nicole perceived as inadequacy, she was able to negotiate her status as normal which minimized the distress caused by shame. Positive feelings of inclusion negated the features of shame that was preying on images of exclusion. When explaining the nature of a negative evaluation, Nicole utilized social belonging as a justification for the failure:

I remember texting one of the guys in my class. I was like, “I got a 57.” And he . . . is like the smartest person I know. He was like, “I didn’t do well either.” He was like, “I don’t think anyone did.” He was like, “Maybe he’ll curve it.”

In fact, Nicole participated in an engineering community of peers built around failure to meet expectations within engineering. Bonding with others in engineering culture was created by common experiences with failure. Here, the experience of failure, following disclosure and discovery of mutual experience, was the uniting factor within the engineering community. Nicole’s communal experience was displayed in phrases like:

“Oh, that humbled me.” But really, I’m like, “Oh, that made me feel very dumb. I should’ve known that and I really didn’t.” . . . [O]ur joke is like, “Oh wow. That humbled me.” Really it’s like, “Oh no, I was not right in the way I was thinking.”

Within a community, failure was transformed into a humorous experience that was seen as a necessary part of the educational journey. This normalization allowed Nicole to, following a mistake, negotiate what she considered failure and an experience alleviate her experience of

shame. Aside from the community, however, when Nicole saw herself as alone in not meeting expectations, isolation enhanced the shame experience. Nicole's inner experience of isolation in failure led to deep shame as she recounted the incident of failing to make a pen holder, which was presented at the beginning of this paper. We revisit a portion of this excerpt here:

So I think I failed making my pen holder like two times. . . I had to restart. I was like, "Oh my gosh. No one else made this mistake, but of course, I'm the one who does it." People would make jokes, and my professors make jokes.

Nicole felt that she was the only one that had failed at the task given. This perception triggered verbalizations of past experiences where professors and peers had made comments about her mistakes. This instance was a demonstration that not only did Nicole feel ashamed of the current failure in the machine shop but also of every experience of failure she had had within her engineering education experience. This circumstance was a portrayal of how, through shame, isolation turned a single mistake to an overall sense of inadequacy in engineering.

Another solution to the tension caused by conflict of identity and expectations is an alteration of identity to be congruent with performance. Distress caused by failing to meet expectations when one identifies as a people-pleaser was sought to be alleviated by minimizing the importance of that identity feature. Getting a 4.0 was very important to Nicole until it was no longer possible. Her processing of the event is explained as: "But that was just some personal thing that I like—had. I wanted to graduate with a 4.0 and I was like, 'I can do it. I can graduate with 4.0.' And I didn't. And that's totally fine"

Nicole managed distress by negotiating how much importance she had previously given to her engineering performance in forming her identity. In discussing how she adapted to the pressures of meeting expectations of engineering culture, Nicole said:

My biggest thing was I'm not going to overstress about school. And that only came from me oversteering about school so many times. . . If I would've gotten a B a couple semesters ago, it probably would've been better than the stress I put myself through and maybe the years I lost on my life.

Prior to getting a "B" in a course, Nicole saw being a perfect student as a piece of her identity and earning anything less as an unwanted possibility. After earning the grade, she saw the experience as a positive element in her education and altered her behaviors to reflect engineering performance as less important to her overall identity.

Theme 5: Experiencing gender identity as primary in negotiations of identity and expectations

Challenges to engineering identity seemed to be especially potent to Nicole's identity as a woman engineer. Nicole experiences being a woman in engineering as something that has to be proven to others. She hesitates to voice any concerns about diversity in engineering. Recognition of the complexity of the issue is demonstrated in her words:

She was talking about how she was one of three girls in her class. I was like, "I'm one of two." I understand it's all about location also and . . . I do think in the South, it is still kind of a thing that women, I don't know, don't see themselves as engineers? If it doesn't interest you, then like I said, don't do it.

In discussions of the origins of her engineering identity, Nicole justified her choice with explanations that seem to be aimed at combating unspoken narratives that as a woman, she has to prove her choice. She uses the word “but” to strike blows to forge her place among the community as she says: “My parents always joke—or my dad makes jokes like, ‘I had two sons and my daughter chose engineering.’ But I liked math and I like science, more math than the science. But I do like both.”

Nicole fights to preserve her spot as an engineer while being a woman. In addition to feeling the need to justify her identity, the small population of women engineers lessens her ability to find belongingness. Nicole presents her response to this circumstance as she says:

Right now, like I said it is just me and one other in my graduating class here, which is kind of wild to me that it’s not more. That’s why I’m happy I participated in female STEM day. I helped lead that this year. I hope girls see that—and there are a lot of girls in the STEM major. It’s just engineering for some reason that it’s not very well, you know.

Nicole managed the need for belonging in a male dominated engineering culture in two ways. First, Nicole satisfied her need for belonging by negotiating her identity as a woman engineer to better fit within the surrounding culture. This is similar to the response seen earlier when she altered her academic goals to fit her current reality. When Nicole experienced conflict between satisfaction of her belonging need through meeting the expectations of others and her identity as a woman engineer, she negotiated to resolve tension. She depicted other’s response to her identity in this account:

When I started in engineering, some boys did not know how to talk to me in the class. I was like, “Guys.” I told them, I said, “Treat me like a boy because we cannot have a conversation.” Because they would look at me, they’re like, “Hey.” Then they’d run away. I’m like, “Human, I’m a human. It’s fine, really.” Now, obviously, like I said, I’m close with all of them. But I still like to give them a little grief on that at first. But a lot of them didn’t know how to take me like—I remember some kind of made sexist jokes freshman year. I didn’t know them well enough to know that they were joking. But I was like taken aback by it, like, “This is why women shouldn’t do engineering.” I was like, “Look, I have a brain. I can do whatever I choose to do.”

In Nicole’s experiences, when being a woman is not what the male engineering culture expected, she actively alters her identity presentation. In doing so, she raises their comfort level and cites that as the beginning of belonging in the group.

In addition to this response, Nicole’s belonging deficiency develops a strong desire to be representation for younger girls who might want to be engineers. She does not want mere scant numbers to scare off any girls who might want to be engineers. Thus, she has taken it as her own duty to ensure that girls feel they belong in engineering.

But I do think a lot of girls, either specifically in the South or just girls in general—if you don’t see something, it’s hard to see yourself doing it. If you don’t see someone, and not that girls can’t see men doing engineering and think, “Oh I could that.” But I think that is also helpful. I would’ve liked to talk to someone about it when I was younger. I want to be that girl for people. So when

girls come on visits, I'm like, "Text me if you need anything. If you have any questions—" I want to be that for them as well.

This self-prescribed duty of representation could become a burden on Nicole's experience within engineering. The pressures of showing young girls that engineering is an option develops into yet another expectation she must satisfy to maintain her identity.

Honestly, I just felt more pressure on myself, like well I'm standing for all girls in engineering. Since there's only two of us, I have to do better. And I definitely did put more pressure on myself. I mean, I still do. I feel like a responsibility to . . . try and represent women in engineering as well as I can, which is not a bad thing. I don't think—it can be, and I definitely put a lot of pressure on myself for that.

This added expectation has the implication that when those expectations were not met, shame threatened not only her engineering identity, but also her identity as a woman engineer.

Discussion

Nicole's case provides critical insight into the experience of shame within a woman engineering student. Her data creates a detailed narrative of how the emotional experience of shame presents within a real student, outside of theory. This IPA study, true to the methodology, is intended to make connections of theory concerning engineering education, gender identity and shame with the real ways that shame is experienced within the student [19]. The five themes presented above present a picture of the interaction between engineering culture and the individual student.

Nicole's experience of shame follows a cognitive path that is valuable for those in the engineering community who wish to see students succeed. Navigation of shame experiences is closely linked within the literature to student's self-efficacy [22-25]. Students who continually experience pervasive shame within their academic and professional careers display inhibited self-efficacy beliefs that are characterized by a lack of motivation and upward movement. The themes described in this paper outline a process of comparison of internal expectations of identity and perceived external expectations. When these concepts do not align, Nicole experiences shame.

Nicole's management process of shame is much like many educators' reflective reactions to what must be done about the issue. Many think that the solution to conflict between internal and external expectations is to change one or both so that they match one another. It is important here to recognize that shame is created by incongruence between two forces. Thus, in the experience of shame, neither expectations or identity cause distress but rather the interaction of the two. In Nicole's case, she recognizes that failure to meet the same external expectations causes more distress for her than it might lead to in others because of her people pleasing identity. Ergo, because shame occurs in the interaction, resolution lies within focus on the process of shame, not negotiation of any one force.

Negotiation of the self or what is to be expected of students does no good in resolving the negative effects shame brings to education. To change either is like attempting to make a copy of a painting that is ever changing. This process, however well intentioned, leaves students feeling like they can never do right no matter what, all while compromising the very identity that is essential in the formation of the professionals that educators so desire. Instead we suggest that the focus should not be on attempting to prevent students from experiencing negative evaluations

of self, but instead on teaching positive ways to maneuver the experience that spur, rather than inhibit, motivation and progress.

The incongruence experienced by Nicole is the center point of the shame experience within this case. True to the operational definition, which was set long before data collection or interpretation, shame as experienced within this case is centered around the evaluation within the self according to identity and perceived expectations. When these concepts of self are mismatched, shame is experienced and resolution to distress is sought.

It is clear through the data that the effects of unmanaged shame, namely isolation, are harmful to the educational experience. In their poignant examination of a single marginalized student in engineering, Foor and colleagues highlighted the necessity for belonging. Nicole's case serves as an example of the harmful effects of isolation [26]. When experiencing shame, Nicole described hiding physically and emotionally from the entirety of engineering. Research on shame indicates that an individual experiences the desire to hide, escape, or strike back [3]. Most importantly, this hiding causes withdrawal from the belonging that is critical for resolution of distress. Belonging provides Nicole with the ability to negotiate the differences between identity and expectations. When an individual can access connections with others, the cognitive process of shame is interrupted. Without that provision, Nicole exists in shame-filled distress. These processes inhibit the individual student from reaching their potential in engineering education.

Through the findings we see many sections of Nicole's identity as an engineer, a woman, and a student athlete. Since shame is situated within the social context [5], no threat to the social bond is above the effects of shame. As research suggests, individuals are motivated to organize their multiple identities into a holistic self, these parts form her global self and no measurement to expectation is separate from her identity [18]. That is to say that engineering expectations do not simply affect engineering identity. The whole self is affected by failure to meet expectations in any part of the self. It is important for those in engineering culture to understand that shame is an emotional experience involving the whole self. Thus, any attempts to mitigate the effects of shame must address the whole self and avoid isolating engineering identity alone.

This concept is especially important when analyzing the presented data on Nicole's identity as a woman engineer. The psychological literature and data from this case suggest that gender identity is complex, extremely integrated and should not be viewed as a separate entity from any other sense of self [15-17]. The data show that Nicole's identity as a woman engineer was especially salient in times which she was internally evaluating her standing to expectations. She discussed the felt additional pressure to succeed because she is a woman and thus, exaggerated effects of shame when she perceives that she had not. This is well supported in the literature in the phenomenon known as stereotype threat where, knowing the expectations of the culture, she experiences unique pressures [27]. Additionally, Nicole's data pragmatically validates theory of identity representation. Literature demonstrates how, in accordance with Bandura's theory of self-efficacy, culture does not allow women the resources needed to form a mental representation of themselves as an engineer [24]. Without representation from those around her, Nicole says that she would likely have not seen herself as an engineer. For this reason, belonging takes a new more powerful form for her. As previously discussed it provides the antidote for the effects of shame even that centered around extremely high expectations set by cultural norms.

Conclusions: Implications for practice

It is clear through the data that shame is an emotion experienced with engineering education. Shame is not experienced by students only in moments or extenuating circumstances but is an ongoing process that is intertwined with the learning experience and formation of engineering identity. Educators, in the interest of creating capable professionals, must be able to understand this experience and be capable of aiding students in creating pathways for successful navigation.

Some may react to discussions of the emotional experience of failure by defending the need for external expectations. Of course, expectations must exist. Nicole even recognized this: "It's not like professors can't have expectations because that's their job to have expectations. So I guess I don't know—I guess I don't have a good answer." High standards in engineering education are essential to preparing individuals for careers in the field. These findings by no means suggest that educators adopt a policy of easy success. They do suggest, however, that in order to do produce individuals who are most capable of success, engineering education must demonstrate to students how to successfully navigate shame.

To address another reflexive defense to the findings of this study, attention is drawn to the definition of shame here operated within. The term "perceived" is essential in depicting the true nature of shame. Expectations are interpreted by the individual. Nicole recognized multiple times that her perception of expectations may not be absolutely identical to reality. However, despite logical recognition of reality, her emotional experiences still operate within forms of expectations that are interpretations determined by the self.

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