EMPIRICAL RESEARCH

Coupling Methodological Commitments to Make Sense of Socio-Psychological Experience

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Background: The engineering education research community has embraced a diverse range of qualitative, quantitative, and mixed methods research approaches. In line with the pragmatic roots of both engineering practice and education, we concur with past scholars that no particular method is better than any other. Rather, the method should be determined by the nature of the research object or the social reality of interest.

Purpose/Hypothesis: The purpose of this article is to discuss investigations of complex phenomena that have both individual and socially constructed features by using a mixed qualitative methods approach. Our discussion focuses on how to honor, maintain, and leverage the methodological commitments of multiple approaches to achieve a coherent understanding of the social reality under investigation.

Design/Method: We introduce a method to map a social system of interest and define the scope and nature of a specific and researchable social reality within that social system. We specifically draw on an example of our study of professional shame in engineering contexts, describing how articulating this social reality enabled us to select two qualitative approaches, interpretative phenomenological analysis (IPA) and ethnographic focus groups, to thoroughly examine the phenomenon.

Results: Drawing on data from a larger study, we demonstrate how the two methodologies allowed us to see different features of professional shame. IPA provided a lens into students' intrapsychic experiences of shame, while the ethnographic lens provided a window into the social construction and maintenance of the norms, expectations, and master narratives that can provoke shame experiences in individual students.

Conclusions: We found that combining multiple qualitative methods, based on an explicit and shared definition of the social reality under investigation, afforded a coherent, empirical understanding of a complex social reality that one method alone could not have provided. Although mixing qualitative methods does demand a cogent way of managing multiple methodological mindsets, the whole outcome of both approaches was greater than the sum of the individual parts. We encourage other engineering education researchers to similarly consider the use of mixed qualitative methods when investigating complex socio-psychological phenomena.

Keywords: qualitative methods; mixed qualitative methods; interpretative phenomenological analysis; interviews; ethnographic methods; focus groups; professional shame

Introduction

Prior work speaks to a steady but consistent evolution in how engineering education researchers approach methodological questions. Given that the majority of engineering education researchers have a bachelor's degree in an engineering discipline, it is not surprising that, just over a decade ago, Borrego et al. (2009) identified a strong preference among researchers at "a prestigious international engineering education research conference" (p. 61) for quantitative methods. Since that time, the field has seen a dramatic shift toward embracing a diverse range of quantitative, qualitative, and mixed methods. For example, of the articles published in the *Journal of Engineering Education* in 2019 ($n = 24$), 33% were quantitative, 50% were qualitative, and 17% used both quantitative and qualitative (i.e., mixed) methods. Such a shift in methodological diver-

sity indicates an increasing openness to multiple ways of knowing within engineering education research. However, our current practice of mixed methods research has pushed for integrating quantitative and qualitative methods. The inherent goal is to produce knowledge claims that are broadly applicable, through use of quantitative methods, and contextually grounded, through use of qualitative methods.

The purpose of this article is to precipitate the next step in this evolution, namely, a dialogue about the affordances of using mixed qualitative methods to empirically investigate and understand complex, socio-psychological phenomena. Such a methodological shift in engineering education research would help our community to frame mixed methods research as enhancing the scope of what we investigate rather than focusing only on how broadly knowledge claims might apply to other contexts. The two methodologies we explore are interpretative phenomenological analysis (IPA) and ethnographic focus groups.

In what follows, we reflect on how we coupled methodological commitments from each of these qualitative traditions to investigate a complex, interrelated, social and individual phenomenon, that is, professional shame. More specifically, we explored the following questions:

Q1) How can researchers combine qualitative methodologies, with ostensibly contradictory aims, to examine socio-psychological phenomena?

Q2) How can researchers align procedural processes of an investigation to yield coherent findings that reflect the complexity of both social and individual phenomena?

We emphasize that the focus of this article is on our process of coupling the methodological commitments of IPA and ethnographic focus groups to investigate the socio-psychological phenomenon of professional shame rather than on the findings of the investigations themselves (see Huff et al., in press; Kamanda et al., in press).

Below, we begin by introducing the context of our investigation on professional shame. We then describe the process we used to identify the nature and scope of the object of our research, or social reality under investigation, which enabled us to purposefully select two different qualitative methodologies to provide us with views on both the individually experienced and socially constructed nature of professional shame. Finally, we share examples from our data that demonstrate how the two views on professional shame yielded distinct, significant findings, and how the combination of these two views yielded a coherent view on the social reality that one method alone could not have provided.

Context of the Study

Our reflections on using mixed qualitative methods is based on our experience with an investigation into professional shame in the context of engineering students in the United States. We define professional shame as having four important features (Huff et al., in press): 1) individuals perceive themselves to have failed to meet socially constructed expectations or standards that are relevant to their identities in professional domains (Brown, 2006; Lewis, 1971; Tangney & Dearing, 2002); 2) individuals experience painful emotional states amid such perceived failure (Tangney & Dearing, 2002; Van Vliet, 2008); 3) individuals do not attribute the failures to meet expectations to domain-specific feature of a certain identity, but rather to the global self (Ferguson et al., 2000; Gilbert, 2003; Lewis, 1995); and 4) individuals not only experience the emotional state of shame, but they also contribute to socially constructed expectations that establish the context for shame to occur (Brown, 2006; Huff et al., in press; Kamanda et al., in press; Secules et al., 2020; Scheff, 2003).

At the outset of this study, we conducted an in-depth and interdisciplinary literature review on the more general construct of shame. Specifically, literature in psychology attuned us to consider the effects of shame as an emotional state that can dramatically influence one's well-being (Tangney & Dearing, 2002; Van Vliet, 2008). In addition, sociological literature on shame attuned our team to consider the ways that shame is influenced by the cultural landscape, particularly that of engineering education (Brown, 2006; Scheff, 2003). For example, in Brown's (2006) shame-resilience theory, which she developed from a grounded theory study of women's experiences of shame, she described shame as a web in which "socio-cultural expectations are narrow interpretations of who women are 'supposed to be' based on their identity … and/or role" (p. 46). We similarly proposed that engineering students, likewise, experience shame in response to sociocultural expectations that dictate who they are "supposed to be."

Thus, we recognized the complexity of the construct we were trying to study, that is, shame. On the one hand, we could not view it purely as an individual phenomenon as prior literature had established that shame could not exist without others' expectations of an individual. Yet, on the other hand, we could not disregard the rich ways in which shame occurs within the personal experiences of individuals. Therefore, we framed our investigation to examine the complex social reality on both individual and social levels, anchoring the study in 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?

In seeking to operationalize our understanding of shame as a socio-psychological phenomenon, we recognized that a single methodological lens would not be sufficient to elicit data and analytically capture the two distinct facets of individuals' internal experiences and collective, shared constructions of the phenomenon. The nature of our research questions oriented our investigation to develop an intensive focus on both individual and personally lived phenomena and explicate sociocultural features of collective and intersubjective phenomena. To inform our research design around multiple methodological lenses and subsequent procedural choices connected to our methods, we needed to develop a complex yet coherent understanding of shame as a *research object*.

Approach
Definition of the research object—A social reality under investigation
In order to achieve a coherent coupling of different methodological lenses, we drew on the notion of developing a shared understanding of the social system of interest and the social reality under investigation (Walther et al., 2013; Walther et al., 2017). The former describes the social structures, actors, and dynamics that surround the phenomenon of interest. The latter defines the focus and scope of the particular investigation within the larger social system. The process of mapping a social system and defining a social reality as the *research object* was supported by the generative use of the prior theoretical perspectives discussed above as a way to understand what researchers may *get to see* in a particular setting. In other words, the iterative, visual, and theory-informed process described below aimed to define "the social reality under investigation" in both its scope and in its nature (Walther et al., 2013, p. 635).

In defining the social system of interest, the research team iteratively used visual system maps to articulate and advance a shared understanding. More specifically, a collaborative session of sketching a systems map used the following questions as generative prompts:

- What are the elements of the system?
  (e.g., courses, programs, educational goals, classrooms, curriculum, structures, cultures)
- Which people or groups of people play a role?
  (e.g., students, faculty, external stakeholders, staff, administrators, teachers)
- What structures or artifacts are important?
  (e.g., technology, space, policies, educational materials)
- How are the elements connected?
  (e.g., organizational structures, hierarchies, social structures, groups, working or individual relationships)
- How and where does interaction, information flow, or communication occur?
  (e.g., discussions, class interactions, written communication, non-verbal communication, use of artifacts)
- What time frames or spatial scales are relevant?
  (e.g., prior educational or personal history, development throughout the program, transition to workplace, local, regional, national, global impacts or influences)

In our example study of professional shame in engineering, these questions and the visual mapping activities directed our attention to both the internal experiences of individual students and the interplay of people, structures, and activities that form the reference points for those individual experiences.

Theoretical perspectives of both shame and professional socialization (Walther et al., 2011; Cech, 2014) helped the research team to understand the nature of the social reality of interest, that is, potential dynamics that may be at play in this social system and that research methods would have to be able to capture (Procedural Validation, Walther et al., 2017). More specifically, theoretical perspectives on shame (Brown, 2006; Gilbert, 2003; Lewis, 1971; Scheff, 2003; Tangney & Dearing, 2002) helped us understand students' potential internal processes as instances of this emotional state, while the notion of professional socialization directed our attention to the ways in which expectations, norms, and disciplinary cultures are co-created by the interaction of members of a groups (Cech, 2014; Kamanda et al., in press; Pawley, 2009; Tonso, 2006; Walther et al., 2011).

In multiple iterations of this process (see **Figure 1**), the following visual model of the *research object* emerged, which provided the basis for subsequent research design decisions and methodological choices. Our initial sketch of the research object (the top portion of **Figure 1**) was formed by the authors documenting their latent perspectives of the shame phenomenon. Jo and Nicki (Authors 2 and 3), whose research is anchored in sociocultural perspectives, immediately could connect to a nuanced picture of how shame only could make sense in a professional environment that afforded potential reference points for individual shame. James (Author 1), whose research is grounded in psychological literature on identity, was naturally oriented to understand shame as an embodied phenomenon within the individual. The initial sketch of the research object came as a result of our informed discussions based on theory to which we had previously been sensitized.
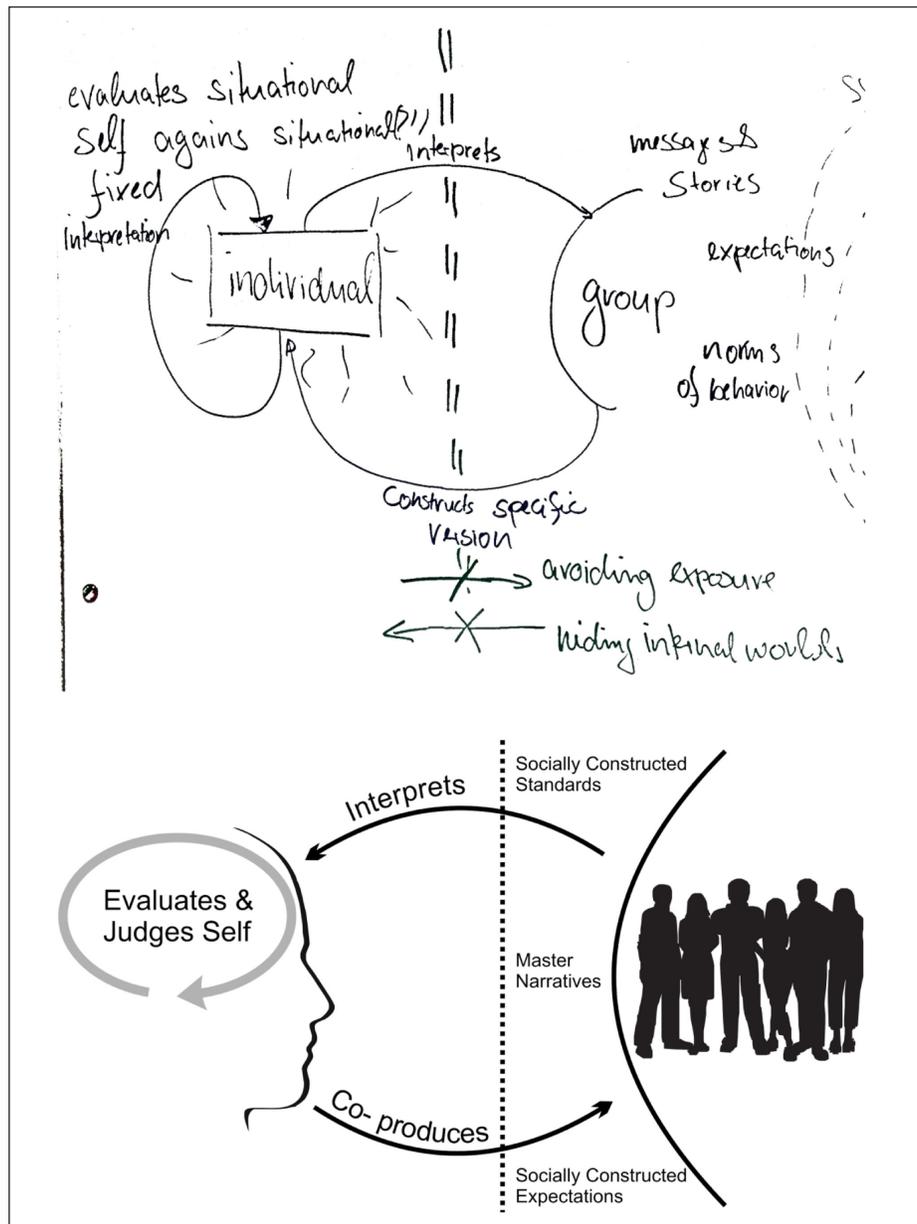
Figure 1: The iterative development of the visual model that describes the scope and nature of our research object—from initial sketch to final version (Huff et al., in press).

Our final theoretical model of professional shame (bottom portion of **Figure 1**; see Huff et al., in press), was given more intentionality in the directions of interactions between the individual and the group. We refined the terms used to describe the right-hand portion of the engineering education context based on our empirical findings and on a more nuanced understanding of sociological literature on shame. We further gave more specificity to the directions of the arrows and the terms used to operationalize the connections between the individual and the group. The process of defining this social reality through an image helped us to *see* that we were investigating something that contained two salient and connected features – that of the individual's lived experience and that of the culture that embedded the individual.

Mixed qualitative method research design as purposeful examination of a social reality
According to the social reality illustrated in **Figure 1**, we were interested in understanding the psychological experience of shame (left side in **Figure 1**) and how standards, master narratives, and expectations that trigger shame are co-produced in the social context of engineering programs (right side in **Figure 1**). To purposefully examine these connected aspects—or to get to *see* the social reality in its full extent (Theoretical Validation, Walther et al., 2017)—we employed two distinct methodological approaches with different data collection and analysis techniques: interpretative phenomenological analysis (IPA)

as a way to examine personal lived experience (Smith et al., 2009; Smith, 2011a) and an ethnographic lens on a grounded theory analysis of focus groups (Agar & McDonald, 1995).

We specifically chose to investigate the individual, lived experience of shame using IPA because the method is uniquely suited to deconstruct and explicate psychological patterns of experiences that are salient to individuals (Smith, 2011a). Additionally, IPA provides a methodological framework to examine a phenomenon with an intensive focus during interviews and then carefully analyze the psychological features of how an individual may have experienced the phenomena. When considering the psychological reality of professional shame, we leveraged our extensive experience with IPA (Huff et al., 2014; Kirn et al., 2019) to uphold a sensitive and focused process of interviewing participants about emotionally-charged experiences that they would not typically discuss in everyday conversation. We further used IPA to provide a managed process to analyze the psychological patterns that were found in interview transcripts.

To examine the socially constructed expectations that afforded opportunities of professional shame, we selected an ethnographic lens on conducting a focus group investigation. An ethnographic approach enabled us to remain attentive to sociocultural features of how students constructed shared narratives of expectations and professional shame in engineering education contexts (Agar & McDonald, 1995). Beyond the procedures of focus group data collection and subsequent coding, an ethnographic lens also enabled us to maintain a sharp focus on cultural features of shame rather than, as afforded by the IPA approach, a psychological perspective.

Our use of multiple methods to unpack professional shame might be classified according to what Morse (2010) describes as a simultaneous qualitative mixed method approach. While extant literature generally regards *mixed-method* research as the intentional integration of quantitative and qualitative approaches, Morse describes a qualitative mixed methods investigation as characterized by a core component, typically a standalone methodology, and a supplementary component, where "both the core component and the supplementary component have an inductive theoretical drive" (p. 484). What we propose in this article differs from Morse's work because we selected and used different qualitative approaches to examine distinct psychological and sociocultural features of the social reality under investigation. Thus, our investigation into shame can be regarded both as two self-contained yet coupled studies, such that the holistic understanding is more than the sum of the independent findings. Below, we elaborate on the methodological choices that supported each distinct focus of the investigation.

Interpretative phenomenological analysis (IPA) using intensive, non-standardized interviews (used to examine left side of Figure 1)
To make sense of the lived experience of shame in individual engineering students, we used interpretative phenomenological analysis (IPA). IPA is a methodological framework that is well-suited for investigations as it requires an in-depth and contextual understanding of phenomena as lived by individuals (Smith, 2011a). The approach has been used with increasing frequency in engineering education research (e.g., Huff et al., 2014; Kirn & Benson, 2018; Kirn et al., 2019 Ross et al., in press; Stefl, 2020) perhaps because of the affordances of the methodology to provide in-depth insight into the contextually rich environment of engineering education (Kirn et al., 2019). Building on a Heideggerian conceptualization of phenomenology (Heidegger, 2010). IPA requires that investigators who use the approach access the in-depth experiences of individuals through intentional and mindful interpretation, drawing on well-established concepts of hermeneutics (Gadamer, 2013). In practice, the IPA mindset keeps the investigator anchored in an intensive focus—during data collection and analysis—of how a participant is experiencing a certain phenomenon. IPA investigators are active in reflective dialogue regarding their own presuppositions of the study, as a way to maximize their self-awareness of interpretive processes, and they build up a coherent understanding about theoretical claims based on an *idiographic*, or particular and contextual, understanding of how individuals might live the phenomenon (Smith et al., 2009).

In the context of our study on shame, we used intensive, non-standardized interviews with two sets of individuals at two different institutional settings: white male engineering students ($n = 9$) and minoritized (i.e., white women or men and women from underrepresented racial or ethnic backgrounds) engineering students ($n = 7$). Each interview was conducted by a trained IPA interviewer. In some cases, an IPA analyst who was not fully trained in conducting non-standardized interviews would accompany the trained interviewer. Throughout the investigation, the person leading the interview maintained an intentional posture that facilitated warmth toward the participant while also holding a committed focus on how the participant experienced shame. The interviews were non-standardized in that they did not follow a particular protocol. Rather, the interviewer was committed to maintaining a deep sense of presence with the interview participant, adapting questions to the responses of the participant.

Such an intensive process of probing the psychological experiences of shame in participants aligned with our pursuit of quality in *making data* that aligned with the social reality of the study (Walther et al., 2017). During the interview sessions, the primary interviewer would ask general questions related to how the participant understood their sense of self and then build on their response to learn more about the perceived significance of being an engineering student. From that point in the conversation, the interviewer would guide the participant to consider what they felt was expected of them as an engineering student. At this point in the process, the participants would often naturally start to describe moments that they

had failed to meet expectations. The interviewer would then probe these episodes to obtain a rich description of how the participant felt during these moments, what they believed about themselves, and how they were regulating their response to the environment around them.

The interviews were then professionally transcribed and then examined by a trained IPA analyst on the research team to ensure that the transcripts reflected an authentic quality of the interview session and were thoroughly deidentified. The analyst then went through multiple passes of the transcript to annotate descriptive observations, linguistic features, and connections to psychological concepts. Finally, they completed an additional pass through the transcript to annotate emergent themes, that is, "phrases which speak to the psychological essence of the piece and contain enough particularity to be grounded and enough abstraction to be conceptual" (Smith et al., 2009, p. 92). As previously discussed elsewhere (Huff et al., 2014), these procedures served to support the analyst in maintaining a decisive focus on the internalized experience of the individual (rather than their context) regarding the professional shame phenomenon. Accordingly, these procedures also served to enable the analyst to mindfully interpret the data (i.e., *handle* the data; Walther et al., 2017) in ways that maximized their attention to the participants' lived experiences rather than the analyst's presuppositions. Our findings for the IPA study are detailed elsewhere (Huff et al., in press).

Ethnographically informed focus groups (used to examine right side of Figure 1)

As a way to investigate the dynamics of how expectations, disciplinary, and social norms were co-constructed we chose to employ focus groups with an ethnographic orientation. The focus group format was chosen as a way to elicit accounts around expectations in engineering that are either contributed by one participant in the context of the broader discourse shared with their peers or are collectively constructed by multiple participants. In other words, individual accounts of a student's experience of expectations were told in a public forum that carried with it some of the same discursive rules and constraints. In the shared space of the focus group, the way in which these experiences were discussed seemed subject to the same rules that also apply to other conversations in the engineering cohort. In the focus groups, we observed instances of students both conforming to and pushing back on conversational and cultural norms of the broader engineering cohort. An example of this dynamic is that students gave a sense of the personal significance of the experiences often without expressing or acknowledging the emotional facets of their experience. The accounts co-constructed by multiple participants built on shared individual experiences but the discussion often transcended individual experience and arrived at overarching, collective conclusions about what the expectations discussed meant in a broader sense (Wilkinson, 1998).

The ethnographic orientation of the focus group approach both in *making* and in *handling* the data (Walther et al., 2013) directed our attention to the social and cultural contexts in which students' experiences occurred. This focus on culture as the context of experience and sense-making was operationalized in the focus group protocol through thoughtful questions that directed participants to explore not only what their individual experiences were and why they were personally significant, but also what they meant in the larger context of the collective experience of the engineering cohort. In the analysis of the data, we purposefully attended to the cultural connotations of individual accounts or shared meaning making. We paid attention to instances where the general backdrop of the discussion was informed by features of the disciplinary culture or narratives that characterize engineering. Agar & McDonald (1995) confirm that "ethnography provides broader frames of interpretation in terms of which focus group details take on added significance" (p. 78).

Across the same two research sites used for the IPA study, ten focus groups were conducted with a total of 38 participants. The focus group discussions with 2–5 students took about 60–90 minutes and were facilitated by a co-researcher who was not involved in the teaching of the participants' courses. The sampling strategy and participant recruitment aimed for mostly homogeneous groups in terms of majority and minoritized participants. We defined minoritized and majority status in terms of race and gender. This research design feature was intended to increase opportunities for participants to co-construct authentic accounts of their experiences in light of the potentially sensitive and emotional qualities of their experiences (Walther et al., 2017). More specifically, we observed that in minoritized focus groups, students tended to be more comfortable revealing personally challenging experiences and connecting with other participants' accounts. Similarly, the discussion in groups with majority participants tended to emphasize emotional content less and focus more on accounts of individual perseverance or framed individual experience in terms of generalized advice for other students. This sampling strategy did not aim for representation of particular perspectives, and we recognize the intersectionality of the identity facets of our participants (Pawley, 2019). Rather, the composition of the focus groups aimed to maximize variation in perspectives and experiences while creating environments where those perspectives could be shared.

The focus groups were guided by a semi-structured protocol to elicit individuals' experiences around expectations, and the facilitator followed up with questions that established the details and context of individual experiences. The facilitator initiated the discussion with a question about the context of expectations in the engineering program. To ground the discussion not in students' perceptions but in their lived experiences, the follow-up questions by the facilitator prompted students to recall specific incidents or times when they experienced not meeting explicit or perceived expectations.

In summary, IPA allowed us to see professional shame experiences through a psychological lens and ethnographic techniques allowed us to see how the triggers for these experiences are socially constructed. The above discussion also makes it clear that each method is inherently unsuitable for the researcher to get to see what its methodological counterpart makes visible.

Demonstration examples: Social construction of expectations, individual discomforts, and profound internal experiences of shame

In this section, we use excerpts from our ethnographic focus group and IPA interview data to demonstrate how each method enabled us to see a different aspect of the individually lived and culturally constructed experience of professional shame. Both of the examples from each method focus on the dominant narrative that engineering students are "smarter" than other majors and the lived experience of this expectation. In examining these excerpts, we focus, first, on how they contribute to a holistic understanding of professional shame in engineering education. Put another way, we focus on how the different methods enable us to see the two sides of **Figure 1**. Second, we point out how maintaining different methodological commitments, to IPA and to the ethnographic focus group research design, was necessary in both the making and handling of these data (Walther et al., 2013; Walther et al., 2017). We begin with an extended excerpt from a focus group of four White males.

> Edmund: I don't think there's this idea that engineering majors are—like [Philip] said—super smart, like—it's kind of separate from the flock I guess, but I mean, there are so many other students on campus who have the mental ability and work ethic to pursue engineering, to do very well in it, but have just chosen another path.
> Philip: Yeah.
> Edmund: So we're not any different, it's just the path (laughs) that we chose to take, so we're not really smarter. We just have taken different ways …
> Rance: I have had people think of me as somewhat arrogant when it comes to trying to help them with lower level math, like early statistics or algebra-related problems, because it's just—it's so easy, it's so simple, in my mind, and they just can't get it no matter how much they try. I come off as arrogant, because I'm trying to help them, and I'm telling them all these things, they're still not getting it, and I explain it three or four times. It's not that I'm trying to be, it's just that this stuff comes easy to me, but if you were to ask me anything about history I wouldn't be able to tell you anything.
> Martin: I know it's often said on the internet that engineering students are like the most arrogant of the students just because we think our major is so much harder than everybody's—
> Philip: Well—
> Martin: —which I don't agree with whatsoever. I couldn't do an art major's class work at all so (laughs)—I have so much respect for like art majors, just because they put in so much work.
> Rance: I have a bunch of respect for nursing majors.
> Philip: Oh yeah, nursing majors—
> Rance: Yeah, like art majors, they have it rough, but nursing majors, I've seen them with like Star—like three or four Starbuck's cups in front of them, finishing up like term papers.
> Martin: Yeah, [someone close to Martin] graduated from nursing, and just the amount she had to memorize, like every—She had to memorize everything about the human body. (laughs) And I'm just like why would you want to know all of that? (laughs)

This rich excerpt provides insight into how the dominant narrative of relative smartness, or intellectual superiority, is both socially constructed and maintained, as well as problematized and questioned among engineering students. The excerpt begins with Edmund's simultaneous rejection that engineers are "super smart" and "separate from the flock" coupled with an implicit assumption that engineering requires "mental ability and work ethic." This tension is reflected throughout the excerpt. Rance described his experience of people thinking of him as "arrogant" because he finds statistics and algebra "so easy" and "so simple" compared to others who "can't get it no matter how much they try." Not long after, however, he expressed his respect for nursing majors. Martin similarly named the dominant narrative of engineering being a comparatively "harder" major, which he attributes to what's "often said on the internet," only to, like Rance, also then express his respect for those who study nursing. Philip's three brief utterances also seemed to both confirm ("Yeah") and reject ("Well" and "Oh yeah, nursing majors") the dominant narrative of relative smartness.

In short, this excerpt provides a clear example of what Wilkinson (1998) describes as "an opportunity for researchers to see exactly how views are constructed, expressed, defended and (sometimes) modified during the course of conversations

with others, i.e. to observe the process of collective sense-making in action" (p. 193). Returning to our conceptualization of professional shame in **Figure 1**, we can clearly see in this excerpt the co-construction of the dominant narrative of relative smartness, coupled with an implicit assumption that, while engineering students may not necessarily be smarter than students who have not chosen to study engineering, at a minimum, one has to have a certain level of "mental ability and work ethic" to succeed.

What is equally interesting about this excerpt is what we do not see. We do not see, for example, how these students feel, or what actions they take, when they perceive themselves to have not met the socially constructed expectation of relative smartness. The ambivalent rejection of, and apparent discomfort with, the notion of smartness points to a more nuanced individual relationship with this disciplinary narrative that perhaps includes instances of individual students not feeling "smart." In this instance, we nearly get a glimpse into the inner world of students, but the microcosm of social construction in the focus group setting renders the individual experiences invisible. We also note that the interviewer purposefully did not probe these potentially painful and deeply personal aspects. Instead, the interviewer focused on the sources of these narratives and expectations. Put another way, instead of moving to the left of **Figure 1**, the interviewer purposefully moved in the other direction, as illustrated in the third paragraph below (the first two paragraphs follow on from the above excerpt).

> Rance: That's something I actually feel like hasn't been really tested for me. I always thought like my memorization skills were very good, but engineering, that's irrelevant, like because you have to—yeah, you have to know equations, but you have to derive them from certain things, so it's not just like this plug and chug method. It gets down to the nitty gritty. You have to make up equations yourself, which is making it a lot more difficult as classes are getting harder.
>
> Philip: Yeah a lot of engineering is problem solving, although because I'm a biomed I have had to take some classes where I've had to memorize stuff … I had to memorize like how to name certain organic compounds. For anatomy I had to memorize all the bones and the muscles and all that fun stuff.
>
> Interviewer: Could I go back to what—Sorry, [Martin's] like—I'm also really curious as we like—both as we name the expectations, I'm also just curious in the kind of social landscape. I'm curious where some of them [the expectations] come from.

This commitment to co-construction and staying away from deeply personal experiences was similarly maintained in the data analysis. The team members who analyzed these data consistently reminded each other that, while the glimpses of internal processes afforded in the focus group transcripts may be intriguing, the data set does not authentically, or to any depth, show this aspect of the social reality. Rather, the focus of the analysis was the intersubjective construction of expectations around what it meant to be and succeed as an engineer, a dynamic that was not only described in participants' accounts, but often on display in the discussions themselves.

In order to see the individual dimension of the social reality under investigation, we turn to an excerpt from the IPA data, which was intended to investigate the left side of **Figure 1**: the individual, intrapsychic experience of professional shame. In the focus group excerpt above, we saw how all four participants both confirmed and pushed back against the dominant narrative of relative smartness in engineering. Yet how did they personally experience this narrative? To consider this question, we examine an individual interview with Martin, who also participated in the previously discussed focus group. While our coupled forms of analysis did not explicitly require or connect participants like Martin who mutually participated in both focus groups and individual interview, in this paper, we draw on examples from a common participant to illustrate both the coherence and complexities of the methodological commitments.

We begin our snapshot of the IPA interview with Martin in the middle of the session. He had just described the painful discomfort he felt in trying to connect with his grandmother about his major, electrical engineering. Try as he might to explain the purpose of his career, she did not seem to demonstrate an understanding to Martin's satisfaction. We reached a point that Martin had provided a thorough description of his conversation with his grandmother, and the interviewer probed a connection between Martin's feeling inadequate and an earlier moment where Martin described others' presumption of his smartness, a standard that elicited his experience of professional shame:

> Interviewer: Yeah. (pause) Let me take you to a different conversation that you talked about as well, about being told that, "Oh, you must be smarter." How does that feel whenever you hear that?
>
> Martin: It's not a great feeling, just because—I don't know. I grew up with, my brother is much smarter than me. Just purely much smarter than me. I always tried to go to him, and whenever I hear people say, "Oh, you're smart," I think, "Well, I'm not on my brother's level." It's kind of like, "Are you sure you're talking about me? Because I don't think I'm as smart as you think I am."

Interviewer: When that happens, you said it's not a great feeling.
Martin: Mm-hmm (affirmative).
Interviewer: So going into the inner world of [Martin]—as we've been calling it—can you walk me through that inner world whenever you hear that—
Martin: Yeah, I guess whenever I hear it I think—
Interviewer: —and you have that not-great feeling.
Martin: Yeah, that's a little vague, isn't it?
Interviewer: No, it's okay.
Martin: I guess it's just more like little Martin inside my brain holding up a measuring stick of my smartness, and holding up someone else's measuring stick of smartness and going, "That doesn't match." And then … it's just kind of a feeling of, "Oh no. They're going to have expectations of me to be much smarter than I am," because I don't catch on to things as quickly sometimes as people think I might. So I'm like, "Oh no. They're going to expect me to be smarter than I feel sometimes." That's just kind of like a (deeply inhale)—I don't like to set high expectations, I guess. That sounds pretty bad, but (laugh)—I don't like to set high expectations, because I don't like causing people to feel disappointment. I like people to be happy, you know? And disappointment is like the opposite of happy. That's why I make jokes, is because it makes people happy (laugh).

Martin ended the above excerpt with a vivid depiction of the shame he experienced when others presumed him to be smart. His mind was filled with social comparison (e.g., "holding up a measuring stick"), and his attention turned to his inadequacy of feeling smart. Furthermore, in these moments, he directed his attention to how the perception of him being smart would only serve to isolate him from others as he perceived they would feel disappointed in his inability to meet their "high expectations." These high expectations were embodied, in Martin's view, in the form of his brother. Martin's brother represented the prototypical standard of smartness, and Martin could not receive a passing remark of his own smartness without feeling a sense of downward comparison in relation to his brother ("Well, I'm not on my brother's level"). It is important to note that we do not have evidence to suggest that Martin felt a sense of threat from his brother's perceived abilities. However, his fraternal relationship gave him a well-practiced context to feel inadequate when someone applied the label of "smart" to him. And to resolve feelings of shame, which he felt when someone judged him to be smart, he turned to humor. If others could see Martin as someone that made them happy, they might not feel disappointed in him. To Martin, maintaining interpersonal relationships was the goal that became threatened when others saw him as smart. To resolve this threat, he sought to redirect others' attention on his smartness to his ability to "make jokes," a temporary fix to postpone feelings of shame that arose from the label of smartness.

We recognize the above excerpt to be what Smith (2011b) calls a *gem*, that is "the thing that stands out when you're reading a transcript, it's the extract that demands attention and prompts further analytical work … [Gems] offer analytic leverage, they shine light on the phenomenon, on the transcript and on the corpus as a whole." Martin demonstrated what is central to his concerns during shame experiences—it was not that he was failing to "be smart," rather it was that he might isolate himself from relationships with friends, with family, and with his grandmother, who could offer "a blank stare" when he tried to explain what he was doing. In the brief excerpt above, we are offered an in-depth way to make sense of Martin's description of shame in a way that is true to how he lived the experience. And such is the core focus of IPA, to make sense of individual, lived experience of a certain phenomenon (Smith, 2011a).

However, the gem that is represented by this excerpt did not merely happen. The interviewer was intently focused on ensuring that he probed the phenomenon of shame as experienced by Martin. Such an intensive focus informed the probing questions in the interview. For example, when Martin answered the interviewer's initial question, he described the emotions associated with the label of smartness as "not a great feeling," and began to elaborate on his comparison to his brother. Rather than attending to the features of his brother's smartness, the interviewer recognized that Martin was only beginning to trace the contours of his emotional experience of shame, so he built the stem for his next probe around Martin's exact words ("not a great feeling") and probed for Martin to explain what is going on in his "inner world." Such phrasing was intentionally designed to elicit features of his experience that were unseen in his initial explanation. Martin offered that his explanation was "a little vague," and the interviewer briefly offered warm reassurance but maintained the question that opened the door for Martin to voice a rich analogy of "little [Martin] … holding up a measuring stick."

From here, Martin became fluid in his description of how he experiences shame. Shortly after he introduced the analogy of "the measuring stick," Martin elaborated on another strategy that he used redirect people's attention away from smartness, that is, his "stubbornness:"

Interviewer: What are you trying to do in that situation? If someone says, "You are an engineer. You must be smarter than I am," how do you respond to that?

> Martin: Immediately try to lower their expectations. Like, "I'm not that smart." I tell them I guess, "You don't have to be smart to be an engineering student. You've just got to work at it." I tell them, "There's a lot of classes where I barely understand what's going on, but I just keep working at it, and working at it until I have a slightly better idea of what's going on." I think I convey … that it's more my stubbornness to not be wrong that gets me through than being smart.

Here, Martin revealed that his solution to resolve the painful emotional state of shame was to reframe the expectations of his role as an engineering major as *stubborn* rather than *smart*. Such a mindset, in a paradoxical manner, reinforced his perception of smartness as a gold standard of being an engineering student. By a stubbornness to "not be wrong," the standard to always be right was upheld as an ideal feature of what it means to be an engineering student. Although Martin preferred to meet such a standard through a persistent work ethic rather than smartness, he was left to contend with an unreachable standard that persistently caused him to feel shame when he encountered it.

However, there are features of Martin's experience that cannot be seen in an individual interview. For example, we can view his experience of shame with detailed attention to the idiosyncrasy of his perspective. But it is not clear if the expectations of smartness that Martin describes were unique to his own experience or they were connected to a broader, socially shared experience in being an engineering major. In fact, for most of the excerpt that viscerally described Martin's shame experience, his role as an engineer was only invoked toward the end of the description. Thus, while we gain a clear picture of the emotional gravity of shame through the IPA interview, we lose the richness and complexity that captures how this experience is situated in narratives that pervade engineering student contexts.

The complexity of Martin's response is even more elucidated when we consider that this is the same participant who, in the focus group interview, validated the perceived difficulty in engineering majors. While diminishing the narrative found "on the internet" that engineering majors have a superior sense of arrogance due to the difficulty of their major, he sought to justify his position in the focus group by pointing to difficulty in other majors. Even though he ostensibly rejected the exceptional difficulty of engineering majors, he contributed to the expectations that difficulty in a major, which is commonly attributed to engineering, is something to be valued and respected. Thus, as an engineering major, Martin co-constructed the narrative that engineering is a field that should demand high expectations. And, as an individual living in these expectations, he frequently felt shame when he was not able to meet them.

Discussion

The above sections describe the complementary methodological affordances of ethnographically informed focus groups and individual IPA interviews. We showed how we maintained the methodological commitments of each approach in both making and handling the data, based on a shared definition of the social reality under investigation (Walther et al., 2017). The demonstration example around students' experiences of smartness showed which part of the social reality the respective methods made visible and, conversely, which facets of students' lived experiences remained hidden in the data collection and analysis. The focus group analysis's view of the shared construction of expectations ideally complemented the IPA study's intimate view on individuals' profound emotional experiences of not meeting these expectations.

Beyond this coherent, composite picture of the social reality depicted in **Figure 1**, looking across and integrating both analyses yielded powerful new insights at a meta-level. We demonstrate this synergistic potential of coupled qualitative approaches by returning to the example of smartness. Looking across the data and insights from both methods we begin to see how markers of disciplinary identity are collectively constructed and individually internalized and why these definitional narratives are so powerful and persistent in shaping engineering cultures and socializing individuals.

The excerpt from the focus group showed how students resist the notion of smartness but collectively maintained a narrative of engineers' superior status. Departing from the broader public narrative of smartness (i.e., as represented on "the internet"; see Dringenberg et al., 2019; Kramer et al., 2020) they identified hard work and the conceptual nature of engineering as markers of the discipline's superiority. In a striking pattern of shared speech, the students collectively negotiated a consensus around these alternative definitional markers in ways that included nuance ("everyone can do it") and also demarcated engineering from other, "lesser" disciplines ("She [a nursing major] had to memorize everything.… Why would you want to know all of that?"). This shared consensus transcended individual experience or opinion and became a declaration of who we (i.e., as engineers/engineering students) are, what we do, and what makes us special.

The IPA excerpt, then, showed how Martin individually engaged with "hard work" as a definitional marker of the professional space he wanted to be part of. After expressively sharing his problematic relationship with smartness, he picked up the notion of hard work and personally reframed it as "stubbornness to not be wrong". Thus, he tied the collective notion of hard work to his personhood by declaring it a trait that defines him. In grappling with this notion, we can see Martin assimilate the concept into a version that was compatible with his self-image and fully invest himself into it ("it's more my stubbornness to not be wrong that gets me through than being smart").

In combination, these analyses show how powerful the collective consensus around the definitional narratives of the discipline is and how important it appears to be for the group, a shared notion that individual students then assimilate and profoundly internalize. In this way, the synergy of both methodological approaches gives a coherent sense as to why some of these disciplinary narratives are so persistent in the engineering environment and why they can be so problematic for individual students or the context of attracting and retaining diverse groups to the discipline.

Conclusion: Implications for Future Research

Our methodological discussion here has implications for how we view the nature of *experience*, a broad construct that is at the heart of many investigations in engineering education. We contend that social phenomena broadly classified as experience (e.g., identity, emotion, belonging) might be viewed with multiple lenses, each of which has substantial implications for the credibility of the research methods that are used within the investigations. For example, identity in engineering can be viewed as a collective phenomenon that is co-constructed by many actors. In this view, we might be oriented to understand the content of dominant images of identity within engineering (e.g., Pawley, 2009) or to examine messages that characterize what it means to be an engineer (e.g., Sochacka et al., 2014). In the same example, identity can also be viewed as an individual phenomenon that is embodied by a single actor. In this view, we might be oriented to understand the ways that students choose to major in and persist in engineering (Godwin et al., 2016; Patrick et al., 2018), how students are motivated to pursue engineering (Kirn & Benson, 2018; Matusovich et al., 2010) or the ways that students integrate their professional identities with who they are holistically (Huff, 2019).

Regardless, the assumptions that a researcher brings to the nature of experience have powerful implications on methodological choices that undergird the investigation. In engineering education, we have opportunity to provide better alignment to investigations of experience by developing methodological commitments that align with our perspectives of the social reality under investigation, even if these assumptions are multi-faceted. In the present example, due to the intentional research design, the two methodological approaches of IPA and ethnographic methods, together with their respective methods of individual interviews and focus groups, were leveraged to fully commit to individual and collective aspects of shame (as shown in **Figure 1**). By understanding the nature of how individuals' experiences of various phenomena meet their personal needs, we might better understand why they so persistently reside in the collective narrative. And by understanding intersubjective social constructions of these same phenomena, we might better understand how cultural explanations that inform individual behavior.

Acknowledgements

Competing Interests

The authors affirm that they have no competing interests in relation to the research, authorship, or publication of this article.

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