Exploring Early-Career Professionals' Conceptions of 'Stretch Assignments': A Qualitative Study of Recent Graduates from Engineering and Non-Engineering Fields

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1.0 Introduction

Early-career engineers often enter workplaces that have not been designed with equity in mind. Beliefs about techno-meritocracies reign, blurring experiences of negative stereotypes, bias, and discrimination. Many new engineers learn largely opaque organizational practices and unwritten rules of advancement as they go—with some having more informational advantage than others. One such practice is a developmental, or "stretch", assignment. We define *stretch assignments* as informally allocated work assignments that can prove one's readiness to move up the job ladder.

In this study, we explore how early-career professionals experience and understand these informal developmental opportunities availed, or not availed, to them. Specifically, we probe how early-career professionals, especially those who historically have faced socio-structural barriers to attaining professional leadership positions, understand these *unwritten rules of advancement* at work. Drawing from an interview sample of predominantly women engineers and non-engineers two years after college graduation, coupled with a different open-ended survey dataset collected from early-career women engineers 1-3 years into the workforce, we use qualitative methods of analysis to examine their descriptions of stretch assignments, their learning experiences around stretch assignments, and the insights they have gleaned about advancement, placing their words in conversation with previous sociological research on work assignments and workplace inequality. Our findings show how the dimensions of these types of assignments are not at all clear and unified, with participants' descriptions reflecting a mixture of often inconsistent and contradictory understandings, such as: random, meritocratic, ad hoc, sought on one's own, given by top leaders, exploitative, beneficial, enjoyable, and scary. Such assignments are conceived as important for advancement or even "secretly" required for promotion, but there is no consensus on how to access them or connect them to positive career outcomes.

Building from synergistic resources we developed and presented at the ASEE annual meeting in 2023, we seek to connect these findings to continued resource development for engineering students and faculty. With tools and worksheets created on the basis of this and related research, our aim is to equip soon-to-be-professionals, and their mentors and teachers, with insights to advocate for better and more equitable workplace practice.

2.0 Background of the Study

2.1 Stretch assignments: Definition and dimensions

In a larger employment context where workers, especially technical knowledge workers, are expected to manage their own 'portfolio careers' and are increasingly commodified as the sum of their projects, developmental, or stretch, assignments are critical levers of mobility [1]. Organizations and managers curate and allocate these types of assignments informally, using

them as a means to develop leadership skills, identify people ready for promotion and the "fast track", and build succession plans [2], [3]. Software engineering managers in Tobias Neely et al.'s [1] case flagged that stretch assignments need to have an element of building new skills and capacities (stretches were routinely described as "getting out of your comfort zone") and an element of visibility in the organization and to managers and leaders. Career advancement for these engineers, in other words, revolved around proving competence in novel areas that had strategic importance to the business unit.

Several studies have established that stretch assignments are highly gendered—women have less access, more narrow scopes, and fewer positive returns attached to a stretch (e.g., [4], [5]). In Williams and Multhaup's [6] work, women of color in engineering were especially likely to perceive low access to highly desirable assignments, or "glam work", relative to White women and men. And in a recent study of early-career engineers [7], links between stretch assignments and expected career gains were observed for those from dominant gender and racial/ethnic groups (men engineers, White and Asian engineers) more so than for engineers from minoritized backgrounds (women engineers, Black, Latinx, Indigenous, and Pacific Islander engineers). The results signaled a potentially "inequality-intensifying" pattern in stretch assignments that was not present in other types of early-career assignments. These studies together suggest that the racialized and gendered dimensions of career-advancing stretch work can manifest in both access and rewards even for engineers just starting out on the job.

2.2 The flip side: Low-promotability tasks

Advantages to stretch tasks that are concentrated (both the task and advantage) among some groups have a flip side: disadvantages to what are called "low-promotability" tasks [8] that are concentrated among other groups. In engineering, such tasks might include routine activities like documentation, which, despite being essential to good practice, is not perceived by organizations as "creating value" in the same way that technological innovation is [9], [10]. These types of lower-recognition tasks also can include "office housework"—planning social events, getting coffee for colleagues, coordinating meetings. Some of these tasks carry more organizational significance than do others, as they can sustain networks, communication, and project momentum, but few are rewarded in the way that strategic stretch work can be; Babcock et al. [8] write that these are tasks people generally do not want to do as part of their jobs and wish would be completed by others.

And yet some groups do them, and do them more than other groups do, even among those in the same profession and role. Sociological and economic research shows that gender again comes into play: women do more low-promotability work, and are asked to do this work more frequently than are men [8], [11]. In engineering, too, Williams and Multhaup [6] find that women engineers are more likely than are their men colleagues to report being involved in housework tasks (e.g., "keeping the lab tidy"). As with stretch assignments, these gender differences in office housework show up even in the earliest stages of careers: in Beddoes's [12] study of early-career civil engineers, women perceived men to be getting leadership-building assignments while they were being asked to plan the office holiday party or answer the office phone. Factoring in race and ethnicity, early-career women and men engineers from Black, Latinx, Indigenous, and/or Pacific Islander backgrounds are more likely, on average, to do

documentation assignments than are men and women engineers from White and Asian backgrounds, with women from race-minoritized backgrounds having the highest average frequency; these differences are associated with other racialized schooling and job experiences that predict high-frequency documentation work [7].

Prior research also points to disadvantages associated with these low-promotability tasks above and beyond simply being the opposite of what counts towards advancement, and shows how disadvantages may be more deeply felt for the groups more likely to do them. For instance, Mickey [13] draws out how, in a small engineering-intensive start-up, rules and roles were fluid for women and men, and, despite there being a strongly "bro-typed" work culture, employees jumped in a little bit of everything; women interviewees were "part of business decisions" and planned holiday parties at the same time. As the start-up grew, restructured, and went public, however, a gendered division of labor, occupation, and role was rigidified: men dominated the higher-prestige technical jobs and women, the lower-prestige jobs in feminine-typed areas like project management (women engineers, on the other hand, were disproportionately laid off from the firm). Here, low-promotability tasks done by women in a highly masculinized start-up culture foreshadowed deepening gender stratification in the company as it formally built up and out.

Similarly, if there are any *advantages* associated with low-promotability work, they do not necessarily accrue to the groups more likely to do them. Sociological theory shows how high status groups may be able to gain leverage in low status spaces in ways that low status groups cannot (for recent relevant research, refer to [14]). By contrast, however, some types of seemingly low-promotability tasks may carry a penalty mainly for the groups *least* expected to engage in them—in one study of men and women professionals participating in a corporate social impact initiative, the authors found that men participants, not women participants, faced a promotion penalty. The authors then traced this penalty to evaluation: men evaluators assessed those men participants in social impact initiatives as having low "fit" with the firm [15].

2.3 Incremental learning about organizations and advancement

All together, these studies make clear that the assignment landscape is a loaded one. A matrix of assignments that can matter to getting ahead, and assignments that offer comparatively less traction but are more or less essential, is apparent across fields and career stages, including early-career engineering. Gender and racial/ethnic stereotypes, and cultural expectations about competencies based on gender and race, map onto that matrix.[1] Yet students' and recent graduates' learning about these assignments, and about the workspace and organizational dynamics as a whole, may be largely contingent and incremental.

Recent research on early-career engineering practice highlights this incrementalism through the repeated social-professional interactions, constant "boundary-spanning", negotiation, and network-building that early-career engineers engage in as part of their jobs, adjusting their responses to meet workplace and colleague demands, trying to assert and build influence in small and large ways, and taking on increasing levels of coordination and even management in a very

[1] As do stereotypes and expectations based on class backgrounds, language and country of origin, and other group memberships/markers, e.g., [1].

short period of time [16], [17]. Bjorklund, Gilmartin, and Sheppard [18] describe how early-career engineers often engage in "innovation work" that is not necessarily recognized as such by their organizations, and continually adjust and moderate their perceptions and behaviors in a "chained", heavily socially-situated sequence—with a high degree of self-advocacy and (gendered) self-censorship required to fit in and gain positive visibility. Amidst intense and highly dynamic social-professional demands of work, recent graduates' understandings of the "big picture" at their organizations, including the division of labor and structure and distribution of teams, can be cloudy even after starting a job [19]. Networks are not a reliable source of information for everyone, as engineers move into their new careers with varying degrees of social connectedness and sometimes few social ties at work (e.g., [20]). While none of these studies focus on how new engineers come to know the rules and processes for advancing in an organization, they together suggest that this knowledge is informally and individually collected along the way, inferred or gathered from certain managers, project teams, friends, mentors and sponsors, and others.[2]

We also do not know if those same early-career professionals have had much discussion of "low promotability" versus "high promotability" work assignments while undergraduate students. In engineering education, coursework on "how to move up the engineering job ladder" may be infrequent because this very type of knowledge itself could be de-prioritized in a largely de-politicized engineering curriculum (refer to [21]), and/or there is discomfort in the possibility that career-advancing work could undermine the learning of, quality of, and commitment to more routine and elemental work that still needs to get done. More broadly, the school-to-work transition itself is so variable and unstructured, fueled by dominant individualistic ideologies espoused even by recent college graduates exposed to more structural ways of understanding the world [22]. Some students and early-career professionals may not *want* to grapple with the ideas that 1) not all work assignments have the same weight in advancement pathways, and 2) different groups of people are assigned to these different types of work, and are differentially rewarded for that work, in ways consistent with cultural beliefs about those groups more than individual performance or merit (refer to [23], [24]).

Internships can offer a window into organizational practices like assignments, but it is not certain that they equip students with ways to challenge inequitable assignment practice—they can be largely reinforcing mechanisms, introducing students to normative engineering workplace processes (e.g., [25]). Nor is everyone selected for those internships to begin with [26]; in one recent study, Campero [27] finds racial disparities in the screening of software engineering intern candidates that favor White applicants. There is, in short, the likelihood of informational advantages accrued to people already "in the know" as they enter the labor market and workplace (refer also to [26]); more specifically, *project and task assignments at work are a space where inequality can get worse, particularly as structures are not in place to relay career advancement knowledge equitably and for all.*

2.4 Our research and practice questions

[2] Noting that organizational practices around advancement can be obscure even to more senior engineers in flatter, more informal structures of today's firms [1].

Thus, in light of the importance of certain types of work assignments and the unsteadiness in learning about them, our study is designed to set, on a small scale, a "baseline" around what early-career professionals know about stretch assignments (in particular), and begin to develop educational resources accordingly. We focus on stretch assignments for this paper, and not on low-promotability assignments (e.g., office housework), as a key lever of career advancement for recent graduates and a starting point for a longer line of research on early-career work tasks. We also focus on the words and experiences of women graduates, to foreground how groups that are less or deeply underrepresented in leadership positions conceive of advancement levers and barriers from the earliest stages of their careers (given, too, previous research showing that women have fundamentally different and fewer stretch opportunities than do men). Our research and practice questions guiding this work are:

> Research Question 1: How do recent graduates, particularly women from engineering and non-engineering fields, conceptualize "stretch assignments" in their early-career experiences?
>
> a. How do they define it?
> b. How do they talk about its value?
> c. How do they talk about its potential challenges or pitfalls?
> d. How do they talk about access to a stretch assignment—how one gets these opportunities?
>
> Research Question 2: Where do they learn about stretch assignments? What are their formative experiences to this end?
>
> Research Question 3: To what extent do these early career conceptions of stretch assignments reveal conditions and processes that research has shown can exacerbate inequality?
>
> Practice Question 4: Overall, what can their words tell us in terms of how to elevate learning on stretch assignments? What might engineering educators be thinking about?
>
> Research/Practice Question 5: What are we left wanting to know more about after learning from these young professionals?

At the end of this paper, we append a unique resource to test and share with faculty and students to jumpstart conversation.

3.0 Methods

3.1 Study 1: Sample and methods

The first set of data analyzed for this paper are interview data drawn from a larger longitudinal project on gender inequality and leadership development among college students moving into the workforce, described in Carian and Johnson [22]. All interviewees were initially undergraduate students enrolled in a sociology course on gender and leadership at a private, West Coast university in the 2014-2016 academic years. In the 2020-21 seventh wave of interviews with two

different cohorts of interviewees, now college graduates two years out of their bachelor's programs, interviewers added a segment of questions about "stretch assignments", aligned with evolving interests and goals of the broader research group (of which the current authors are a part) as well as new work contexts for interviewees. Of the larger group of 30, 12 interviewees were asked this new question segment, which was placed at the end of the semi-structured interview protocol (asking these questions was subject to the available time in the interviews; the first and long-running part of the protocol was designed to gather information about participants' education and work histories over the previous year as well as their current thinking about gender inequality in broader societal spheres). Interviewees' responses to these questions, and not other questions on the protocol, compose the data analyzed here.

Based on self-reported data, the 12-person sample includes four Asian women, two Latina women, one Black woman, four women from "other" racial/ethnic backgrounds (not corresponding to Asian, Black, Latina, Pacific Islander, and White categories), and one White man (Table 1). Women composed the majority of both the original sample in Carian and Johnson [22] and the subset reported here. Four of the twelve interviewees majored in engineering degree programs and/or completed a concurrent engineering master's degree. At the time of the seventh wave interviews, six interviewees had worked in engineering- or tech-intensive firms.

We engaged in both structured and open coding as we analyzed interviewees' words and experiences. That is, we coded for responses that corresponded to our main research questions (e.g., "value", "challenges and pitfalls"). But within and across those question categories, we considered connective themes and ideas that captured emotion and feeling ("fear"), people and relationships ("manager guides/curates"), and perceived structures or systems ("discretion", "power"). With the stretch assignment excerpts from these 12 interviews, we have a small-scale dataset. As we note earlier, however, we think of these data as setting a small-scale "baseline" to consider how early-career professionals, particularly women, conceive of a certain type of advancement opportunity availed or not to them.

Table 1. Characteristics of Study 1 early-career interview sample

Pseudonym	Interview Cohort	Gender	Race/ethnicity	Engineering major/concurrent master's degree?
Isabella	1	Woman	Latino/a	No
Olivia	1	Woman	Other	No
Viva	1	Woman	Black	Yes
Gabriel	1	Woman	Other	No
Isabel	1	Woman	Asian	Yes
Diana	1	Woman	Asian	No
Taylor	2	Woman	Other	No
Piper	2	Woman	Latino/a	No
Jean	2	Woman	Other	No
Anita	2	Woman	Asian	Yes
Rachel	2	Woman	Asian	No
Sam	2	Man	White	Yes

Cohort 1's 7th wave interview was conducted in 2020. Cohort 2's 7th wave interview was conducted in 2021. Highlighted rows mark the four participants with engineering degrees.

3.2 Study 2: Sample and methods

The second set of data analyzed for this paper are responses to open-ended text box questions about stretch assignments from seven women with undergraduate engineering degrees, newly entering the workforce. These data were collected as part of an ongoing research project at our lab focused on women's leadership development. This project is separate from Study 1, but highly synergistic with our Study 1 interview data and have the added benefit (for this conference paper) of being collected, by design, among early-career engineers. After describing our Study 2 sample and methods in this section, we integrate quotations and themes from Study 2 into our results below–with a focus on if and how the voices and experiences of women in Study 2 aligned with, called into question, and/or expanded our Study 1 dataset. **Study 2 findings are reported in Section 4.4, following Study 1 findings.**

Participants from Study 2 are from the same private, West Coast university as are participants from Study 1. The Study 2 dataset includes data from the first five years of the program (Cohort 1-Cohort 5); these students participated in a year-long women's leadership development program during the years 2017-2022. In addition to completing pre-program (T1) and post-program (T2) surveys, they were also surveyed one year (T3), two and a half years (T4), and four years (T5) after program completion. T4 and T5 surveys are, for many participants, administered during the first few years in the workforce. We included a few questions about stretch assignments at the end of both surveys T4 and T5. The data featured in this paper are from Cohort 2's T4 survey and Cohort 3's T5 survey, both administered in early 2023. They include responses to the following question block:

If you have time for ONE MORE set of questions, we hope you might reflect on an idea that some of our colleagues are testing. They are studying something called "stretch assignments" in people's first jobs out of college.

Broadly speaking, a "stretch assignment" is a work assignment that is particularly important for getting ahead. At some organizations this can be called something else, like "growth assignments" or "developmental assignments".

Please feel free to write as much or as little as you like as you answer the questions below. And your answer can be "I don't know" - that is a perfectly acceptable response!

1. *What types of assignments are particularly important for getting ahead where you work?*
2. *What have been your experiences with these types of assignments where you work?*
3. *Anything else you want to share with us about "stretch assignments" where you or your friends work?*

We used a similar analytical strategy as for the Study 1 interview data described above. We employed both structured and open coding and coded for responses that corresponded to our main research questions. Table 2 reports the self-described characteristics of the Study 2 sample.

Table 2. Characteristics of Study 2 early-career survey sample

Participant	Survey Cohort	Gender	Race/ethnicity	Engineering major/concurrent master's degree?
1	3	Woman	Asian	Yes
2	3	Woman	Black	Yes
3	2	Woman	White	Yes
4	2	Woman	Asian	Yes
5	2	Woman	White	Yes
6	2	Woman	Asian	Yes
7	2	Woman	Latino/a	Yes

4.0 Research Findings

4.1 Conceptions of stretch assignments (Research Question 1)

Defining stretches. When asked what comes to mind when they think of the term "stretch assignments", Study 1 interviewees' responses ranged from "I don't really know" to words and understandings very closely aligned with more senior professionals in other studies of stretch work (e.g., [1]). For example, Anita, one of the four engineers in our sample, immediately connected stretch assignments to promotions, naming their relevance to advancement right away:

> [Stretch assignments have] been coming up for me recently. Recently in conversations about promotions and how to gear yourself up for promo…You do need people who support you while you do stretch assignments, or people to give you stretch assignments, because that's how you get promoted.

Anita spoke about how stretch assignments proved, to influential others in an organization, a person's "next level" ability and drive: "[you need opportunities to] prove that you can do a thing before you have to do the thing".

For several other interviewees, this proof element unfolded more slowly over the series of questions. Their initial descriptions focused on the challenge, growth, and learning dimensions of a stretch assignment—this was work that was "out of your comfort zone" (a common phrase in this and other stretch research), pushing a person outside of what was "expected" of them in their current role. Piper discussed how a stretch assignment was "an opportunity to expand [your] skill set and learn new things in the process". However, after interviewers prompted them to link stretch assignments to career advancement ("researchers think of it as something that is important for getting ahead in a job"), interviewees repeatedly described such assignments as involving "high visibility" work establishing one's credibility, trustworthiness, reputation, and potential in an organization. As Jean noted, to do "good work on your team" is one thing, "but ultimately to career-progress, you need people outside of your team and above you and adjacent to also be supporting you—[you need assignments] that have high visibility." Stretch assignments were proving mechanisms that set people up for advancement in their organizations in decisive ways.

Taylor, Rachel, and Diana cast stretch assignments in more negative terms, e.g., "free labor" on supervisors' "pet projects" (Diana), "dangerous" and perhaps even "illegal" tasks to help organizations gain competitive market advantage (Taylor), "a veiled way of giving people more difficult and harder work for below their pay grade" (Rachel). These interviewees may have been more skeptical of stretch work than were others, but they were not alone in naming discomfort. Stretch assignments were "not going to be fun to do" (Isabel); "success" was, by definition, not guaranteed (Jean); and they could make you "scared" (Isabella). Interviewees shared a sense that there was risk in a stretch ("it's a high risk/high reward situation", Anita pointed out).

Value. Interviewees perceived stretch assignments to be valuable in three major ways: they could increase visibility, ensure access to subsequent high profile assignments, and make the case for promotion. But not everyone was clear on these outcomes. For instance, Gabriel on one hand said a high visibility stretch assignment could give her a "leg up" at her company, but later in the interview, said "not much" could be expected to come from it. It might "hopefully" contribute to a promotion but was not the only thing. Taylor was unsure if promotions were at all attributable to stretch assignments. Value may have been more clearly realized through stronger and more far-reaching relationships at an organization—as Jean and Anita relayed, people seeing and supporting you, or as Piper said, "the important assignments are those led by people who will advocate for you. I don't necessarily think that it's about the work that you're doing, but more about who you do it with." And/or the value may be realized too late, because it is not communicated clearly enough, if at all. Isabel, another engineer in our sample, commented on

the "secret" (unwritten) importance of a stretch assignment and how her peers do not know the value until they are passed up for promotion:

> *Isabel*: I actually feel like stretch assignments in a way are actually, like, secretly mandatory to get promoted, but they get advertised as like, "This is a bonus thing to do," right? But actually I think that you kind of need to do them to, like, move up, and then people forget that they need to do them and then, you know, the outcome is not as optimal as they would have hoped…
> *Interviewer*: How do people find out that they're kind of mandatory?
> *Isabel*: They find out when they don't get promoted. They find out, like, too late, I think.

Isabel's comments on the mis-construction of stretches as optional and non-essential calls for a second look at words of another interviewee, Olivia, who indicated that stretches are more important later on in one's career (not in the early stages), and at a large organization (not the smaller organization she currently works for). Olivia did not appear to feel that much work was make-or-break for her now—things at her organization were collaborative, generously assessed, and straightforward. However, even Olivia's assessment might not be so simple—we revisit more of her words and observations below.

Challenges and pitfalls. Even for these early-career interviewees, just two years into the workforce, they anticipated serious consequences to a stretch assignment not going well. Although a few interviewees could not name a downside to a stretch assignment and admitted that they hadn't thought that much about it, others readily named risks to one's reputation and credibility, in addition to the loss of promotion, as Isabel described, and the potential for getting taken advantage of, as Taylor, Diana, and Rachel expressed. If a stretch assignment goes poorly, people "won't want to work with you", Piper commented. Trust falters, Isabella said:

> [If an assignment does not go well, you] lose trust and [it] doesn't look good on your reputation, credibility. Lose trust for sure. People lose trust in you.

Sam, an engineer commenting on other early-career engineers, noted that poor performance on a stretch assignment could mean that someone "really junior" would get "transferred" or "fired", although he qualified that this was not necessarily common. Mid-level professionals, by contrast, would simply start receiving fewer and fewer stretch opportunities. In Sam's understanding of the technical ladder at his company, in other words, stakes could be especially high for early career.

Access. Several interviewees described access to these assignments as being driven by top-ranking people in an organization, or as Isabella noted, from "someone in power". Assignments are just that, in other words—projects and tasks assigned by influential decision-makers in an organization who determine work flow and allocation. Sam described a planned and rational allocation process based on the decision-making by senior engineering leaders:

> There's a really senior engineer who's in charge of a domain, a technical domain, and then he kind of works with the other senior engineers and the executives to figure out what's the high level direction we want to move in with this domain, especially in

> relation to other domains and how they intersect. And then within that domain you have several different teams. Each team is headed up by a manager who doesn't do any coding or anything, and that manager coordinates with the senior engineer to basically break the projects down into smaller chunks, and then they assign them to individual engineers on the team. And those engineers, they're all working on one project, it's just different pieces of one or two big projects. And so that senior engineer and the managers play a big role in figuring that out. And of course they consult with the people on the team, especially the more senior people on that team, to divvy things up, but ultimately it's coming from the top.

Managerial discretion, however, in "divvying things up", did not happen in a vacuum. Jean emphasized that perceived merit, or demonstrable competence, was a determining factor in access to high visibility work ("I think all the people that I've seen get the high priority things are just people that get things done, and get things done well, and consistently do things that are good, and pay attention to detail") but that managers also assign work based on "trust"—a factor echoed by others in describing who gets a stretch. Rachel added the importance of being "notable" –suggesting it is more than just merit, it's being *known* for your merit, conflating "competence" and "being notable" by the end of her remarks:

> I would expect it would be *whoever has been more notable* in the work that they've been doing, so it would probably be someone *who has been seen more* and *has shown* that they are reliable, and potentially someone who can take on more work. So sometimes it's the people who are more competent at their role who would be given a stretch assignment. [Italics added]

Others stressed that stretch assignments were not so much handed out by managers than actively sought out on one's own, and volunteered or self-nominated for. This, too, was not an unmediated process. Of her research lab experience, Diana noted that being "aggressive" and "knowing where to be at the right time and [talking] to a lot of people [to] find out which are the good projects and [going] and insert[ing] themselves in there" was key. As Isabel stated, so too was having a few more years of tenure and record-building at an organization and broader perceived skills and "energy", in her experience:

> [You] kind of take [stretch assignments] upon yourself… And I think I get assigned some of this a bit more just because I'm a little bit more of a generalist and, you know, joined [my company] a bit earlier. And I guess have…I guess my coworkers think I have a lot of energy.

Yet even with actively signaling one's energy, "interest", and "commitment", Piper stated in the very next breath that it's White men who have an "easier" time getting them:

> *Interviewer*: How do people typically get those assignments? How are they assigned?
> *Piper*: I think that a lot of it is on me, on the person who wants the assignments, to reach out and make themselves known and express some sort of interest . I think that a lot of people are willing to take you under their wing and help you if you show that you're committed and that you want to learn from them and work with them.

> *Interviewer*: Who usually gets those types of assignments?
> *Piper*: White men. I feel like they're the ones who…one, they have it easier. I feel like they don't have to put in as much of the work to reach out to them. I don't know why they stand out, but they do stand out in class. Or maybe standing out is not the right word. But things like that. Like professors, or not just professors, like people tend to be more open to them, so then half of the work is done for them before they even have to reach out. Unless a person is particularly focused on opening doors and giving—not given up—like expanding opportunities for minority people or women.

Viva, an engineer, underscores this caveat in a general sense. Stretch assignments happen by "raising your hand" for one, but are still given, or green-lit, depending on someone's personal "brand":

> Goes back to branding. People [who get these assignments] who are perceived as competent. Passionate. And have a record of having small successes along the way.

Viva's words drive home the chicken-and-egg conundrum of a stretch: does one need access to a stretch assignment to get visible success and proof of ability at an organization, or does one need those visible successes in order to gain access? And do White men, as Piper indicates, have visible success from the get-go?

Across all interviewees' words, there was little to suggest awareness of a formal system of assignment allocation (if it even existed), and little to indicate that stretch assignments involved an equitable allocation—these were trust-driven processes going to name-brand candidates, candidates who had shown themselves to be "notable" and "reliable", and/or the most "aggressive" seekers. Based on Olivia's initial words, her organization was an exception, but even she then describes work processes where higher-profile assignments seemed "randomly" doled out and paid high dividends—a parallel path running alongside the person "in theory" who coordinates task allocation at her office:

> There's just like one person in my office who, like, is in theory in charge of somewhat keeping track of like what people are doing. But yeah...I mean you can also put your hand up. Like, when we have meetings, like when we're in the office and we have meetings, you know, like, "Oh, that sounds interesting to me. I'd like to go to that meeting." Normally you can, and then if it's a sensitive meeting, they'll just like randomly pick [who goes]...The senior-most people who, like, need to be there will go, but then for the kind of open spots, [other] people will go, and then if you were in that meeting you're more, and then that turns into something actionable, like a project moving forward, then you're more likely to be kind of a part of that team. That project team or whatever. Yeah.

4.2 Sources of learning (Research Question 2)

Nearly all Study 1 interviewees drew from on-the-job experience in sharing their understandings of a stretch assignment. "On-the-job" includes rotation programs that interviewees were placed in at their new companies, multiple jobs since graduation (for some, their current role and organization was not the same as where they started when they entered the workforce), and even

research lab experience in graduate school. Some had more firsthand experiences with a stretch assignment, or what they conceived a stretch assignment to be, than did others. Anita is someone who detailed many stretch opportunities in her interview, and was a "big believer" in their importance. Here are three of her examples of stretch experience as an early-career engineer in a technology company—noting many of the stretch elements described above in her words, namely managerial discretion, trust, high visibility, and challenge:

- "And so one of our biggest projects…was [launching a new software feature]. And I had a really good relationship with my manager…and because of circumstance I was able to work on a very important feature for that year. And when it launched it got press, it got companywide acclaim.
- "I got to present to our CEO and our chief product officer. And it's not an opportunity that [everyone] involved in my cohort got, and I got lucky because my manager was like you're a good public speaker, you can present yourself well, you can present your ideas well, go do this, and if there's questions that you can't answer, I'll back you up."
- "And so even in my time on the privacy team I got to work on a very tough technical project that was the No. 1 priority for the team."

Rachel, someone who did not detail many stretch experiences yet, "guessed" that she had a stretch opportunity "once or twice" so far. No one specifically mentioned an undergraduate educational setting in which they learned about these types of assignments at work, albeit this question was not directly asked on our interview protocol. Piper's description of White men having an "easier" time getting recognized and selected could be located in her current graduate school experiences, or her undergraduate experiences. Whatever the setting may be, however, it is notable that Piper describes gender and racial biases held and exercised not by workplace supervisors but by professors.

4.3 What participants' words reveal about conditions and processes driving inequality (Research Question 3)

In our third research question, we explore how these early career understandings of stretch assignments reveal conditions and processes that research has shown can exacerbate inequality—particularly by amplifying the tendency towards overreliance on stereotypes and bias in decision-making. The assignment space is exactly this decision-making "arena" in which allocation and rewards can work in highly gendered and racialized ways. To this end, we turn our attention to one well-established context in which inequality thrives: *ambiguity* [23], [28]. Our data paint a picture that is full of ambiguity—most notably revealed in a set of inconsistencies and contradictions in interviewees' conceptions of stretch assignments, where they are seen as: random versus meritocratic processes, opportunities for innovation versus replications of old systems, and focused on growth and development for the employee versus benefiting the employer at the employee's expense. We also uncover a simultaneous knowing and not knowing about stretch assignments that reveal a set of underlying assumptions and beliefs about how "work works".

Stretch assignments were described by our Study 1 interview participants as both "random" and as part of a meritocratic process, where rewards are doled out based on talent and ability and awarded to those who most deserve them. For example, as we observe in Olivia's narrative quoted in Section 4.1, the process of being selected for a stretch is perceived as random, i.e., people are randomly assigned to attend meetings and then selected for stretch assignments based on attendance at that meeting. This sentiment—that there is no real rhyme or reason for who gets these assignments—was echoed in others' accounts as well. At the same time, many interviewees described a strongly meritocratic context within which stretch assignments operated, extending out from dominant ideologies in undergraduate settings, including undergraduate engineering settings [21], [25]. Jean's words above underscore this meritocracy narrative—stretch assignments and the chance for important, career-advancing work go to people who "consistently" "get things done well". Then, woven through random and meritocratic understandings was the importance of "branding", showing "passion", and being a White man—underscoring the swirl of perceptions of process across this small group of interviewees.

Another contradiction that emerged from the data was in conceiving stretch assignments as an opportunity to do something new versus replicate existing systems. For example, Anita described a type of stretch assignment that involved very technically complicated work, both for the individual engineer and for the organization as a whole– "it's just very important and hard" and "you will be rewarded richly because you created a thing that we [our organization] didn't think we could do". Yet Isabel observed that stretches involve getting closer to the evaluation metrics applied to more senior, established people in one's organization or field. In other words, stretch assignments essentially mold candidates into the shape of existing leaders, taking on more of a reproductive than novel or innovative element:

> I, like, honestly can't, like, pinpoint an exact [assignment that matters to advancement] because [finance] is, like, the most broad industry…I guess one thing is, you know, you do get evaluated at a certain level, like, by your deal flow, and, like, the number of [companies] you have connections to and, like, the quality and caliber of the [relationships] you have access to, so I think maybe a stretch project is making sure you host events every month with, like, you know, the best of the best in this industry.

While many interview subjects perceived stretch assignments as an opportunity for growth and development, there were also several who put forth a contradictory perspective - stretch assignments are actually for the benefit of the employer at the employee's expense. Taylor described a process that is "manipulative" and noticed an exploitative pattern that put women at greater risk.

> I also find that it goes to people who can't say no, who internally—and I think this is a lot of times women who are like I can really only say yes, like I've never been trained to say no.

We observed distinct fear and concern about being taken advantage of, as well as dread (it "was not going to be fun" as Isabel put it) from several women. These emotions may be understood as part of a larger system of inequality in which lower-status groups *have* to understand stretches in much more cautious terms, through a more cautious lens, than do higher-status groups. The

rewards are not always clear (not only expressed by women in this sample, but suggested in [7] as well). The road to these assignments involves visibility, which can heighten scrutiny and doubt (refer to [23]). By contrast, we observed a relatively trusting and straightforward description of the stretch assignment process coming from Sam (our one White man in the sample) and, to a lesser extent, Anita, who was excited and savvy about stretch assignments but also eager to learn more, and worried about advancement:

> Maybe I wasn't plugged into the conversation before, but I would say with the past three or four months, whenever I've asked female leadership mentors who I look up to—even male mentors, actually—and I'm like hey, how do I make sure that I can get to this next level in this time frame, more often than not the things that they'll say involve talking about stretch assignments and being like "build up trust, prove that you can do this, ask for work, or ask for opportunities, or look for opportunities yourself."

The final area where we observed considerable inconsistency and contradiction was in simultaneous knowing and not knowing about stretch assignments. As the interviews unfolded, it was evident that while some interviewees did not have a comprehensive definition for a "stretch assignment" at their fingertips, even these interviewees named key parts of a stretch (e.g., work that garners high visibility in an organization) as soon as they were prompted to think of such tasks as important to career advancement. They would quickly shift from "I don't know" to being able to name processes and systems with distinct potential rewards and penalties. Rachel's words, heavy on a sense of "I don't really know but here is what I expect based on what I have heard" (an amalgamated quote from her transcript), hint at what sociologists call "third-order inference" (refer to [28]). In a context of uncertainty and not feeling sure, she relays what *she* thinks *others* think about how stretch assignments work, and in doing so, pulls from more readily available, dominant ideologies (e.g., beliefs in meritocracy) to outline who has access. These quick shifts from not knowing to knowing show us how the concept of a "stretch assignment" can be part of a shared cultural script about workplace advancement, one that perpetuates ways of thinking and believing that justify unequal and inequitable outcomes.

The inconsistencies and contractions jumping out of our data are important for understanding why stretch assignments are fertile ground for inequality to manifest in the workplace, especially in the early career. They reflect, we would suggest, the lack of clarity and unsteady ground that people who are not in the dominant group have around "secret" workplace rewards and opportunities. As we conducted these interviews, we observed these young professionals actively engaged in *sense-making* around stretch assignments—puzzling through what they have experienced and their underlying assumptions about how "work works". We could trace them grasping to make sense of a system that may or may not even exist. Yet at the same time, for many, the process of answering the interview questions seemed to reveal a *deep sense* that something else besides drive and merit was at work with what these assignments were, how someone got them, and what they led to (or did not seem to lead to). This deep sense could help to explain the unease and apprehension some felt about the entire concept.

4.4 Study 2: Synergistic findings and new insights from a different dataset

With Study 2, we sought to take the lens and learnings from Study 1 and consider how these ideas played out in a different set of data collected from a focused sample of women engineering graduates. Did the themes and contradictions repeat across this new sample? The short answer is yes, with new and synergistic insights emerging around gender, engineering learning, and stretch work.

How Study 2 participants defined a stretch assignment, or work that mattered to getting ahead (staying consistent with the turn of questions in Study 1), was very much aligned with Study 1 interviewees and, again, with studies of career-advancing stretch assignments at mid-level and senior-level ranks. Recent graduates' words ranged from "I am not really sure yet" to "Software projects with high visibility, high 'impact' (especially financially), and that involve creating something new". These participants also stressed the increasing work and team responsibilities involved in a stretch assignment, as well as "ownership" of many moving parts of a project.

Challenges and pitfalls of stretch work were vividly described by Study 2 women, substantively adding to the picture of such challenges in Study 1. First, we observed again vulnerability and trepidation about the entire stretch space, expressed in this engineer's words:

> I haven't been given a task like this yet and I am not sure that I could even handle it at this time. I think if I took initiative to solve a problem that was unassigned to me, that would be kind of unexpected and a "stretch" for what's expected of me in my current position, but I am not familiar enough with everything that my team does to take initiative and do that.

We also observed a gendered bind that did not come up in Study 2: taking on stretch work as a chance to learn and prepare for promotion, and yet how risky it is to present oneself as a "learner" even when women have no choice, culturally speaking:

> When it comes down to it, people at work are often not really paying enough attention to what you do and do not think critically about the work you've done or your progress. They will rely on you to tell them how you're doing. If you are someone like me (and like a lot of individuals who have been socialized to not brag about themselves and to be incredibly harsh about themselves and their efforts), then being thoughtful about all the ways you could've done something even better and erring on the side of 'this isn't my best work' can quickly backfire.

Other participants spoke about the value of stretches in terms of confidence-*building*, as in this comment:

> I usually find it difficult to keep up in the beginning but I stick with it and then become more comfortable as time goes on. I feel anxious about whether everything will come together at the end but everything is always fine at the end so these experiences have given me confidence in my abilities.

Putting these two comments next to each other, we observe an essential complexity of a highly gendered domain like engineering: early-career engineers need experiences to build confidence,

but women cannot actually then show that confidence—and nor can they come across as a novice or a learner either. These findings are right in line with previous research indicating that new area stretch assignments for early-career engineers (i.e., assignments in new and unfamiliar domains) are associated with clearer rewards for men than for women [7]. Stretches call attention to a cloudy, if not highly precarious advancement landscape for minoritized engineering groups.

Study 2 participants pinpointed two other key ideas about stretches. First, one woman extended Piper's observation of men's assignment advantage to the workplace, not just educational settings:

> It's easier for men to get noticed when they do any sort of 'stretch assignment' because male managers often have a preexisting gendered expectation for men to do well. Being loud about the work you're doing and 'looking the part' is often a big part of getting ahead (at least at my first company).

Second, in terms of sources of learning about stretch assignments, we note that one participant held a Responsible Engineer role at her company within her first few years on the job, and this role appeared to encapsulate many dimensions of a stretch, namely ownership and visibility:

> At my company we have this concept of "Responsible Engineer" (RE) who is responsible for owning their hardware or tests 100% end-to-end…I had the most growth when I was asked to be RE of several tests. I was responsible for setting test objectives, getting hardware ready to be tested, monitoring hardware health during tests, analyzing data and held an informal leadership role amongst the team of technicians and test engineers I worked with. It was highly visible to the company and senior/executive leadership - I provided daily updates on our progress.

Her words indicate that engineering workplaces may have built-in, codified stretch opportunities, given such jobs as an RE. In light of considerable ambiguity, contradictions, and differential advantages expressed through the words of all Study 1 and 2 participants, the question becomes: how to ensure equitable steps to getting these opportunities, and then leveraging them for future advancement?

5.0 Discussion and Practical Implications: What Might Engineering Educators be Thinking About? (Practice Question 4)

These data affirm that stretch assignments, and career-advancing work more broadly, are being observed by recent graduates, can be described by recent graduates, are worried about by recent graduates, and are experienced by recent graduates—i.e., stretch assignments happen for early-career professionals across fields. In our interview sample, the stories shared by Anita, Isabel, Isabella, Jean, Taylor and others attest to real-life examples of getting what they saw as and connected to "stretch assignments" and having more or less support in executing them. Most of these early-career professionals could conceive of consequential outcomes for doing these stretch assignments successfully, or not successfully, noting positive or negative visibility and deepening or breaking trust in an organization based on how a stretch goes. Several either expressed a need to be savvy about them, including Anita, Isabel, and Viva, or, as they actively

made sense of stretch assignments during the interviews, showed the importance of getting savvier. There was real risk observed by our research participants—getting taken advantage of, getting overlooked for promotion, getting outcomes that were the opposite of what one had hoped for (e.g., planning birthday parties rather than deepening key relationships, as Viva outlined). The lines between access and assignment, and between assignment and outcome, were not clear for several interviewees, nor was there consensus on how stretches work—rather, there were many contradictions. We also learned of early-career experiences in which people described supportive managers and getting Responsible Engineer roles, votes of confidence from one's team and team leaders, mentors and sponsors sharing the importance of getting these stretch opportunities, and even the possibility that "in theory" there can be people in organizations to monitor how work is allocated and to whom.

For educators, especially engineering educators recognizing how thoroughly the early-career engineers in this study articulated stretch work, there is a question of what happens when recent graduates do not have a lot of experience in those first few years on the job. Also evident in our research is that not everyone shares the same understandings, the same words, about a stretch assignment, and this can relate to a person's position and privilege in the world. It is easy to see how Isabel's point that people find out about stretch assignments too late could deeply derail efforts to bring more women, for example, into engineering leadership pathways. Starting with just two women new hires at a hypothetical men-dominated engineering firm, compared with 15 men new hires – at a group level, who has more access to that "secret" knowledge about promotion will determine who stays, and if those two women do not have this access, the cohort finds itself replicating larger inequalities in the engineering workforce within the first months of stepping foot into a new job.

So what kinds of supports might educators set up to bolster learning and conversation about these unwritten rules? In Appendix A, we suggest one such support: a worksheet to bring to engineering student, faculty, and staff settings where students can consider a hypothetical scenario around a stretch assignment and then engage in discussion questions with their peers. This scenario is built from our data in this study as well as other research on stretch assignments and the unwritten rules of work; we have designed this worksheet to connect with a similar worksheet developed for ASEE 2023 [29]. Faculty might include this worksheet in course sections as part of professional preparation modules, or the worksheet could be integrated into co-curricular opportunities for engineering students offered at the college or school level. The worksheet calls attention to terms like stretch assignments, brings students into small group discussion, and then prompts larger discussion about how to equip all students, not just a small and informed few, with knowledge about the "workings of work"– that is, how to disrupt informational advantage that can deepen structural inequality in engineering. Resources like this worksheet, alongside many others like it, can help to address the contingent, incremental, and uneven learning about decisive work experiences (refer also to Section 2.3) that create the very conditions in which bias and stereotypes thrive. Our worksheets also are works-in-progress and will benefit from continued piloting and iteration over time.

We note two additional points for educators and educational researchers. First, it became more and more apparent to us as analysts that the very act of asking these questions to interviewees was an intervention in their early work lives, giving them an opportunity to reflect on and

articulate these processes and dynamics in ways that many, if not most had not done yet. So, while the call to action for building learning experiences around these dynamics is clear, our realization also underscores the importance of keeping up research in unwritten spaces like this—keep asking questions, keep exploring with our research participants what these phenomena look and feel like, in order to not only build towards generalizable knowledge, but give participants themselves a chance to name what they deeply sense, what they know already, and what they would like to learn more about. We see our call aligned with similar calls for consideration of and question-asking about "hidden curriculum" in engineering education, and education more broadly (refer to recent work by Idalis Villanueva Alarcon [30] and Jerry Yang, Joseph Towles, Sheri Sheppard, and Sara Atwood [26] as two examples).

Second, as we have discussed, stretch assignments had analogs in research lab settings in graduate school. Diana very clearly articulated key components of career-advancing stretch work (e.g., having and gaining visibility through them; raising your hand for and aggressively finding the "right" projects that would lead to, in her case, publications and funding; the risks of not going after the "right" projects and getting taken advantage of; and perceiving the value of a stretch as almost solely accrued by the employer/Principal Investigator). Her personal experience in graduate school around this type of work was not positive, and she linked this to having very little mentorship and sponsorship centered on her development: "I feel like… PIs [aren't] really interested in teaching me and mentoring me and caring about me as a person, beyond what I can do for their project and their lab." To us, the concept of a stretch assignment as it is understood by young people early in their careers brings up perhaps the most critical practical takeaway of all: we must keep up mentorship and support of our students as they transition into advanced degree programs and the workforce, to ensure they are given ample opportunities to learn, "stretch", contribute to their fields, and make strides in their careers.

6.0 Limitations and Future Directions after Learning from these Young Professionals (Research/Practice Question 5)

Our data and methods for this paper are limited to the extent that we have only analyzed one focused segment of data for each participant–for instance, for Study 1 interviewees, not only is there a longer transcript of their full interview, but there are multiple interviews with each person over time. Further, while we state that our goal is to set a small-scale "baseline" on early-career professionals' understandings of stretch assignments, we recognize that a larger-scale "baseline" could reveal new voices not represented among our research participants, and/or dimensions that we have not yet pulled out and could substantively inform educational practice. We did not examine women's intersectional locations in the stretch assignment landscape for this paper, noting that none of the interviewees in Study 1 self-identified as White, and only two survey participants in Study 2 identified as White; the voices in this research include women of color and yet we do not delve deeply into how each woman's unique position as, for example, an Asian woman engineer, or a Latina woman graduate from a non-engineering field, shapes their knowing of stretches and the benefits and risks they conceive being attached to them. Finally, we are in a still-nascent research space about early-career trajectories and the unwritten rules of work, sitting between at least two well-established bodies of scholarship in this paper–sociological research on workplace inequality and engineering education research on early-career engineering practice–and we are still learning how to maximally integrate the two.

Given these limitations, we propose many questions for future research, drawing from both our own datasets and our data still to be analyzed, and other datasets as well, using new types of qualitative and quantitative methods. We begin with among the most salient questions for us at this stage. Jean ended her interview with a telling single statement about stretch assignments. It may seem like the simplest statement, but to us, it is one that encapsulates the curiosity, vulnerability, hesitation, and deep sense, or deep knowing, that surrounds stretches–and career advancement more broadly:

I guess I need to think more about them.

In that statement, we can conceive of so many possibilities, beginning with: what more *are* early-career professionals curious about when it comes to "how to advance"? What are *their* burning questions at the two-year post-graduation point? What is top of mind for them at this time, and how might this foreshadow work trajectories to come?

Relatedly, we wonder, for interviewees such as Isabel, Isabella, and Jean, who name dimensions of stretches like trust, power, and secrecy without necessarily conveying that these dimensions could lead to unfair or problematic outcomes at work, what is their pivot point, if any? Which set of experiences might spark more intentional engagement in the privileges behind that type of assignment "system"--and/or which set of experiences might point them towards the other direction, where they rationalize outcomes as "lucky" or earned through hard work alone? Who among this group of early-career professionals, including early-career engineers, will mobilize for change to status quo practice–and why?

Finally, future research questions might center on which types of, and how many, reference points are important for people learning unwritten rules to feel equipped to navigate, and savvy about, workplace advancement–especially women in engineering spaces that are radically imbalanced in terms of gender ratio and gendered technical structures. As one of our Study 2 engineers put it, "I feel like I am always on a stretch assignment" in her early career professional spaces–it is all so new, intense, and high stakes. Given this idea that the entire early career stage is itself a stretch, understanding more about reference points becomes even more critical. And how does the experience and accumulation of these reference points, both in education and work settings, vary by socioeconomic resources and race and ethnicity, demanding critical assessment of any proposition that stretch assignments are only experienced in "this way"? Surfacing this variation and thinking about strategies to realize more equitable advancement in the very earliest stages of professional careers is, to us, imperative to a flourishing future of work.

References

[1] M. Tobias Neely, S. K. Gilmartin, C. Simard, J. D. Wehner, A. Rao, and S. Kennedy, "The lifecycle of a stretch assignment: Flexible bureaucracy, advancement, and inequality in the new economy," paper presented at the annual meeting of the American Sociological Association, Online, August 8-11, 2020.

[2] D. V. Day, "Leadership development: A review in context," *The Leadership Quarterly*, vol. 11, no. 4, pp. 581-613, 2000.

[3] I. E. De Pater, A. EM. Van Vianen, M. N. Bechtoldt, and U.-C. Klehe, "Employees' challenging job experiences and supervisors' evaluations of promotability," *Personnel Psychology*, vol. 62, no. 2, pp. 297-325, 2009.

[4] I. E. De Pater, A. EM. Van Vianen, and M. N. Bechtoldt, "Gender differences in job challenge: A matter of task allocation," *Gender, Work & Organization*, vol. 17, no. 4, pp. 433-453, 2010.

[5] K. S. Lyness and D. E. Thompson, "Climbing the corporate ladder: Do female and male executives follow the same route?", *Journal of Applied Psychology*, vol. 85, no. 1, pp. 86-101, 2000.

[6] J. C. Williams, and M. Multhaup, "For women and minorities to get ahead, managers must assign work fairly," *Harvard Business Review*, 2018, March 5.

[7] S. K. Gilmartin, S. R. Brunhaver, S. Jordan-Bloch, G. G. Rosa, C. Simard, and S. D. Sheppard, "Early-career assignments and workforce inequality in engineering," *Engineering Studies*, 2023.

[8] L. Babcock, M. P. Recalde, L. Vesterlund, and L. Weingart, "Gender differences in accepting and receiving requests for tasks with low promotability," *American Economic Review*, vol. 107, no. 3, pp. 714–47, 2017.

[9] J. Trevelyan, and S. Tilli, "Longitudinal study of Australian engineering graduates: Perceptions of working time," paper presented at the annual meeting of the American Society for Engineering Education (ASEE), Pittsburgh, PA, June 22-25, 2008.

[10] J. Trevelyan and B. Williams, "Value creation in the engineering enterprise: An educational perspective," *European Journal of Engineering Education*, vol. 44, no. 4, pp. 461-483, 2019.

[11] L. K. Nelson, A. Brewer, A. S. Mueller, D. M. O'Connor, A. Dayal, and V. M. Arora, "Taking the time: The implications of workplace assessment for organizational gender inequality," *American Sociological Review*, vol. 88, no. 4, pp. 627-655, 2023.

[12] K. Beddoes, “Gender as structure in the organisational socialisation of newcomer civil engineers,” *European Journal of Engineering Education*, vol. 47, no. 1, pp. 102-116, 2022.

[13] E. L. Mickey, “When gendered logics collide: Going public and restructuring in a high-tech organization,” *Gender & Society*, vol. 33, no. 4, pp. 509-533, 2019.

[14] R. Keynton, and K. Lee, “Taking the glass escalator theory to school,” *Socius*, vol. 10, 2024.

[15] C. Bode, M. Rogan, and J. Singh, “Up to no good? Gender, social impact work, and employee promotions,” *Administrative Science Quarterly*, vol. 67, no. 1, pp. 82-130, 2022.

[16] B. K. Jesiek, N. T. Buswell, and S. Nittala, “Performing at the boundaries: Narratives of early career engineering practice,” *Engineering Studies*, vol. 13, no. 2, pp. 86-110, 2021.

[17] B. Lutz, and M. C. Paretti, “Exploring the social and cultural dimensions of learning for recent engineering graduates during the school-to-work transition,” *Engineering Studies*, vol. 13, no. 2, pp. 132-157, 2021.

[18] T. A. Björklund, S. K. Gilmartin, and S. D. Sheppard, “The dynamics of innovation efforts in the early career,” *Creativity and Innovation Management*, vol. 32, no. 1, pp. 80-99, 2023.

[19] S. R. Brunhaver, R. F. Korte, S. R. Barley, and S. D. Sheppard, “Bridging the gaps between engineering education and practice,” in *U.S. Engineering in a Global Economy*, R. B. Freeman and H. Salzman, Eds. Chicago, IL: University of Chicago Press, 2018, pp. 129-163.

[20] B. Lutz, N. E. Canney, and S. Brunhaver, “‘I wish I could do more’: A qualitative meta-analysis of early career engineers’ perceptions of agency in their workplaces,” paper presented at the annual meeting of the American Society for Engineering Education (ASEE), Tampa, FL, June 16-19, 2019.

[21] E. A. Cech, “The (mis)framing of social justice: Why meritocracy and depoliticization hinder engineers’ ability to think about social injustices,” in *Engineering Education for Social Justice: Critical Explorations and Opportunities*, J. C. Lucena, Ed. New York: Springer, 2013, pp. 67-84.

[22] E. K. Carian and A. L. Johnson, “The agency myth: Persistence in individual explanations for gender inequality," *Social Problems,* vol. 69., no. 1, pp. 123-142, 2022.

[23] S. Correll, “Reducing gender biases in modern workplaces: A small wins approach to organizational change,” *Gender & Society*, vol. 31, no. 6, pp. 725–50, 2017.

[24] C. L. Ridgeway and S. J. Correll, “Unpacking the gender system: A theoretical perspective

on gender beliefs and social relations," *Gender & Society*, vol. 18, no. 4, pp. 510–531, 2004.

[25] C. Seron, S. Silbey, E. Cech, and B. Rubineau, "'I am not a feminist, but. . .': Hegemony of a meritocratic ideology and the limits of critique among women in engineering," *Work and Occupations*, vol. 45, no. 2, pp. 131–67, 2018.

[26] J. Yang, J. Towles, S. Sheppard, and S. Atwood, "'Barbed-wire boundaries': Hidden curriculum, first-generation and low-income engineering students, and internship acquisition," *Journal of Women and Minorities in Science and Engineering*, 2023.

[27] S. Campero, "Racial disparities in the screening of candidates for software engineering internships," *Social Science Research*, vol. 109, p. 102773, 2023.

[28] S. J. Correll, C. L. Ridgeway, E. W. Zuckerman, S. Jank, S. Jordan-Bloch, and S. Nakagawa, "It's the conventional thought that counts: How third-order inference produces status advantage," *American Sociological Review*, vol. 82, no. 2, pp. 297-327, 2017.

[29] S. K. Gilmartin and S. Jordan-Bloch, "Managers, reporting structures, and re-orgs: Volatility and inequality in early-career engineering and implications for educators," paper presented at the annual meeting of the American Society for Engineering Education (ASEE), Baltimore, MD, June 25-28, 2023.

[30] I. Villanueva Alarcon, "Hidden curriculum: An image holder of engineering," *NAE Perspectives*, 2023. Available online at: https://www.nationalacademies.org/news/2023/02/hidden-curriculum-an-image-holder-of-engineering

Appendix A. Learning Resource/Worksheet for Engineering Educators and Students

DEMYSTIFYING THE UNWRITTEN RULES OF WORK: STRETCH ASSIGNMENTS AS LEVERS OF ADVANCEMENT

This activity is designed to support you in thinking about some of the foundational aspects of a new job and what these aspects might mean for your career.
By elevating the elements of a new job early in the transition from school to work, you will have more information about what's to come, what you might need to think more about, and what steps you want to take to make things more transparent and put everyone on an equal playing field.

We begin with a few definitions:

Stretch Assignment

These are assignments at work that matter to career advancement. Sometimes they are called "developmental assignments", "growth assignments", or even "challenging assignments". They are part of a larger landscape of work tasks that have more or less consequence for "what it takes" to be promoted. Stretch assignments often are informally allocated at work—that is, it is uncommon for organizations to have a central system or dashboard that methodically allots these key assignments across the workforce. Rather, individual managers can help to identify these assignments, make these assignments available, support the execution of them, and leverage them into future opportunities and rewards.

Advancement

Advancement in context of this worksheet refers to building skills, knowledge, and savviness about moving up the job ladder, and then actually doing so—getting bigger and higher-profile assignments, getting to know more people at an organization, getting a salary bonus or raise, and getting a promotion. There are many different ways of thinking about "advancement", but here, we focus on increasing role, responsibility, and rank at an organization.

Reporting Structure

Reporting structures reflect the flow of leadership and decision-making—who reports to who, and who does that person report to, all the way up to the lead decision-maker of a business unit or organization. Reporting structures are not the same as job rank ladders.

Lead Decision-Maker

This is the head of a business unit or organization. It is often a single individual, with many possible job titles (e.g., "Senior Vice President"). Many times, in a complex organization, there are multiple lead decision-makers across multiple business units, all of whom report to a CEO or President.

Reflection

How familiar are you with these definitions? Where, if at all, did you learn about these concepts?

Which questions do these definitions raise for you? What are your curiosities, puzzlements, or concerns about these different aspects of jobs?

Stretch Assignment Scenario

We now invite you to reflect on an early career job scenario. You will first read and reflect on your own, then you will break into pairs or small groups to discuss.

Imagine that you've been in your new job for about two years—so things don't quite feel as "new" anymore. But you still have some questions. One of your colleagues is getting invited to a lot of meetings with the Senior Vice President (SVP) at your organization. She tells you it's because of a project she's been assigned to—this assignment is something that the SVP has named as "top priority" for the company. You don't really know how she got that assignment. Did she raise her hand? Did the SVP personally ask her to join the project? She does great work, yes, but so do a lot of engineers on your team and they rarely get "face time" with the SVP. Is face time even important though, especially now that many engineers at your company can work from home 1-2 days per week?

But even more than that, YOU are feeling a little stuck. It would be fun to travel a little, visit some of the clients of your company, and work on something new. It's not clear how you can get to do those things

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Now reflect on the following questions and then break into pairs or small groups to discuss. Remember: you are in an imaginative space – there are no wrong answers!

- As you imagine being in this scenario, what are 1-2 things that you most want to find out more about, e.g., your colleague's assignment, the way your team works, "face time", the lead decision-maker, yourself and your goals/worries at this time, etc.?
- Think about the project assignment process specifically at this company (the scenario does not give much information about it). Imagine 1-2 questions that you might want to ask someone at your company about the assignment process. Then, who might be a good person to ask (e.g., someone who has been at there for a while, someone in leadership, your direct manager, someone who is also new)?
- As a student right now, what are a few campus or local resources that you might want to consult to learn more about stretch assignments and career advancement within a company?

Reflection

What are you ending this activity thinking about? What do you want to know more about?

What is ONE thing you can do tomorrow to get more information about any questions you have?

Now, coming back together as a full group, here are suggested questions for everyone to reflect and puzzle on:

1. What themes and ideas came up as you and your classmates talked about this scenario?

2. Which campus resources did you identify as being potentially helpful to learn more about these aspects of new jobs? As you all imagined and looked ahead, which types of people did you identify as being potentially helpful to you once you enter a new job? (And it's okay if you did not identify anyone!)

3. As you all have been thinking and talking about the uncertainties of organizational life in the early stages of work, do you think all students and/or recent grads have access to this information before starting a new job, or do some start work with more informational advantage than others? Which kinds of experiences create more or less informational advantage? What might be done to disrupt these patterns? How can conversations like the ones you are having today disrupt these patterns?

Reach out to continue the conversation!

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