

Chapter 4

The (Mis)Framing of Social Justice: Why Ideologies of Depoliticization and Meritocracy Hinder Engineers' Ability to Think About Social Injustices

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Abstract Engineers will incorporate considerations of social justice issues into their work only to the extent that they see such issues as relevant to the practice of their profession. This chapter argues that two prominent ideologies within the culture of engineering—depoliticization and meritocracy—frame social justice issues in such a way that they seem irrelevant to engineering practice. Depoliticization is the belief that engineering is a “technical” space where “social” or “political” issues such as inequality are tangential to engineers’ work. The meritocratic ideology—the belief that inequalities are the result of a properly-functioning social system that rewards the most talented and hard-working—legitimizes social injustices and undermines the motivation to rectify such inequalities. These ideologies are built into engineering culture and are deeply embedded in the professional socialization of engineering students. I argue that it is not enough for engineering educators to introduce social justice topics into the classroom; they must also directly confront ideologies of meritocracy and depoliticization. In other words, cultural space must be made before students, faculty and practitioners can begin to think deeply about the role of their profession in the promotion of social justice.

Keywords Depoliticization • Meritocracy • Culture of engineering • Framing of social justice

4.1 Introduction

As part of the ethics course in my undergraduate engineering program, my classmates and I were required to prepare a presentation on an ethics topic that interested us. I decided to use my presentation to discuss Affirmative Action policies in engineering

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firms. I knew it would be a tough sell, but I believed in the importance of introducing inequality issues into class conversations about engineering ethics. Armed with statistics and arguments I learned in my social science courses, I described the structural roots and historical lineage of gender, racial/ethnic, and class inequality and the reasons Affirmative Action policies were developed in the first place. Two thirds through my presentation, the classroom erupted into an unruly and increasingly angry debate about the very existence of inequality. My talk was abruptly derailed after one of my classmates scoffed: “poor people are only poor because they are lazy and stupid.” The majority of the class laughed and nodded in agreement.

It was not until several years later that I began to understand that this event was not an isolated experience involving a classroom full of people with a particular disregard for social justice issues. This was a *framing* problem, one that is widespread in engineering education and the engineering profession more broadly. My discussion of social justice elicited a hostile response because it introduced a “social” issue into a context that is otherwise considered strictly “apolitical.” As such, the issue was seen as irrelevant to that very context. To add to my crimes, I approached inequality in a way that is antithetical to engineering’s dominant way of understanding achievement and failure. As I argue, this framing problem not only means that social justice issues are bracketed in traditional engineering education and practice, but also that changing engineering curriculum to include concerns of social justice will likely be met with complacency and, possibly, resistance.¹

This chapter theorizes the cultural reasons why introducing social justice concerns into engineering contexts is such a tremendous challenge. Namely, that the professional culture of engineering frames social justice issues as, by definition, separate from traditional engineering concerns. I argue that two prominent cultural ideologies within engineering—depoliticization and meritocracy—frame issues of inequality and injustice as irrelevant to engineering practice. As I explain, these ideologies interlock to reinforce the (mis)framing of social justice issues in engineering. As a result of professional socialization experiences in engineering programs, during which students learn what it means to be a “good engineer,” engineering students come to reproduce these ideologies and define social issues as simply unimportant to their own roles as engineers.

At the most basic level, engineering students and practitioners will only be motivated to consider social justice issues to the extent that they recognize such issues as relevant to engineering practice. I contend that only by directly confronting ideologies of depoliticization and meritocracy, thereby making *cultural space* for social justice concerns, can engineering education effectively promote such concerns among students.

I begin by describing the ideologies of depoliticization and meritocracy and their integration into engineering culture, and how these ideologies reinforce one another to frame social justice issues as culturally irrelevant to engineering practice. I end with a discussion of how engineering educators might break down these ideologies and reframe social justice issues as integral to engineering practice.

¹Schneider and Munakata Marr (Chap. 8, this volume) offer a useful “flexible” definition of working toward social justice as an “attempt to redress the unequal distribution of goods, rights, or opportunities, or to challenge policies or practices that exacerbate inequalities among groups of people” (p. 19).

4.2 Cultural Ideologies in Engineering

Engineering, like other professions, is not just a collection of knowledge, skills, and practices grouped into a set of jobs. Professions have rich and historically-rooted cultures that are built into and around their knowledge, skills, and practices. Professional cultures are the sets of beliefs, myths, and rituals that give meaning to the intellectual content and practices of a profession. Professional cultures serve several purposes in addition to giving meaning to professional work: they bind profession members together as a social group, provide the foundation of professional identities among group members, draw boundaries between profession members and “others,” and they offer justifications for the privileged social status held by their members (Abbott 1988; Friedson 1971; Grusky 2005; Grusky and Sørensen 1998; Weeden and Grusky 2005).

Engineering, as a profession, has its own culture that is relatively autonomous from the larger societal culture and from other professional cultures (Abbott 1988; Bourdieu 1984). This culture is the foundation of everything from notions about engineers’ “professionalism” to the social bonds that make “engineering jokes” humorous (Trice 1993). This culture extends far beyond specific engineering tasks (such as the value put on “elegant” coding solutions) and encompasses a rich set of beliefs about what it means to “be” an engineer. Boundary drawing procedures close engineering culture off from those who are uninitiated, and this culture often makes little sense to those outside the profession (Abbott 1988; Haas and Shaffir 1991). Although there are variations of engineering culture by geographic region and subfield, engineering culture is rich and enduring.²

An integral part of the culture of engineering is the promotion of particular ways of understanding society and engineers’ roles and responsibilities therein. These specific *cultural ideologies* shape how engineers understand their own work, their responsibility to the broader society, and what counts as “engineering work” and what is superfluous to that work. Cultural ideologies provide frames through which profession members understand complex aspects of social life, both inside and outside the purview of their profession. Cultural ideologies can have wide-sweeping effects both on how the profession as a whole acts (for example, the National Academy of Engineering’s choice of “Grand Challenges” priorities [<http://www.engineeringchallenges.org/>]) and on how individual engineers think about their work in relation to society.

Those who wish to participate in the engineering profession must not only learn the proper skills and competencies required of practice in the field, they must learn to “fit in” with the culture of engineering by adhering to these ideologies (Barley and Tolbert 1997; Dryburgh 1999). The most concentrated presentation of professional culture is through professional socialization—the training process by which students move from being neophytes to professionals (Becker et al. 1961; Schleef 2006). By taking classes, working in labs, engaging in design teams, and struggling through homework assignments, engineering students not only learn thermodynamics and circuits, they also learn to become a part of this culture. Students are introduced to

²Engineering cultures differ by national context, variation that is partly contingent on the origin of engineering as a profession in each country (Downey and Lucena 2004).

the norms, beliefs and ways of understanding the world common among their profession members. For example, they learn the difference between “white-hat hackers” and “black-hat hackers” and how to work together in design teams. They, in other words, *learn to become* engineers. In this way, the professional culture of engineering is perpetuated among the next generations of engineers. Socialization is also a broader process of learning—and learning to justify to oneself and to others—one’s privileged status in the capitalist labor force (Becker et al. 1961).

Engineering students enter engineering programs as freshman with a myriad of beliefs about the social world. But, because cultural ideologies within engineering form the centerpieces of engineering culture and engineering identities, most neophytes adopt the cultural frames of engineering.

Although the majority of engineering students take on the prominent cultural ideologies of engineering as their own (Cech 2010), the absorption of these ideologies by everyone is not actually necessary to uphold them within the culture of engineering. As I will discuss, engineering students, faculty, and practitioners may be personally skeptical of the ideologies of depoliticization and meritocracy, and they may even see advancing social justice to be of central importance to their core values systems. They do not have to personally *agree* with these ideologies for them to be perpetuated; engineers must simply agree to “go along” with the culture of engineering and bracket social justice concerns from engineering contexts. Such pressures to go along are sizeable: those who do not may be ignored at best and sanctioned at worst. Thus, engineering students, faculty and practitioners who find social justice issues personally important but keep them off the table in engineering contexts so as not to “go against the grain” perpetuate this (mis)framing equally effectively as people who embrace these ideologies.

I argue that two particular ideologies within the culture of engineering frame social justice concerns as tangential and irrelevant to engineering practice. These ideologies—depoliticization and meritocracy—actually reinforce one another in engineering contexts and legitimate ignoring social justice issues altogether. As I will argue, simple “additive” pedagogies that sprinkle social justice issues throughout classrooms or lab environments will likely fail. Engineering educators must first deconstruct these ideologies before cultural space can be made for the serious consideration of social justice issues. I will next describe these ideologies, explain why they prevent social justice from having a central place in engineering education, and argue why engineering educators must first dismantle these ideologies and reframe social justice issues in order to make them more central to engineers’ notions of what it means to be members of their profession.

4.3 Depoliticization of Engineering

The first important ideology within the culture of engineering is the notion that engineering is a purely “technical” domain, and thus asocial and apolitical. Because science and mathematics knowledge is understood to be the basis of engineering

expertise, engineering work is assumed to be carried out objectively and without bias. Indeed, this is the foundation of logical positivism, the belief that science and engineering work can be separated from messy “social” concerns as long as proper scientific and engineering methods of inquiry and design are followed (Johnston et al. 1996; Klee 1997). As presumed “neutral” actors, engineers defer to the objectivity and value neutrality that are assumed to be part of these methods (Seron et al. 2011; Faulkner 2000).

However, as decades of Science and Technology Studies research has demonstrated, even the most seemingly objective and neutral realms of engineering practice and design have built into them social norms, culturally-informed judgments about what counts as “truth,” and ideologically-infused processes of problem definition and solution (see e.g. Knorr-Cetina 1999; Latour and Woolgar 1986; Mackenzie 1990; Traweek 1988). Engineering work is necessarily heterogeneous and “technological” work can never be separated from its social or political influences (Faulkner 2009; Cech and Waidzunus 2011). Indeed, prioritizing certain “technical” features (faster, smaller, cheaper vs. quality or sustainability) over others is a social and political choice at its core. Thus, the notion that engineering work can somehow be separated from the social world is *itself* a cultural frame for understanding what engineering is.

Connected to the understanding that engineering work can be separated from the social is the ideological belief that it *should* be separated from the social. I call this the ideology of *depoliticization*—the belief that engineering work, by definition, should disconnect itself from social and cultural realms because such realms taint otherwise pure engineering design methodologies.

Through the frame of depoliticization, the political and social foundations of all engineering work are culturally invisible in the meaning systems surrounding that work. More importantly, the ideology of depoliticization means that aspects of social life that have to do with conflicting perspectives, cultural values, or inequality are cast as “political” and thus irrelevant—perhaps even dangerous—to “real” engineering work (Cech and Waidzunus 2011; Faulkner 2000; Florman 1994). As a result, these concerns are defined as illegitimate to engineers’ day-to-day work by the very culture of the profession. Engineering’s status as a profession depends on its relevance to society, and depoliticization allows engineers to carry on with their socially important work (e.g. food and medicine production) without having to grapple with the messiness that comes with actually engaging with questions of the effects of engineering work on society.

The ideology of depoliticization is deeply rooted in engineering. Early engineers sought to ground their new profession in math and science knowledge to increase engineering’s status as a profession. Thus, early notions of engineering design drew from similar enlightenment notions about the potential for “purity” in scientific inquiry, isolated from religious, social, or political influence (Hughes 2005; Nye 1994). From the mid-nineteenth century on, a key facet of engineers’ privileged status in society was their assumed ability to make decisions from purely technical considerations. Engineers and scientists were called upon in the 1920s to help instill technocratic decision-making procedures into public policymaking. Technocratic rule was supposed to diminish emotion, corruption and “politics” in public

administration (Jordan 1994). While the technological skepticism of the 1950s–1970s challenged the notion that technocratic leadership was possible or desirable (Florman 1994; Nye 2006), the ideology of depoliticization remained essentially intact. Today, most engineers continue to conceptualize and portray their work as generally above any emotional, social or political messiness.

Depoliticization means that “social” issues, which encompass considerations of social justice and equity, are considered inappropriate within engineering contexts. Engineering students learn early through professional socialization that justice issues are “social” and “political” and thus irrelevant to serious classroom and study group conversations. For example, an engineering student at “Gold University,” a research-intensive public university in the western US, noted:

It’s just a different way of communicating with engineers than with all the people that I tend to hang out with... You don’t talk about your feelings, you don’t talk about the world and what’s happening in it...I wish there was more of that in school, more about the consequences of technology, the history...Really, we’re just doing the technical stuff. (Becky; quote taken from Cech and Waidzunus 2011, p. 11).

Another student at Smith college, a women-only liberal arts college that recently launched an engineering program, shares Becky’s recognition of the lack of exposure to social and political issues she receives in her engineering courses:

I have recently noticed that I cannot keep up or contribute anything of value to conversations about politics or current events. I simply have no idea what is going on in the world right now. All through high school I loved having political debates with people, but I haven’t been able to take a single class in public policy, government, or social science in college, which are the subjects that Smith is known for. Because I haven’t taken any of these classes, I seem to have forgotten everything I ever knew about American government and the legal system. It’s kind of embarrassing. And its not like you can have a dinner conversation about physics or calculus. No wonder engineers are stereotyped as being social awkward...In fact, I got so many awkward silences from telling people my real major that I started telling people that I was majoring in architecture. Trust me, architecture majors have much more interesting conversations that engineering majors. (Meredith, Smith student; taken from Seron et al. 2012, p. 31).

Both Becky and Meredith (pseudonyms) notice this depoliticization, but their recognition of—and concern over—depoliticization is the exception rather than the rule (Seron et al. 2011). The majority of students take on the dominant depoliticized worldview that is core to the professional culture into which they are being socialized. In a study of engineering students at several universities, I found that social justice concerns (e.g. “understanding the consequences of technology,” “improving society,” and “professional and ethical responsibilities”) became less important to engineering students over the course of their undergraduate careers, and that the cultural ideologies promoted by their engineering programs had a direct influence on the decreased importance of social justice issues to students (Cech 2010).

The perpetuation of depoliticization in engineering—and the subsequent bracketing of social justice concerns—does not require that all engineers adhere to this ideology. Indeed, many engineering faculty, practitioners and students may believe social justice issues to be important to them personally. However, they must simply

be complacent with the cultural norms that social justice concerns be “left at the door” of engineering contexts in order for depoliticization to be perpetuated.

In short, the ideology of depoliticization renders social justice considerations illegitimate in engineering contexts. As such, these topics are rarely discussed, and those who introduce them risk being ignored, criticized or sanctioned. But what happens if social justice issues do make it to the floors of engineering classrooms, labs and workplaces? I argue that a second ideology in engineering, the ideology of meritocracy, frames the very existence of social inequality as the result of just and fair processes, and thus simply not of concern to engineers.

4.4 The Ideology of Meritocracy

The ideology of meritocracy is, broadly, the belief that success in life is the result of individual talent, training, and motivation, and that those who lack such characteristics will naturally be less successful than others (Arrow et al. 2000; Cech and Blair-Loy 2010; Young 1994). The meritocratic ideology is deeply engrained in the popular belief in the “American Dream” (success comes to those who work hard and dream big) and is resonant in the popularity of stories about individuals who pull themselves up by their “bootstraps” (Hochschild 1995). The meritocratic ideology is not just a way of interpreting the outcomes of successful people, however. It is often deployed as an individual-level explanation for sweeping wealth, gender, and racial/ethnic inequalities in the U.S. It is “a theory of justice in which distribution of rewards is expected from the distribution of individual talents” (Brickman et al. 1981, p. 175). This ideology is also a *moral* judgment—meritocracy legitimates the unequal distribution of rewards as the outcome of morally acceptable and fair processes (Cech and Blair-Loy 2010; Lerner 1980).

The meritocratic ideology is the most prominent explanation of social inequalities in the U.S. (Kluegel and Smith 1986). Because discrimination based on religion, class, gender, age, etc. is formally illegal, most Americans believe that inequality of outcomes is based on fair mechanisms. This belief relies on several assumptions: (a) that the opportunity for personal achievement is widespread; (b) that individuals are personally responsible for their position in society, and (c) that the overall system of opportunities and rewards is equitable and fair (Major and Schmader 2001). But, of course, over a century of social science research has demonstrated that all three of these foundational assumptions are false: the opportunity for personal achievement is severely restricted by the quality of education one’s family can afford, processes of discrimination prevent equal access to opportunities for women and minorities, and other structural and cultural processes sharply curtail opportunities for those who are not wealthy, heterosexual, white men (e.g. Bonilla-Silva 2003; Fischer et al. 1996; Kozol 1991; Lemann 1999; Padavic and Reskin 2002). Just as being born into poverty is not the fault of children of the poor, it is a logical fallacy to blame individuals for the structural and cultural constraints that limit the sorts of opportunities available to them.

It becomes difficult, therefore, for Americans to cognitively reconcile the structural reality of injustices with the belief that the social system is equitable and just. However, the very framing of inequalities as the result of individual outcomes resulting from a meritocratic system allows Americans to square the visible differences in opportunities and outcomes for women, racial/ethnic minorities, and the poor with the general societal belief in equality. If the system is seen as fair, social injustices arising from that system are seen as legitimate.

Because the meritocratic ideology is a widespread cultural belief, many college students likely believe in this ideology even before entering college (Jorgenson 2002).³ Popular beliefs about the “liberalizing” effects of higher education assume that, as a result of being exposed to broad-based liberal education, college students are more likely than the general population to recognize the structural basis of social inequalities (Kane and Kyyro 2001). However, the empirical support for this assumption is mixed at best. In most cases, higher education (especially in science and engineering) simply endorses an emphasis on individualistic hard work as the basis of success, rather than exposing the cultural and structural bases of social inequalities (Jackman and Muha 1984; Kane 1995).

Importantly, certain professions are more likely than others to reinforce a belief in meritocracy (Cech and Blair-Loy 2010). Disciplinary differences in the promotion of the meritocratic ideology are largely due to the values within their professional cultures. Business schools, for example, promote a potent version of the meritocratic ideology, where success is in reach of anyone with sufficient personal drive and experience (Khurana 2007; Schleef 2006). Indeed, high-level women in science and engineering firms who attend business school are significantly more likely to give meritocratic explanations for gender inequality compared to women who took other educational paths (Cech and Blair-Loy 2010). This is in contrast to other academic disciplines (e.g. social sciences and humanities) that promote a multiplicity of explanations of inequality, or simply encourage critical thinking skills that question dominant frames for understanding injustice.

The meritocratic ideology is deeply engrained in the culture of engineering. To the extent scholars have been able to trace the history of the culture of engineering, this ideology has been central to the worldview promoted in engineering for at least a century (Hughes 2005; Nye 1994). The maverick view of engineering innovation (exemplified by Thomas Edison and Steve Jobs) promotes a romanticized notion of success where individual hard work, talent, and dedication can lead to pathbreaking engineering designs even out of home garages (Hughes 2005).

The meritocratic worldview is widespread among engineers working in both industry and academia (Cech and Blair-Loy 2010; Fox 2006; Rhoton 2011; Jorgenson 2002). It is also a central ideology in the professional socialization within engineering education (Dryburgh 1999; Seron et al. 2011). As students learn to become engineers, they adopt as their own the dominant worldviews of their future profession

³It is also possible that students who enter college believing in the meritocratic ideology are more likely to select into some majors (i.e. science and engineering) than others. This consideration is beyond the scope of this chapter, however.

(Becker et al. 1961; Dryburgh 1999). Thus, the socialization of engineering students often reorients or reinforces their framing of social inequalities as the result of fair, meritocratic processes. As an example of how the meritocratic ideology is deployed, an MIT engineering student rejects Affirmative Action procedures that promote gender equity in engineering because such policies are counter to her framing of success as the result of meritocratic outcomes:

In my mind, a woman will succeed if she wants to succeed. Maybe that is an overly idealized thought, but I'm going to live by it. Should such a policy be introduced to work fields such that every workplace would be comprised of fifty percent females and fifty percent males? ... In my own opinion, however, I think it isn't right...I feel that the best person should get the job, regardless. (M20; taken from Seron et al. 2011, p. 12).

Why is the meritocratic ideology such a compelling frame within the culture of engineering for understanding social injustice? For one, this frame denies the structural foundations of inequality—foundations that may include the work of engineers.⁴ If inequality is the result of individual failings, then the profession of engineering neither plays any role in that inequality, nor has any responsibility to attempt to rectify it. Secondly, the meritocratic ideology frees engineers from the responsibility to design accessible or inexpensive products that alleviate social problems but may have little profit potential (e.g. slower, less expensive internet connections that would allow more people to access the internet).⁵ Again, the popularity of this ideology within engineering is not the result of uncaring or naive individual engineers, but rather the outcome of a cultural frame that eliminates these social complexities from problem definition and solution.

4.5 Misframing Social Justice Issues

The cultural ideologies of depoliticization and meritocracy are not benign. They have important effects on social justice and equality outside *and* within the engineering profession because these ideologies frame the way engineers understand social justice issues in the context of their engineering work. With this framing, discussions of power, discrimination, and inequality are considered irrelevant. The relegation of these issues as “political” upholds the cultural perceptions of “‘technical’ aspects of engineering as objective and neutral (although they are no less prone to bias, no less steeped in culture and politics than social aspects)” (Cech and Waidzunus 2011, p. 11). Depoliticization prevents issues of social justice from

⁴In the 1920s, for example, Robert Moses and his engineers intentionally designed hundreds of New York City bridges too low for city busses (which were typically used by poor and African-American New Yorkers) to pass underneath. This effectively prevented these groups from accessing the Long Island beaches, maintaining the beaches as white, middle-class spaces (Winner 1980).

⁵This is in contrast other professions such as law, where a certain level of pro-bono work is encouraged or expected.

being brought to the discussion of engineering design and other professional practices. The meritocratic ideology, furthermore, frames social inequalities as the result of fair processes of social sorting, and, thus, not actually a cause for action.

Not only do the ideologies of depoliticization and meritocracy undermine social justice considerations independently, they also *reinforce* one another. Depoliticization means that issues of social justice are deemed irrelevant to engineering practice. Even if such social justice issues are introduced into engineering contexts, the primary explanatory framework of inequality in engineering—the meritocratic ideology—casts social injustices as the result of an equitable, properly-functioning system of rewards. For example, challenges to depoliticization via the introduction of social justice issues into professional conversations are likely to be met by arguments legitimating injustices on the basis of meritocratic processes. On the other hand, someone who wants to challenge the meritocratic ideology and discuss structural and cultural bases of social processes may be brushed off as being politically motivated.

There is, in other words, little cultural space in engineering for professionals, students, or faculty to reflect upon engineering's role in reinforcing or undermining social inequalities. Since those inequalities are framed as the result of individual failings, any sort of structural influence—especially any influence that may arise from the engineering profession itself—are rendered invisible. Nor is there much cultural space for engineers to think deeply about how they might use their specialized knowledge to solve problems that advance social justice.

Equally importantly, these ideological frames can actually help reproduce social inequalities *within* engineering. In a colleague's and my study of lesbian, gay and bisexual engineers, for example, discussion of LGBT equality was considered political and thus irrelevant. One student articulated the power involved in the silencing of discussions of equality in engineering:

In my department, [the issue of sexual identity] is sort of invisible. I think most of them are straight dudes who don't really think about the existence of people who are not like them. I think they have so much privilege that they can't understand what it's like for people who don't have that privilege. And, they think [that] other people getting privilege is taking it away from them (Sara, engineering student; taken from Cech and Waidzunus 2011, p. 11).

Silencing discussions of advantage and disadvantage in engineering, while simultaneously attributing the success of white, wealthy, heterosexual men (success partly resulting from structural and cultural advantages) to their own hard work doubly disadvantages women and minority groups within the profession.

This framing has several implications for the introduction of social justice concerns into engineering education. First, these ideologies leave little cultural space for discussions of social justice in engineering classrooms. Engineering educators may deem such discussions as irrelevant to thermodynamics or circuits, and students, learning quickly the cultural values of their future profession, may be either hesitant to bring up social justice concerns out of fear they will be ignored or criticized by professors or classmates, or may themselves consider such issues to be irrelevant (see, e.g. Riley, Chap. 3, this volume). And, as made clear in my example at the beginning of this chapter, the meritocratic ideology can quickly shut down such concerns as non-issues.

But what about the non-engineering core courses engineering students are required to take? Might they be a pathway for introducing social justice concerns? Students in most engineering programs in the U.S. are required to take a set of core courses outside the area of their majors. Some programs have sought to increase students' exposure to non-engineering courses, even as tighter accreditation requirements make such curricular innovations difficult. These courses are believed to help engineers be more "well-rounded" in their perspectives, and to be able to engage in critical thinking about their engineering work (see, e.g. <http://abet.org> and NAE 2004). However, the ideologies of depoliticization and meritocracy mean that these exercises of critical thinking in humanities and social science courses are likely compartmentalized by students as extraneous to "real" engineering work. The consideration of social and political issues developed in these core courses are, in other words, largely "left at the door" of engineering classrooms and engineering workplaces.

Thus, most engineering students currently do not graduate with the cultural frameworks necessary to consider social justice issues relevant to their engineering practice. Even if they do desire to understand the implications of their future work (as some of the students I have quote here), the prominence of these ideologies prevents students from developing the intellectual and analytical tools necessary to think about their work in that way—they simply have very little practice doing so.

4.5.1 Non-dominant and Dominant Groups Adopt These Ideologies

These ideologies—especially the meritocratic ideology—serve the dominant and powerful—i.e. white, middle-class, heterosexual men. The meritocratic ideology is particularly compelling to the advantaged because it is "considerably more gratifying for dominant groups to see themselves as reasonable and enlightened benefactors of society rather than as the self-serving benefactors of a biased social system" (Jackman and Muha 1984, p. 759). Might disadvantaged groups in engineering challenge the meritocracy and depoliticization of engineering itself, and thus disrupt these ideologies within engineering culture?

It is often assumed that ideologies which benefit the powerful are only upheld by the powerful (Young 1994). However, meritocracy and depoliticization are often also upheld by those who are disadvantaged by them. "We are psychologically motivated to believe that our own social system is fair and legitimate," even if such system serves someone else's interests (Olson and Hafer 2001). Thus, within engineering, even disadvantaged groups (e.g. women, racial/ethnic minorities, LGBT individuals) may also adhere to the meritocratic ideology and depoliticization. Rhoton (2011), for example, found that women science and engineering faculty fiercely defended their belief that these disciplines are fair, unbiased and objective spaces (even in the face of clear examples of discrimination) and upheld the meritocratic ideology in the process. Similarly, my colleagues and I found that women

engineering students, even when faced with examples of sexism and inequality in engineering, interpreted those events using the frame of the meritocratic ideology (Seron et al. 2011). Additionally, even if women and under-represented minorities personally reject the ideologies of depoliticization and meritocracy, they are often hesitant to introduce issues that run counter to these ideologies for fear of being marginalized or labeled a “whiner” (Dryburgh 1999; Seron et al. 2011; Rhoton 2011).

Thus, we cannot expect that disadvantaged group members within engineering have the resources or viewpoints from which to challenge these ideologies. Such expectations underestimate the power of the professional socialization process to inculcate neophytes into the worldview of the profession to which they aspire, and unnecessarily burden disadvantaged groups with the responsibility for questioning the dominant cultural ideologies of their profession. Challenging these ideologies must be the deliberate and systematic effort of engineering educators and profession leaders.

4.6 The Insufficiency of One Lecture or One Essay: The Task of Reframing

What can be done to instill in students a sense that social justice concerns are central to their work as engineers—and provide them with sufficient practice to develop the necessary “reflexes” for social justice considerations? An “additive” solution whereby social justice concerns are added on to the end of engineering courses in the form of an additional reading or tacked on to an existing curricula in the form of a single course on social justice concerns, is unlikely to be effective on their own. Even if social justice issues are included as “engineering” assignments or courses, the ideologies I discussed in this chapter, and their subsequent misframing of social justice issues, mean that such lessons will be understood by students as *supplemental* to their engineering training rather than as *fundamental*.

The only way social justice issues can become central to the way engineering students understand their work and their role as professionals in society is to make cultural space for such issues. And, the only way that such cultural space can be created is to deconstruct the very ideologies of meritocracy and depoliticization. Deconstructing ideologies means just that: actually engaging students in conversations about the fact that these are *ideologies*, and not accurate representations of the engineering profession or the social world. Such deconstruction requires that engineering students and professors alike develop reflexivity about the professional culture in which they are embedded and recognize that criticisms of the legitimacy of certain values and beliefs within a profession’s culture does not constitute an affront to the legitimacy of the profession itself. By decoupling these cultural values and beliefs from students’ and faculty’s identification with (and admiration for) their profession, dialog about problematic ideologies within that culture become possible without anyone becoming defensive or reactionary. Obviously, the first place to start

is to explain that professions actually have their own cultures, which exist relatively autonomously from wider societal-level cultures and subcultures.

Depoliticization can be challenged by pointing out the clear social and political considerations that go into everyday design priorities. Bruno Latour (1992) gives a compelling example of how a moral belief (that people ought to wear seatbelts while driving) was actually designed *into* car doors with seatbelts that strap in drivers when the door is closed. The inherently political nature of engineering also becomes visible when discussing controversial engineering designs. It is hard to ignore the political and moral issues involved in engineering designs of, for example, the gas chambers in Holocaust concentration camps (BBC 2009, <http://news.bbc.co.uk/2/hi/8224666.stm>). From extreme examples such as this, students can extrapolate to understanding how all engineering design is infused with social and political considerations (Lynch and Kline 2000). After all, to ignore the existence of such political and social influence is to lack a complete understanding of the engineering design process itself (Latour 1999).

Regarding the meritocratic ideology, introductory social science textbooks are full of examples that illustrate and explain how social inequities are far more the result of structural processes of disadvantage than they are the result of individual failings.

But, as Leydens (Chap. 9, this volume) points out, “as faculty, most of us are woefully unprepared to engage and integrate social justice issues into our disciplines and classrooms” (p. 11). Engineering educators who feel ill-equipped to discuss these structural processes could invite social science professors to guest lecture or co-teach courses, who could, for example, provide information (e.g. statistics on or causes of particular forms of social injustice) which becomes the context in which engineering students discuss the connection between social justice and engineering design. Furthermore, Leydens (Chap. 9, this volume) and Schneider and Munakata Marr (Chap. 8, this volume) describe faculty workshops designed to encourage engineering faculty to think about how to integrate social justice concerns into their course content, and Leydens explains how workshop facilitators can work past participants’ resistance with meaningful and respectful dialog. Finally, engineering faculty can engage students in the task of researching the social justice issues built into particular design activities. This not only shares the burden of the information-gathering required for meaningful engagement with social justice considerations, but also gives students much-needed practice finding such information—a necessary skill if we expect them to engage with social justice considerations in their future engineering work.

Once the ideologies of meritocracy and depoliticization have been deconstructed, students must have practice filling in the cultural space provided for social justice concerns. Several other chapters in this volume provide useful tactics for facilitating this skill development. Breaking down these ideologies would be most successful if abstract discussions were paired with concrete design activities. Such activities could address a social justice problem that—*itself*—challenges the meritocratic ideology (such as poverty, hunger, domestic violence, and underfunded schools) and use design procedures that fold social and cultural considerations directly into the design process.

Ideally, in such activities, instructors would begin with a general overview of the social justice issue in question through lectures (possibly from colleagues who are invited to guest lecture), readings and through student-led discussions based on credible sources students found on their own. Then, teams of students would be asked to design an inexpensive product or process that helps address this social justice concern. Finally, if time allowed, students would build and test prototypes of their designs and explain how their engineering design addressed the social justice issue.

As one example, students might investigate the issue of homelessness. The curricular segment would begin by assigning research-based readings on homelessness (Jencks's *The Homeless* (1994), Liebow's *Tell Them Who I am: The Lives of Homeless Women* (1993), and Rossi's *Down and Out in America: The Origins of Homelessness* (1989) are compelling and accessible books).⁶ The class would then discuss homelessness as an issue of social justice. In part 2, students would break into small groups and conduct their own literature search for research on homelessness in American—how many people does it affect? For how long? What are the most common paths in and out of homelessness?—and then each group would report back to the class on what they found.

In part 3, the groups would conceptualize and design portable, lightweight, inexpensive, collapsible individual shelters that would provide homeless individuals with shelter and safety. Then, students would prototype their shelters and demonstrate them to the class. In part 4, time and administrative approval permitting, students would actually take turns trying out their shelters by sleeping on campus grounds overnight (ideally outside). This trial could be paired with a consciousness-raising campaign about homelessness in the local area. (See Hattery's article (2003) for an excellent discussion of instituting a similar “shantytown” activity.)

The very premise of this activity challenges the ideologies of meritocracy and depoliticization: students are required to confront the realities of an unfair system of rewards, to think about social justice issues through the eyes of the disadvantaged, and to fold those very concerns right into their designs. In the exercise, the success of the designs depends on the students' ability to understand the complex socio-cultural factors that go into the problem the design seeks to alleviate.

Students' ability to analyze how their engineering work is connected to social justice concerns takes practice, just like the development of any other intellectual skill. One lecture or one essay on “engineering and social justice” is not enough.

4.7 Conclusion

The purpose of this chapter was to explain how the culture of engineering hinders engineers' ability to see social justice concerns as relevant to their professional work. I explained that engineering has its own professional culture, complete with

⁶The National Coalition for the Homeless provides easily-accessible fact sheets on the prevalence and causes of homelessness in the United States (www.nationalhomeless.org)

cultural ideologies that frame how engineers see the social world and understand their roles and responsibilities therein. I argued that two prominent ideologies within the culture of engineering frame social justice issues as irrelevant to everyday engineering contexts. Depoliticization is the belief that engineering is a fundamentally asocial and apolitical space, and any discussion of social or political issues such as justice are out of place in that space. If social justice issues are introduced into engineering contexts, the meritocratic ideology frames unequal opportunities and outcomes as the result of a fair and properly-functioning system of rewards and thus not worth much attention from the engineering profession.

This misframing shields engineers from difficult considerations of how the profession's products might help reproduce social injustices and excuses them from the responsibilities for designing accessible, equity-promoting technologies that might not be profitable. The ideologies of depoliticization and meritocracy also reproduce inequalities for under-represented minorities within the profession by silencing serious discussions of power, privilege and voice with the profession's boundaries.

I argued that one way cultural space can be made for discussions of social justice concerns is if these ideologies are deliberately deconstructed. Engineering education provides the ideal site for this deconstruction, as it is the time in which neophytes are first introduced to the culture of engineering.

This deconstruction is not impossible—as is evident from the recent rise of “green” engineering (alternative fuels, sustainable building materials, etc.) as a legitimate and popular design approach (e.g. NAE's “Grand Challenge” of making solar energy economical). Only a few decades ago, designing with environmental impact in mind would have been framed as political and, thus, in contradiction to the ideology of depoliticization. This suggests that the culture of engineering, and the ideologies therein, are not intractable. The popularity of the “Engineers Without Borders” organizations on hundreds of college campuses (<http://www.ewb-usa.org/>) suggests that many engineering students are hungry to explore how their professional roles might advance social justice. Only when cultural space is made for such issues can engineering educators, students and practitioners actually be able to seriously consider social justice issues a central part of their responsibilities as professionals.

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