

Meritocracy and Colorblindness: The Perpetuation of Whiteness in Engineering Education Through False Narratives

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Whiteness in STEM/Engineering: The Problematic Nature of Meritocracy and Colorblindness

Abstract

Research in engineering education has taken a deficit-oriented perspective by focusing on the dearth of People of Color (POC) in engineering as a supply issue, also more commonly referred to as a leaky pipeline, while ignoring the false narratives and discourses that dominate engineering education and research which exclude POC from the start. This position paper takes a deeper exploration of two crucial concepts that underpin the hegemonic discourse of Whiteness: meritocracy and colorblindness. These two concepts are fundamental in the discussion of Whiteness because challenging them means rejecting the objectivism embraced in engineering while naming and acknowledging white privilege.

We argue that, while meritocracy and colorblindness have been discussed in engineering education research, little action has been taken to dismantle meritocracy and colorblindness as pillars upholding Whiteness in engineering. Viewing American individualism and exceptionalism through the interdisciplinary and theoretical lens of Critical Race Theory and Critical Whiteness Studies has highlighted the ways Whiteness has flourished, particularly in engineering, and helped support these two pillars of Whiteness. Thus, through a historically contextualized interdisciplinary analysis, we seek to shift the conversation to focus on questioning the ways Whiteness affects pedagogy and research conducted in engineering education research.

Introduction

White supremacy has a firm grip on engineering and engineering education research. However, in order to show “The Enduring, Invisible, and Ubiquitous Centrality of Whiteness,” [1], we will provide a funneled context that will demonstrate to the reader how insidious Whiteness is and how it has infiltrated systems and institutions from K-12, through higher education, and into industry. Hegemony and Whiteness in STEM manifest in many ways but is evident by looking at the demographics within higher education and industry. In fall of 2020, almost three-quarters of faculty in the USA were white (39% white males, 35% white females) [2], [3]. Within the STEM industry, white workers make up two-thirds of workers while in engineering and architects, white workers are overrepresented at 71% [4]. Not only is there an overrepresentation of Whiteness within STEM, there is a wage disparity that continues to grow. Black full-time and year-round workers from the age of 25 and up only make 78% of their white counterparts’ median earnings. In comparison, Latiné STEM workers of the same age make 83% of their white counterparts’ wages [4]. The trends have seeped down to K-12 education also, where only one-in-five teachers are non-white, in which 51% of public school students are non-white [5]. We can begin to see the disparities that reveal themselves in higher education and industry only follow the trends that begin as early as K-12 education. These disparities show a system that advantages Whiteness over “Othered” identities.

Within engineering, specifically in 2019, white professors made up 61% of the full-time faculty population, while Black and Latiné populations made up a mere six percent combined. Within this category, whites made up 50% of assistant professors with Blacks and Latinos

accounting for another mere seven percent. To account for the decline in white bodies was the rise of Asian (33%) and unknown identities (9%) which together comprised 42% [3].

While these numbers may seem too familiar for some in engineering and engineering education research, what these numbers show is that within this system which is often perceived as fair and objective [6], more palatable conceptualizations to justify the statistics are used instead of critically questioning Whiteness in engineering. The two most prevalent arguments are based on meritocratic and colorblind ideologies [8]. Mentioning the pervasiveness of meritocracy and colorblindness without questioning Whiteness reifies a systematic problem that prevents racial equity in engineering.

Research in engineering education has taken a deficit-oriented perspective by focusing on the dearth of People of Color (POC) in engineering as a supply issue, also more commonly referred to as a leaky pipeline, while ignoring the false narratives and discourses that dominate engineering education and research which exclude POC from the start [8]-[11]. Recently, asset-based approaches have gained more traction in the field but too often miss a critical consideration: the hegemony of Whiteness in engineering. That is, the intent to shift the narrative toward a more asset-based perspective has increased in engineering education research; yet, issues of power dynamics emerging from white supremacist ideologies, deficit ideologies, and racialized ideologies are rarely questioned. This position paper takes a deeper exploration of two crucial concepts that underpin the hegemonic discourse of Whiteness: meritocracy and colorblindness. These two concepts are fundamental in the discussion of Whiteness because challenging them means rejecting the objectivism embraced in engineering while naming and acknowledging white privilege.

The concept of meritocracy asserts that individuals are rewarded based solely on their individual effort, implying that people get what they deserve in life through their hard work and determination [12], [13]. Conversely, and often unstated, is the implication that those who are unsuccessful are responsible for their lot in life. However, this belief in meritocracy overlooks the complex web of institutional and systemic variables that play a pivotal role in shaping life outcomes – including entering, persisting, and succeeding in engineering.

On the other hand, a colorblind ideology fortifies the myth of meritocracy because it shifts the focus away from understanding how institutions perpetuate the normalized standard of white supremacy and racism, and instead places the responsibility for combating racism and white supremacy on individuals [7]. This perspective bestows privileges upon white individuals as acts of merit—as if these privileges were earned solely through hard work, rather than acknowledging that they are a product of a racialized system that perpetuates advantages to specific and particular identities like a well-oiled assembly line.

Meritocracy and colorblindness form a self-reinforcing cycle; a colorblind discourse in engineering education dominated by Whiteness willfully ignores the hierarchical positioning of racialized groups, while fostering the misguided belief that success is determined by hard work and persistence, which equal merits. In reality, these merits are not objective or universal, but rather, intangible attributes granted primarily to those who occupy the upper rungs of the

hierarchical ladder within a society dominated by Whiteness and to those who align with such an ideology [1, p. 14].

This position paper builds upon previous research that identified colorblindness and meritocracy as scripts of Whiteness [15]. We argue that, while meritocracy and colorblindness have been discussed in engineering education research [6], [7], [13], [15], [16], little action has been taken to dismantle meritocracy and colorblindness as pillars upholding Whiteness in engineering. Thus, through a historically contextualized interdisciplinary analysis, we seek to shift the conversation to focus on questioning the ways Whiteness affects pedagogy and research conducted in engineering education research. This ontological and epistemological shift is possible by questioning the very foundation that Whiteness is supported by: we are all humans and hard work is the only thing that matters. The inception of this work stems from a National Science Foundation grant to uncover the scripts of Whiteness in engineering education while devising a structured environment to help build individual and institutional racial literacy.

Positionality

All of the authors have transformative world views, which “holds that research inquiry needs to be intertwined with politics and a political change agenda to confront social oppression at whatever levels it occurs” [17, 22, p.9]. They come to these moral pillars of understanding through their own social location and the way those intersecting identities have shaped our lived experience. The team is composed of one woman and three men with varying intersecting identities, including but not limited to identifying as a mix of POC and white, cisgendered, LGBTQ+ and that of first-generation college students.

Due to their own personal experiences through graduate school and/or through the tenure process, the authors have embarked on a National Science Foundation (NSF) funded project to uncover the scripts of Whiteness in engineering, and more specifically in engineering education. The team did not want to only navel-gaze on and about Whiteness for Whiteness’ sake. That is why their study of Whiteness never forgets who should be centered: those that Whiteness hurts, oppresses, and marginalizes [18]. We understand that the lack of Black, Indigenous, and People of Color (BIPOC) in engineering (i.e., supply) is not due to incapability or lack of persistence; it’s further downriver to the demand side—a “culture of the system itself which marginalizes those that do not conform to the white male hegemonic discourse” [19]. Rather, the system is doing precisely what it is designed to do because the lack of diversity in engineering is “a STEM education system perfectly functioning as designed by the system’s architects” [20]. The authors operate from these moral, social and scholarly positions.

Theoretical Lens

The literature for this position paper has been read through the lens of Critical Race Theory (CRT) -- more specifically CRT in education, and Critical Whiteness Studies (CWS). CRT “challenges the ways in which race and racial power are constructed and represented in American legal culture and, more generally, in American society as a whole” [21, p. xxi]. By reading the world [22], and more specifically the world of STEM and engineering, through the lens of race as a social construct but having consequential and real impact on both POC and

white people, we are able to see the ways that race negatively affects the engineering community as a whole. In order to better understand the impact of race on engineering education and research, a more specific style of CRT was employed. CRT in education was first introduced by Gloria Ladson-Billings and William Tate (1995) in their groundbreaking article "Toward a Critical Race Theory of Education" [23]. David Stovall (2005) brilliantly summarized the article into the five main principles of CRT in education:

1. Name and discuss the pervasive, daily reality of racism in US society that serves to disadvantage people of color.
2. Expose and deconstruct seemingly "colorblind" or "race neutral" policies and practices that entrench the disparate treatment of people of non-white persons.
3. Legitimize and promote the voices and narrative of people of color as sources of critique of the dominant social order that purposely devalues them.
4. Revisit civil rights law and liberalism to address their inability to dismantle and expunge discriminatory socio-political relationships.
5. Change and improve challenges to race neutral and multicultural movements in education that have made white student behavior the norm. [24]

These principles provide a roadmap to critically analyze the ways in which Whiteness is embedded in engineering spaces and practice. An acknowledgment and integration of principles addressing systemic racism are crucial for fostering an inclusive and equitable learning environment in engineering spaces that validates the lived realities of POC students. This acknowledgement serves as a foundation for understanding the challenges faced by POC in educational settings, including engineering [7]. Moreover, exposing and deconstructing seemingly "colorblind" or "race-neutral" policies, attitudes and ideologies is extremely important for engineering education scholars and practitioners because these place blame on perceived inherent deficits of POC [25], [26], rather than questioning how Whiteness helps justify colorblindness and deficit thinking. By legitimizing and promoting the voices and narratives of POC, engineering education can incorporate diverse perspectives that challenge the dominant social order and contribute to a richer, more critical academic discourse.

Through the lens of CWS, we are able to see the ways that Whiteness impacts pedagogy and subsequently, students. Matias and Mackey (2016) define CWS as a:

[T]ransdisciplinary approach to investigate the phenomenon of Whiteness, how it is manifested, exerted, defined, recycled, transmitted, and maintained, and how it ultimately impacts the state of race relations. Whiteness need not be only indicative of white folks since people of color can inhabit Whiteness ideology—albeit for different reasons; yet, Whiteness is indeed most prevalent in whites themselves. [27, p. 34]

CWS emerged from CRT to critically examine Whiteness as (1) a social construct, (2) a racial discourse, (3) an ideology, and (4) a claim of superiority [28]. As Matias and Mackey [27], indicate, Whiteness produces racialized discourse to create a hierarchical structure. This is not to say that only whites are to blame for the pervasiveness of Whiteness. Instead, it is Whiteness itself that has percolated through the social fabric to become the dominant narrative in social, political, cultural, and historical discourse even at the global level [28]. Therefore, by focusing on the critical analysis of Whiteness, CWS prompts engineering education researchers and practitioners to scrutinize the often-implicit norms and assumptions embedded in engineering education. It encourages a deeper understanding of how Whiteness operates within academic settings, impacting curriculum design, pedagogical approaches, and student experiences.

Moreover, integrating CWS into engineering education research allows for a nuanced exploration of colorblindness and meritocracy by tracing these ideologies back to “the historical origins of Whiteness and its connections to settler colonialism, racial domination and economic exploitation” [29, p. 443].

These are the theoretical lenses used to present the ways in which both meritocracy and colorblindness represent the foundational pillars of Whiteness. An analysis of the ways that race impacts engineering education is desperately needed because “schools function not only to benignly reproduce social orders, but are in and of themselves contentious actors in the production of power” [18, p. 71]. If we overlook the importance that schools have on perpetuating white supremacy and the disproportionate amount of white people in engineering, we miss the reality that schools aren’t just a mirror of Whiteness, but are active actors in maintaining the status quo. As Gramsci noted, schools are “destined not merely to perpetuate social difference but to crystallize them” [30, p. 40]. These are the reasons that viewing engineering education and research through the lens of these theories is crucial.

Colorblindness in Context

Colorblindness is something that is often taught at an early age by many in the attempt to not be rude [31], [32]. On multiple occasions and in different spaces such as grocery stores or at the local ski hill (in a predominantly white area of the country) the first author has heard a child say “mom, that man is brown,” or “mommy, his hair is weird,” only for the mom to shush the child and tell them not to be rude. As seen in Le and Matias, Thankdeka suggests, white silence is a product of adults forcing children to adopt a colorblind ideology “even though they do recognize racial differences as children” [33, p. 21]. We are not letting the perpetuation of colorblindness off the hook. Instead, we are trying to highlight how the ideology of colorblindness is intrinsic and woven into the national fabric and is not just an academic or engineering issue.

Colorblindness is an illusion to some white people—and some POC whose proximity to Whiteness manifests as self-hate and internalized racism [34]-[36]—that allows them to operate under the fictional appearance that race doesn’t matter and that “we are all humans” [37]. Cabrera summarizes Bonilla-Silva’s term of colorblind ideology as “manifestations of racism that serve to mask the underlying power dynamics that continually stratify society along the color line” [38, p.121]. Additionally, embedded within this colorblind ideology is the idea that one is a racist and maintains racism if one simply recognizes that race exists and acknowledges someone’s race [39].

Colorblindness in STEM

There is a contradiction that exists in the engineering rhetoric between not seeing color, yet making color a salient marker of distinction. The idea of “I don’t see color” is prevalent in engineering spaces [40], yet there is an aspect of racial hypervisibility that has been described in engineering education research that contradicts the idea that people in engineering “don’t see color.” As indicated by Tate and Linn racialization was one of the main aspects that made it difficult for engineering students to adjust to their engineering programs because of the constant

discomfort within the academic environment [40]. Often where racial identity (i.e., visibility of POC) was often equated with inability and stereotypes in engineering [40]. Thus, claiming that color-neutral attitudes exist in engineering negates the lived experiences of POC and the hypervisibility they are constantly exposed to in classroom, laboratories, or team activities. Colorblindness, and the idea that attitudes and behaviors in engineering are race-neutral, also lead to issues of “otherness,” racialization, and cultural dissonance [41], [42], all of which have detrimental effects on students of color.

Moreover, colorblindness institutionalizes racism without asking for accountability when racist acts occur. For instance, McGee argued that racism in STEM continues to exist because racially hostile environments are ignored by the institutions themselves [43]. In addition, diversity mentoring programs, which are often aimed at “fixing” students of color, also minimize the racialization happening in STEM spaces [43]. Often, justifications and excuses are provided for racist behavior instead of better understanding the influence and responsibility that institutions have in and on STEM spaces. This blatant inaction from institutions shows that racist ideologies go uncontested while colorblind attitudes prevail.

Another example in which colorblindness exists in engineering is the assumption that engineering work itself is race-neutral. Governed by the ideal of objectivity [13], engineering work has embraced the idea that color has no role in how engineers design technologies or solve problems. Take for example the problematic use of face recognition technologies for policing of communities of color [44]. These technologies are claimed to be race-neutral when they are, in fact, aimed at defining what safety and security mean under the premise of benevolence but with a clear racial animus [44].

Adding to the list of colorblind ideologies in engineering spaces is that of enacting certain practices in engineering classrooms in the name of pedagogical benefit or benevolence without questioning racial bias. Some examples include placement of emergent bilinguals into Limited English Proficiency (LEP) programs where STEM education is seen as tangential from language instruction [45] rather than using bilingualism as an asset that can promote engineering thinking [46], [47]. Students are often placed in sheltered programs [48] where English proficiency is emphasized in the name of good pedagogy even when students may be fully bilingual [47]. These practices ignore the way in which colorblind racism still exists by categorizing students as inferior or in need of remediation based on perceived limitations originating from inherent ethnic or cultural traits.

When we engage in a colorblind society, we invalidate how racism strips POC of their humanity and sees their real lived experience as not real [33]. Colorblindness also “allows Whiteness to continue its dominance because underneath the notion that all should be treated fairly are white-normed historical social practices that preserves the system of white supremacy” [33, p. 25]. Batty and Leyva, in their article “A Framework for Understanding Whiteness in Mathematics Education” explain that focusing on colorblindness changes the much-needed deep reflexive conversation on the way that “colorblind” systems and institutions hurt POC, to “supposedly non-racial arguments or proxies of student failure, uncaring parents, and devaluing of education, which leaves Whiteness invisible and allows those who assert it to defend their views in apparent nonracial ways” [49, p. 56].

Addressing colorblindness is regularly left up to the individual, which redirects the responsibility away from the much-needed deep reflection of institutions. By engaging in this manner, the institutional and systemic benefactors continue to reap the benefits of Whiteness while not having to change the structure that will continue to provide white people with material and consequential benefits. Simultaneously, by locating racism solely in the acts of individuals, said institutions and systems get to feel as though racism is a *them* problem, not an *us* problem. A colorblind mentality also presents the privileges that whites receive as acts of merit inferring that their success was built upon hard work and no outside factors mattered.

Meritocracy Feeding off of Colorblindness

Meritocracy is a term coined by Michael Young [12] in which he laid out a future dictated by the idea that an individual will be rewarded solely by the effort they give. The book was satire and was intended to be a warning to the flawed idea of depending solely on individuals' efforts. This ignores the many other variables of success that matter, as proclaimed in an op-ed titled "Down with Meritocracy" penned by Young in 2001 after seeing and realizing how, in the span of almost 50 years, many people believed in what he deemed to be satire to be truth [50]. In it, Young laments the idealism of which meritocracy is grounded in: individual effort and hard work equals success and formal education as the only validating factor to intelligence and knowledge. This is because Young saw how external barriers hinder some groups of people to achieve what they deem to be their rightful success, while then discarding their unsuccessful efforts as signs of lack of skill, ineptness, and overall poor decision-making which thus disenfranchises them.

Meritocracy in US History

Meritocracy feeds off of colorblindness— a colorblind society dominated by Whiteness ignores the hierarchical positioning of groups based on racialized ideologies, leading to the belief that success is based solely on merit [14]. The idea that one's hard work will be rewarded with success and said hard worker is a morally good person who plays by the rules, only feeds into the rhetoric that the United States has been built on and seen as the land of opportunity. As coined by historian James Truslow Adams [51] the American dream is:

that dream of a land in which life should be better and richer and fuller for every man, with opportunity for each according to his ability or achievement...It is not a dream of motor cars and high wages merely, but a dream of a social order in which each man and woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, ***regardless of the fortuitous circumstances of birth or position*** [emphasis added] [51, p. 354]

American exceptionalism and individualism were products of the American Revolution and Manifest Destiny, and still have a firm grasp on the American public's conditioning [52]-[54]. Creating boundaries for who can and can't be seen as a contributing member of society through civic engagement in America began from the country's birth with the founders believing in property qualifications in order to vote [54].

Jean Anyon's [55] work on social class and the hidden curriculum provide a much deeper look into the ways that the American educational system has been set up in different spaces to produce the specific labor pool certain areas need for all levels of industrial capitalism. While seemingly out of place, our takeaway from this work is that engineering in America has accepted, incorporated, and/or embraced meritocracy, individualism, and exceptionalism, as Anyon analyzed. These core beliefs continue to be part of the dominant discourse in engineering while neglecting how Whiteness itself has contributed to these framings [14].

While it may be comforting to believe that we have moved away from being a racist society in the U.S., meritocracy and objectivity are ideologies that continue to dominate the engineering discourse [13]. Thus, we make the argument that colorblindness feeds into meritocracy. Meritocracy and colorblindness are mutually beneficial to each other. Combined, they focus on individual efforts; All individuals' efforts are equal if you believe that we are all human and that race doesn't matter. This bolsters the belief that racism is an individual's problem and that systemic and institutional racism don't exist, despite the plethora of data that suggests otherwise [56]-[59].

Meritocracy and Elitism

For Young, and the author of the book *The Tyranny of Merit* [60], Michael Sandel, the main culprit has been an overemphasis on educational selection which has created an elite class whose opinions eclipse that of the average American. As Sandel states:

Meritocratic hubris reflects the tendency of winners to inhale too deeply of their success, to forget the luck and good fortune that helped them on their way. It is the smug conviction of those who land on top that they deserve their fate, and that those on the bottom deserve theirs, too. [60, p.28]

Sandel places a large emphasis on the hubris that elites have due to their college degrees and the prestige which is bestowed upon them for surviving the educational gauntlet, by both themselves as they pat themselves on their back, but also by the general public who too valorizes college degrees. He reminds us that "[S]een from below, the hubris of elites is galling. No one likes to be looked down upon. But the meritocratic faith adds insult to injury" because "for those who can't find work or make ends meet, it is hard to escape the demoralizing thought that their failure is their own doing, that they simply lack the talent and drive to succeed" [60, p. 29].

The myth of meritocracy incites emotions for all involved: for POC, the myth makes them feel as though they are worthless, deserve their social positions in life, and the reason for them not achieving their greatest dreams are due to their own lack of hard work and determination because there should be no outside barrier that exists that hard work can't overcome. And when POC are successful, oftentimes they attribute their success to their individualism and hard work. For white students, pointing out that meritocracy is a myth makes them question their personhood and how they achieved whatever they have. For students, but specifically white students, an unwavering belief in meritocracy makes them believe that they deserve—or even worse, are entitled to—the successes they earn.

Engineering does not escape this fate; how can it? In engineering, meritocracy manifests itself as the manner "that students must prove themselves to be engineers, and they will make it

only if they work really hard through the ‘death march’ of math and science courses” [15]. The authors continue:

[I]n engineering, meritocracy may be repurposed as, or operate under the veil of, maintaining an environment of ‘healthy competition’ or ‘being worthy of the profession’ instead of being recognized as a way to leave unquestioned color-blind racist practices and perpetuate racist ideologies about what it means to be an engineer in the United States. [15, p. 19]

With the difficult task of completing engineering programs (that have an astonishing attrition rate between 40-50% [61]), those that *do* survive inevitably develop a sense of condescending hubris. Unfortunately, this hubris then has a tendency to be viewed and labeled as elitism—by both those that completed the arduous task of engineering school, and the general public.

As already foreshadowed, there are two sides of meritocracy with the front-facing and directly stated effect being: work hard and you will overcome any obstacles and you will be successful. The underbelly effect that is not often directly stated but commonly interpreted is: those that aren’t successful didn’t work *hard enough* and therefore they deserve their failures. In meritocracy, no failure is seen through the lens, or within the context of, systemic barriers that hinder certain identities while advantaging others.

Concurrently, in meritocracy, all success is seen as the success of an individual who puts forth a sufficiently persistent and valiant effort to overcome any obstacles that they might have faced. This is evident when looking for reasons why engineering students drop out. To no surprise, there are a plethora of pitfalls an individual can make, with no recognition of the institutional hurdles that act as gatekeepers in perpetuating the current makeup of engineering as “pale and male” [62, p. 9]. As listed by industry and blogger articles, reasons that students drop out of engineering programs include: poor work ethic, inability to deal with failure, and lacking the engineering mindset [63].

It is common talk among engineers that when trying to explain the dearth of women and POC in engineering, meritocracy is used to justify by stating things such as “they aren’t cut out to be an engineer” or that others “just don’t work hard enough” to succeed in engineering rather than acknowledging the ways the system has been set up to continue to (re)produce the same identities that currently exist within engineering. It is this overreliance on the myth of meritocracy that gives white engineers an inflated sense of self, while simultaneously deflating POC’s sense of belonging, self-confidence, and keeps them away from the field [64].

However, empirical studies suggest there are greater forces at play. In 2013, Brandi Geisinger and D. Raj Raman conducted a comprehensive literature review titled “Why They Leave: Understanding Student Attrition from Engineer Majors” [64]. It revealed several institutional factors at play that explain the increased dropout rates in engineering—all of which are affected by institutional and systemic pressures and not solely individual failures. The six main factors they found were: (1) race and gender, (2) high school preparation, (3) self-efficacy and self-confidence, (4) academic and classroom climate, (5) grades and conceptual understanding, and (6) interest and career goals. As they state so directly:

It is also true that a significant proportion of engineering students leave because the engineering educational system has failed to show them that the engineering endeavor is

profoundly human, has failed to make relevant the key scientific, mathematical, and engineering principles needed for mastery of engineering, has failed to show that engineering is within reach of their abilities, has failed to capture their imagination and fascination, and has failed to provide a welcoming atmosphere to them. [64, p. 920] Notice the importance that is shown to the field itself (systems) failing students (individuals)--not individual students' ineptness or some individual flaw. Given the historical context and theoretical underpinning of meritocracy which places so much value on prestigiousness and elitism, one can see how the engineering field has fallen prey to the myth of meritocracy.

The myth of meritocracy is a product of—and has a dire need to—perpetuate Whiteness. It is not just what the myth directly states: that those who work hard are rewarded for their hard work. It's what meritocracy isn't saying to populations that are not represented in these elite and prestigious careers: that those in difficult outcomes and situations in America deserve to struggle, and their difficulty is due to their lack of hard work and not pulling themselves up by their bootstraps. It is the more insidious undercurrent which is trying to undermine the ability to see race, class, and other minoritized identities (and all of the historical legacies these attributes bring with them) as items that have an impact on one's success. Fully believing in the myth of meritocracy shifts the gaze of who fails in engineering (shown through a lack of representation) to focus on their individual failures rather than understanding that a lot of so-called merits are benefits bequeathed through family and by presenting-identities such as familial wealth, race, generational legacies [15], [65]. And like following a flowchart, meritocracy thus explains the lack of POC representation in engineering.

Colorblindness and Meritocracy as Pillars of Whiteness

How and why are colorblindness and meritocracy pillars of Whiteness? Through the traits of exclusion of American Individualism and the belief that individuals should pull themselves up by their bootstraps as discussed in previous sections, the power of particular identities to create the rules for who can and can't participate, and the mythical belief that race doesn't matter far exceeds the current lack of diversity issues in STEM/engineering [7]. These metanarratives distract from the reality of the systemic and institutional barriers made to do the hegemonic work of a settler colonialism ideology and mindset [66, p. 663]. While a deeper unpacking of the ways settler colonialism helps support Whiteness is beyond the scope of this paper, it is important to identify the connections between a colonizer/colonized ideology and the perpetuation of Whiteness as a self-sustaining operation to protect the interests and hegemony of Whiteness through ideologies such as the myth of meritocracy and colorblindness.

Due to its invisibility and elusiveness, Whiteness is difficult to define. DuBois [67] found Whiteness to be a false ideal, historical mechanism of power, while Leonardo [28] states "Whiteness is historically stratified and partitioned the world according to skin color" (p. 32). Leonardo also says Whiteness is a racial category and socially constructed identity supported by hegemonic and flexible material practices and institutions [68]. bell hooks refers to Whiteness as a representation of terror [69]. The point of emphasis is that while Whiteness is invisible and elusive to many, to others, Whiteness dominates every aspect of their lives. Not understanding how Whiteness works is the difference between life and death for many. One clear, and recent, example is that of Dr. Antoinette Candia-Bailey, Vice President of Student Affairs at Lincoln

University in Missouri, a Historically Black College and University (HBCU), who died by suicide after different sources indicated that she was the object of bullying and mistreatment from the president of the university (a white male) [70]. Not only is this a tragic outcome of Whiteness in higher education, but also demonstrates how Whiteness may be elusive to many while working to oppress POC even in race-conscious spaces.

It is important to state that white people were not always known as white people. Rather, Whiteness became a construct created to formulate hierarchical stratifications to separate groups of individuals and thereby justify subjugation [71]. Groups of people were known by vague tribal names based on characteristics ascribed by societies: Scythians, Celts, Gauls, etc. For instance, for the Greeks, Scythian meant little known, illiterate, and Stone Age People, while Celt denoted strange, barbarian people [71]. One can see from these descriptors that, historically, social constructions have been utilized to frame hierarchies of the masses leading to discrimination, and Whiteness has not been the exception.

Who is and isn't white—that is to say the concept of Whiteness—has been fluid as discussed in Ignatiev's pivotal book *How the Irish Became White* [72]. In it, the acceptance into Whiteness was contingent upon the brutalization and oppression of Black people which was consequently redeemed like something owed. This was a crucial turning point from Whiteness as a concept driven solely by skin color, to Whiteness meaning skin color plus oppression of The Other. Rather than Whiteness being determined by something one had in a passive manner, it now included something one did in an active way. The fluidity of who was and wasn't accepted into Whiteness now depended on other factors, not simply looking at someone's pigmentation (or lack thereof). By realizing that Whiteness is an ideology that both white and BIPOC operate under, problem-solving becomes more about structures rather than individuals.

CWS emphatically states the need to problematize normality [73]-[76]. In order to achieve this goal, CWS theoretically defined and outlined the concept of race-evasion that “articulated the arc of colorblind racism” [77, p. 4]. This indicates that colorblindness is central to upholding and perpetuating Whiteness. There have been Black scholars who envisioned a world in which color does not matter. MLK Jr.'s I Have a Dream [78] speech is regularly used by deniers of institutional racism to suggest that color does not and should not matter. However, MLK Jr.'s speech was aspirational, suggesting a mountaintop not yet summited. Ignoring the reality of systemic and institutional racism through the lens of colorblindness as the solution rather than fixing systemic and institutional forces that perpetuate oppression and advantage certain identities over others, will get us no closer to the mountaintop. Yes, race is a social construct, but the ramifications of colorblind and meritocratic policies and beliefs only exponentially worsen the real-world implications for all identities.

Our Final Position

The United States of America has been built upon the concept of white supremacy which is and has been supported through the uncritical belief in colorblindness and meritocracy. Viewing American individualism and exceptionalism through the interdisciplinary and theoretical lens of CRT and CWS has highlighted the ways Whiteness has flourished, particularly in engineering, and helped support these two pillars of Whiteness. A belief in

colorblindness is needed in order to believe that one unit of merit is equal across all races and genders. However, given the gender and racial disparities in both society and more specifically engineering/education, we know that not to be true. Given the values that meritocracy and colorblindness bring to engineering, we must engage in the larger discussion of the impacts Whiteness has in the field. The way we get there is undetermined nor is there a singular path. This position paper should open the discussion to focus on Whiteness, and not solely its' individual pillars of Whiteness: colorblindness and meritocracy.

We are not advocating for more faculty and staff workshops on diversity, equity, and inclusion. We are looking beyond individual change, although we acknowledge the importance of these endeavors. We are looking for a deep reflexive analysis of institutions and their predisposition toward Whiteness. This would indicate the need for structural change that shifts the focus from celebrating individual success stories of POC having made it, to ways of reimagining the K-12 STEM pipeline that gate-keeps particular identities out all the way through higher education while sending others on escalators to the upper echelons of prestige and elitism. What are chairs, deans, and vice provosts of engineering programs/colleges doing to fundamentally change how we attract, retain, graduate, and send forth diverse engineers to become leaders in their respective fields [79]-[81]?

Future Areas of Study

Current research on Whiteness in engineering has heavily focused on antiblackness and the hegemonic norms of Whiteness that pervade engineering [39], [82]. As James Holly Jr. suggests, the structured hegemony of Whiteness confirms the perpetuation that “racial domination is the goal of both overt white supremacists and white people sympathetic to racial justice initiatives” [83].

In order to disrupt a self-sustaining and contained operation of normalization, one must first name it. In the words of the late Dr. Barbara Love, you have to “interrupt invisibility” [84]. In this vein, many engineering scholars have called for the need to make Whiteness in engineering/education more visible [6], [15], [83], [85]-[87]. One way to do this is through the use of Critical Race Theory in engineering education [86]. In their article “Making Whiteness Visible: The Promise of Critical Race Theory in Engineering Education,” Drs. Holly Jr. and Masta argue that a deep engagement in critical theories will help usher engineering education to a more sustained-equity discipline by:

- (a) articulating how race and racism are ingrained in engineering education; (b) crossing epistemological boundaries; (c) exposing claims of neutrality, objectivity, colorblindness, and meritocracy in light of the self-interest of those in power; (d) challenging antihistoricism; and lastly (e) listening to the racially excluded. [86, p. 800]

The list above includes two of the main themes of Whiteness in engineering and the greater STEM field analyzed in this paper: the myths of meritocracy and colorblindness.

The way that researchers in STEM have been fulfilling the call for diversity in STEM is by paying attention to disenfranchised communities through a lens of individualism, and trying to increase their numbers without changing the current environment that is set up for them to fail. What this does is devalue the importance of systemic barriers that produced the current results.

By trying to simply check boxes of diversity, equity, and inclusion without a deep and comprehensive look at the ways Whiteness and racism have laid claim to the exclusionary ways which act as gatekeepers, leaders in STEM are relegating POC in STEM fields as the topically celebrated “Other.” Those that are non-white are being viewed through a deficit lens to see where they don’t line up with the normalized standards of Whiteness. We are calling for a redirection of focus from individuals and the ways they are seen as deficient, to focusing our attention on the perpetuation of white supremacy through actors such as institutions and systems that continue to produce the same identities in STEM and engineering: “pale and male” [62, p. 9].

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