The Implications of Morality Politics for Diversifying the STEM Workforce

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Abstract

Science, technology, engineering, and mathematics (STEM) workforce development, identified as a critical consideration for meeting current and future societal needs and challenges, depends on the capacity to draw upon a talented pool of individuals possessing requisite knowledge and training. In the United States, as elsewhere, related questions have arisen about who constitutes that pool and the conditions under which it has been determined. Noting the currency and controversies surrounding persistent inequalities and inequities in STEM educational attainment and workforce participation, the research presented here offers an elaborated framework and dedicated analysis of related processes, with the goal of extending understanding and delineating implications for identifying strategic points for intervention. In ideological and political terms, efforts to combat related educational and workforce disparities reflect a “morality politics” diffused in social identities and behaviors and embedded in structural claims with broad and pragmatic implications for STEM educational access and workforce opportunity. With particular attention to race and ethnicity (and gender), this analysis revisits and unpacks related assumptions and addresses challenges attached to the distribution of benefits and burdens in the face of both ideological and practical expediencies in determining profiles of STEM participation and inclusion.

Introduction

Building a strong and effective science, technology, engineering, and mathematics (STEM) workforce has been a prominent topic on both research and policy agenda in the United States (U.S.) and around the world. Indeed, STEM development has been identified as a critical consideration for meeting current and future needs and challenges for societal wellbeing and progress, and it depends particularly on the capacity to draw upon a talented pool of individuals possessing requisite STEM knowledge and training. Accordingly, related questions have arisen about 1) who constitutes the pool of STEM workers and 2) the conditions under which that pool has been determined. In the U.S., these questions are especially pertinent in reference to racial and ethnic minorities who have been traditionally underrepresented in STEM fields, and are the focus of the issues addressed here.

A variety of (often controversial) assertions have been made indicating that minorities embody a vastly underutilized resource and a lost opportunity for sustaining and expanding the country’s research and innovation capacity. As noted in a landmark report by the National Research Council (2011, p. 2), the U.S. stands at a crossroads in STEM development, and a national effort

to strengthen the related workforce must include the minds and talents of all Americans, pointing especially to minorities and other underrepresented groups such as women and persons with disabilities. This assertion was based on a trifold rationale (NRC 2011):

1. Sources for the future STEM workforce are uncertain.
2. The demographics of the domestic population are shifting dramatically, with those groups who are most underrepresented in STEM constituting the fastest growing segments of the general population.
3. Diversity is an asset, contributing to the STEM talent pool, enhancing innovation, and increasing economic progress.

It is in the guise of this rationale that minority underrepresentation in STEM fields has been problematized as wasted resources for building and maintaining a talented and innovative workforce (NAS 2011; McNeely and Schintler 2015; McNeely and Fealing 2018; McNeely 2019). However, as a rationale for strategic planning and policy development, these points require active agreement in terms of relevance and application — and therein lies the problem.

On the one hand, related discussions have turned on traditional questions of *social justice* focusing on equity and rights in educational access and occupational opportunity. On the other hand, perspectives that link disparities in STEM participation directly to issues of *economic utility* have become increasingly dominant in recent years. However, these ideas have not occurred in a vacuum and, in reference to STEM access, attainment, and participation, they require serious engagement with morally positioned questions and assumptions. Both perspectives are delineated in keeping with underlying moral logics — denoting how things *should be* or how they *should work* — indicating strategies and goals for broadening the STEM participation of underrepresented groups (or not).

Note that, while some change has occurred and selected policies and programs have shown some “success” (Chubin et al. 2015; Leggon et al. 2015; Leggon and Pearson 2008), broader inequalities and inequities in STEM education and employment patterns persist. A critical consideration of the processes that sustain racial discrimination requires specific attention to the role that it has played in STEM fields even in the face of claims of social “progress” and “reform.” The fact that specific groups stand out relative to stark disparities in STEM outcomes indicates that the complex role of race and other dimensions of difference must be taken seriously in terms of institutional constructs and determinant processes.

Observed disparities do not just happen; there are processes that produce them and processes that maintain them, all of which reflect institutionalized societal and organizational relations and dynamics.

As mentioned, efforts to combat educational and workforce disparities have been grounded in assertions of social justice and of economic utility. These relative perspectives involve strong, and often problematic, assumptions derived from moral bases that are not necessarily defined, shared, or valued in similar terms. Therefore, both social justice and economic utility arguments must be considered in ideologically and politically bounded perspectives marked by inherent power relationships involving the distribution of resources. Such positions make for a “morality politics” with power reflecting structural

tensions by which those with control over resources influence access and opportunity. In this sense, a morality politics calls for an *instrumental perspective* to change *intrinsic foundations* diffused in everyday identities and behaviors. Thus, morality politics constitutes the *action core* of related policy, with broad and pragmatic implications for STEM educational access and workforce opportunity. Given these issues, what is needed is an ideologically and analytically encompassing approach for understanding and effecting inclusion in STEM fields and the related workforce (Smith-Doerr 2009). What is needed is a heightened awareness of the direct and indirect, intentional and unintentional institutionalized nature of the relations, actions, and impacts in question at different levels and units of analysis. That is,

What is needed is a more encompassing and embedded perspective that also provides a critique of the fundamental dynamics and assumptions underlying participation and underrepresentation in STEM.

Thus, noting the currency and controversies surrounding STEM disparities, an elaborated framework is offered here with the goal of enhancing our understanding of related processes and delineating implications for identifying strategic areas for intervention. The overall aim is to clarify and question generalized positions, practices, and justifications that have been widely assumed regarding patterns of STEM participation. Therefore, after providing information on minority STEM educational and employment situations as background for viewing related issues, I offer a closer look at the positioning rationales typically engaged in discussions of diversity in STEM fields and in society more generally. To that end, I revisit and unpack assumptions embedded in applicable morality politics, engaging it as an active determinant of STEM educational attainment and workforce participation and mobility. Moreover, I address challenges attached to the distribution of benefits and burdens in the face of both ideological and practical expediencies in determining profiles of diversity and representation in STEM fields.

Background

The STEM workforce is composed largely of people who earned related degrees over roughly four decades. Although relatively more pronounced in some areas than others, underrepresentation and lack of diversity are noted generally across STEM fields. For example, as reported by the U.S. National Science Foundation (NSF 2019), selected minority groups (Blacks, Hispanics, and American Indians and Alaska Natives) constitute disproportionately smaller percentages of STEM degree recipients and of related employment than in the U.S. population in general. Although some increases have occurred, significant racial/ethnic disparities remain in educational attainment and in STEM workforce participation and mobility. In general, underrepresented minorities are significantly less likely to graduate from high school, to enroll in college, and to earn a college degree (NSF 2019). Although master's STEM degrees earned by underrepresented minorities in the U.S. have shown a slight decline in recent years, proportions of bachelor's and doctorate STEM degrees have shown slight increases. In 2016, underrepresented minority students received 22 percent of all STEM bachelor's degrees and 9 percent of all STEM doctorate degrees (Figure 1). STEM workers are disproportionately white and male; white males constitute almost one-half of the STEM workforce. Female participation varies, with the lowest degree attainment occurring in engineering, computer sciences, and physics. However, across all racial and ethnic groups, more women than men enroll in college in the first place. Still, women and minorities overall constitute a

smaller percentage relative to their proportions of degree attainment. Also, Asian and underrepresented minority women together represent about 10% of persons in STEM occupations (Figure 2). In all racial and ethnic groups, more men than women work in STEM occupations.

Figure 1. STEM Degrees Earned by Underrepresented Minorities, 1996–2016, as percentage of degree type

Data Source: NSF (2019)

Figure 2. STEM Degree Earners in STEM Occupations by Race/Ethnicity and Sex, 2017

Data Source: NSF (2019)

STEM employment has been identified as generally attractive in terms of occupational prestige and earnings. In fact, STEM workers earn more than workers in all other occupations at the same educational level and, also, even if not working in STEM jobs, workers with STEM college degrees earn more over their lifetimes than those in all other majors (Carnevale et al. 2011). However, are these same opportunities equally open to minorities?

Entry and advancement in relevant fields have not been an equal opportunity enterprise. This point is exemplified in findings such as significantly differential probabilities in grants and other awards to Ph.D. scientists by race and ethnicity irrespective of qualifications (Ginther and Kahn 2013; Ginther et al. 2016). The disproportionately low representation of particular individuals and groups has resulted from socio-historical and hierarchical relations and social and institutional barriers to educational attainment and to occupational opportunity and mobility. Such issues are explored in interrelated research on, for example, social stratification and inequality in terms of race, class, gender, disability, and other markers of social differentiation and societal hierarchy (e.g., Grusky 2014; Coates et al. 2018), discrimination, bias, and “chilly-climate” (Turner et al. 1999; Sandler 1999; Coates 2012; Sue 2010a,b), occupational mobility and leadership (Byrd 2009; Collins 2010; Meyer 2013; Parker 2005; Schein 1992), organizational environments (Greenwood et al. 2008; Suddaby et al. 2010), workplace culture and diversity (Pless and Maak 2004; Scott 2010; Scott and Byrd 2012; McNeely 2019). Also, various workforce projection studies have been conducted incorporating discussions of diversity and participation across groups and sectors, including preference and confidence effects (Sax 1994, 2012; Toossi 2006; Scott et al. 2011).

Furthermore, covering not only instruction and knowledge exchange, but also socialization, certification, and sorting and selection functions, a wide range of work has investigated relevant processes and effects in education itself as a social institution (Cuban and Shipps 2000; Frank and Meyer 2007; Gumpert 2007; Hallinan 2000; Hallinan et al. 2003; Snyder 1999; Lloyd-Jones 2009). Moreover, a burgeoning literature engages questions specifically underlying STEM communities and participation (e.g., Pearson et al. 2015; Fox et al. 2006; Leggon 2006; McNeely and Schintler 2015; McNeely and Fealing 2018). In addition, research has examined interventions expressly aimed at affecting workforce diversity (e.g., Chubin et al. 2015; Curtis and Dreadchslin 2008; DesJardins and McCall 2008; DePass and Chubin 2009; Leggon and Pearson 2008; Goulden et al. 2011; Leggon et al. 2015). However, research shows that many conventional approaches touted to address related problems do not lead to the encompassing or sustainable changes necessary for effecting inclusion and positive transformation. For example, “diversity training” does not lead to greater diversity in upper management in corporations (Dobbin et al. 2011); diversity “professional” training is generally ineffective (Kalev et al. 2012); “colorblind” approaches to racial attitude interventions are less effective in reducing bias than those with explicit reference to prejudice (e.g., Richeson and Nussbaum 2003); and successful diversity initiatives in one field can have unintended negative effects in others (Myers and Fealing 2012).

As is apparent, there is a large and burgeoning literature on relevant issues related to “race, gender, disability, sexual orientation, age, language, religious beliefs, ethnicity, world view, height, weight, life experiences, cultural customs, economic status, educational level, job title, and years of work experience” (Scott and Byrd 2012, p. xx). Yet, there remains a need for more detailed and critical

examinations of the value and relationship of STEM educational attainment and workforce diversity within and across academia, government, and industry. Also, while the focus here is on race and overriding categories of underrepresented minorities, this point applies to diversity more generally in its many forms and applications.

Diversifying Rationales

As noted, rationales for racial diversity in STEM fields typically have turned on economic utility or social justice arguments, each of which “has waxed and waned in popularity through wartime, economic crises, and widely varying levels of national concern regarding civil rights.” Of these, the social justice rationale “has been a less consistently persuasive one. In this sort of argument, Americans must eradicate all traces of racial injustice, including minority underrepresentation in science and engineering arenas, for moral rather than strictly practical reasons” (Slaton 2010, pp. 6-7). Instead, arguments are posited for a system that blends free markets with national policy and collective action, based on a moral logic espousing that “pragmatism, rather than appeal to unachievable utopias, must provide the guiding spirit” (Hart 2010). Economic consequences and materialist values determine the strategic moral logic of such arguments, treating different groups and individuals as mere human capital means, belying societal realities. Moreover, costs versus benefits can be variably applied and related analyses tend to focus on outcomes, rather than interrogating the embedded processes by which they occur. This focus effectively turns equality, equity, and rights into commodities to be bought and sold according to dominant valuations, such that *the intersection of morality and economic gain constitutes an area of flux*.

The lack of moral coherence between these contending positions also reflects an instrumental versus an intrinsic focus, defining the parameters of STEM participation. However, the disutility of the economic argument for examining the underrepresentation of minorities in STEM lies in its narrow focus. Also, by its very nature, the economic rationale truncates the range of discrimination that can be considered (Lucas 2008). Supposed indifference to social identities and structural positioning, along with an absence of attention to social responsibility and justice, produce principles that cross levels of generality and defy values of equity and rights in cultural application. To be clear, the point is not to discount the economic argument; indeed, related assertions are highly compelling. However, discrimination operates across societal spheres, while also affecting and linking them to the economic outcomes which, in fact, are effectively defined within the broader context of the social world. Accordingly, this issue is consequential for our understanding of related educational and occupational relations and dynamics, even in economic terms.

Interestingly, the shift to economic arguments framing underrepresented groups as a wasted resource also was a political move by diversity supporters to counter those for whom rights and equity values held little sway. Yes, economic arguments calling for an expanded and inclusive STEM labor pool can be appealing in the face of research and claims of workforce deficits and related calls for maximizing workforce capacity in STEM fields (NAS 2011). However, note that some analysts have challenged this position on a pragmatic basis, presenting evidence and arguing instead that assertions of shortages of STEM workers are not supported by the data and

that the U.S. STEM supply is strong and improving (e.g., Teitelbaum 2014; Salzman 2013). Such positions raise a critical point:

If the reason for addressing underrepresentation is grounded in the logic of workforce shortages, this logic is subverted if, in fact, there is no crisis in STEM talent availability.

Yet, whatever the economic position, even in a world dominated by material market values and motivations, one could argue the need to “reconcile the efficiency of markets with the values of social community that markets themselves require in order to survive and thrive” (Ruggie 2003, p. 231). This point brings us back to practical morality matters of individual equity and rights emphasized over and above base economic returns and productivity gains.¹ Social justice often has dominated the discourse regarding diversity in STEM fields and, while generally applicable, the complexity of related issues encompasses shifting disciplinary contexts, functional tasks, and socio-historical conditions. While different types of opportunities might be presented for individuals depending on training and education, the foundational nature and cross-sector applications of STEM fields reflect the extent to which educational and occupational hierarchies operate in tandem within related disciplines and social hierarchies (cf. Frehill et al., p. 3). Frankly, differing positions notwithstanding, the existence of minority underrepresentation in STEM is relatively uncontested. *The issue at hand is whether or not underrepresentation is viewed as a problem in the first place and how — or if — it should be addressed.*

Contending Moral Frames

STEM workforce needs are typically defined within the scope of a high-skilled employment sector, such that calls to broaden participation are fundamentally calls for the extension of STEM educational attainment and occupational access and opportunity — areas marked by longstanding disparities and inequities. Efforts to combat disparities historically have been grounded in assertions of social justice, emphasizing ideological and political issues linked to notions of democratic societal relations and institutional dynamics. The democratic impetus for greater diversity among the STEM workforce would demonstrate that “the highest levels of achievement are accessible to the members of any group” (Taylor, in Olsen and Fagen 2007, p. 1). Indeed, without broad representation and diversity, STEM conduct becomes an “elite activity of a few, rather than the social activity that underpins the strength of society” (Zerhouni, in Olsen and Fagen 2007, p. 2). However,

The assumption of individual, institutional, and societal good will and desire to establish an equitable and fair representation in the STEM community is a strong assumption which itself can act to maintain differential access and opportunities.

In fact, economic utility provides a basis for a denial of rights; it offers a model in which the consideration of rights is “inefficient.” Frankly, even the self-interest of those espousing this position ultimately might be harmed by it. For example, increasing disenfranchisement could

¹ Interestingly, few arguments advance direct links between equity and productivity outcomes. However, Weberian rationality arguably could be applied to depict the relationship in fundamental terms and to develop testable hypotheses.

lead to upheaval and instability over time when the power distance exceeds “acceptable” limits. However, most policy approaches are effectively short-term in perspective and the economic argument typically does not engage such externalities as immediately relevant.

As mentioned, the effective use of arguments emphasizing economic expediency as opposed to social justice and rights depends on how the problem is defined. Both reflect moral positions and applications that can change with time and circumstances and, at best, represent a subjective morality as much as a subjective rationality. However, we must draw a distinction between economic returns and investments and notions of social justice and rights. Although they need not be conflicting, if STEM workforce capacity is defined irrespective of social consequences, then it becomes fundamentally an issue of who benefits and who loses. The articulation of motivational sources and relationships must be actively engaged in explanations of differentiation in positive or negative terms. Taking a step back and viewing the continued lack of diversity in STEM through a broader lens denotes contending moral positions. That is, such framing begs the question: Whose morality is in play in this situation?

Understanding problems of access to quality education and training and to credible occupational choices requires attention to process, especially in terms of disciplinary preparation and opportunity and of the complex social dynamics that determine it. Particularly given claims of the scarcity of talent, the consequences of access are critical in determining the development of talent on which the vitality of STEM fields and related workforce depend. The lack of access and opportunities in “disadvantaged” locations obviously will have a negative effect on the number of persons qualified to pursue related careers, a point which is especially relevant given spatially delineated socioeconomic stratification patterns.² Underlying many related arguments are assertions of social justice, which generally are the same ones that have long been applied to questions of equity in educational attainment and employment opportunity.

A variety of interrelated barriers (not the least of which are racism, iterative and cumulative educational degradation, and poverty and other economic contingencies) complicates efforts to remediate the lack of diversity in STEM. However, for analytical purposes, STEM participation can be determined most directly by educational access and occupational opportunity across social strata. Possibilities for STEM participation are directly affected by educational access and attainment, which have practical implications for occupational opportunity (in meritocratic terms). Underlying this point is the adequacy of social and institutional arrangements to educate and to reward promising individuals. Without educational access and training, talent often goes undeveloped and untapped. Barriers to education and participation are heightened for those without the necessary preparation and, even if later opportunities arise (as in various intervention strategies), a game of catch-up and remedial learning must first be undertaken. Accordingly, lack of quality educational access and preparation can mean that an individual might see no way to a fruitful STEM career (even if it is imagined in the first place).

In any case, remember that education is a social institution and among its purposes, determined in part by its nature, quality, and availability, are social control and the sorting and selection of individuals for future roles and performing a kind of status differentiating and gatekeeping

² In this case, location is a proxy for educational opportunity and amplifies the effects on individual and group participation.

function. Education is a powerful tool that can provide the practical means for participation. However, that is not sufficient. Education does not occur in a vacuum. Education itself is a resource, and the institutional and cultural context in which it is distributed – in which access and opportunity are determined – make it the stuff of politics. By extending control over educational resources and possibilities, societal “power brokers” can effectively determine STEM participation. As in race relations in general, claims for availability and participation in STEM represent challenges to the status quo, pointing to questions of *who has access* to education and employment and of *whose interests are served* in controlling it — questions that have long been raised as fundamental moral considerations.

Conceptual Contentions and Considerations

Social justice assumes the desirability of a level playing field, but this is a strong assumption and complicated goal against which racism actively mobilizes. To pursue change, in STEM as in other societal arenas, people have to perceive the disparities and inequities as wrong and subject to redress (cf. Piven and Cloward 1977). Also, as well as for those in less privileged positions, social justice provides a vision for what the powerful stand to gain in an equitable society (cf. Tronto 1993). However, for economic utility, if redress is to be pursued, disparities must be viewed in terms of negative material utility. Accordingly, we need to think about what is valued in society in this regard. Related narratives in the U.S. commonly treat public accomplishment, autonomy, and rationality as laudable qualities (Tronto 1993, p. 117), resting on the fiction that the powerful and wealthy are self-made, that they attained what they have without assistance from others or societal support. From that perspective, those who have been historically and structurally delegated to lesser positions in the social hierarchy often are framed (explicitly or implicitly) as undesirable, weak, lazy, undeserving, or simply incapable.

Contemporary theories of social justice typically rely on principles of fairness, positing shared notions of the “public good” and of human capacities. In this sense, power and political institutions are employed to establish a “good society” reflecting equitable opportunity and access. However, these terms are themselves politically, culturally, and morally loaded. They require a “golden rule” by which individuals accord to others what they themselves regard as fair and equitable treatment and consideration. Such positions reflect a Rawlsian notion that justice is the first virtue of social institutions, referring to “fairness” and “a proper distribution of the benefits and burdens of social cooperation.” That is, social justice “implies fairness and mutual obligation in society: that we are responsible for one another, and that we should ensure that all have equal chances to succeed in life. In societies wherein life chances are not distributed equally, this implies redistribution of opportunities” (RSA 2008). The goal of social justice is “full and equal participation of all groups in a society that is mutually shaped to meet their needs. Social justice includes a vision of a society that is equitable and in which all members are physically and psychologically safe and secure” (Adams et al. 1997, p.1). Moreover, in reference to STEM education and employment, social justice has an *action orientation* focused on opening doors and building bridges to access and opportunity for everyone. As such, it reflects both a process and a goal.

However, conflicting visions of what constitutes the good society and, even more consequential, attitudes and values about realizing the good society are at the heart of morality politics in STEM participation. Morality has been described as “prescriptive judgments of justice, rights, and welfare pertaining to how people ought to relate to each other” (Turiel 1983, p. 3). It is embedded in social contexts (Carnes et al. 2015), with moral principles functioning as “interlocking sets of values, practices, institutions, and evolved psychological mechanisms that work together to suppress or regulate selfishness and make social life possible” (Haidt 2008, p. 70). However, the differing premises of social justice and economic utility arguments make clear that even ideas about what is moral and equitable, or to whom they are applied, are not universally shared (cf. Graham et al. 2009). The concept of morality rests on accounts of “the good” and/or “the right” (which are not necessarily the same thing), but their articulation can be limited or can vary substantially; *they are not universally applicable, at least not in the same way or to the same extent or to the same people.*

Also, people are quite capable of espousing a vision of equity and democratic values, while displaying attitudes and behavior that preclude social responsibility or an ethic of care (Tronto 1993; Lakoff 2014). Perceptions of self-interest and related attitudes and behavior can be disconnected from or not recognized relative to societal well-being other than as directly and immediately applied to narrowly conceived self-interest (Sunstein 2005). Indeed, from such perspectives, loss to some, especially to those at the bottom, is justifiable in the face of (self-interested) gains at the top. Clearly, such positioning relies on framing, and the consequences of underrepresentation and “losses” are understood relative to the status quo. In short,

Ideas about how (and if) to ameliorate inequalities can vary dramatically and, without a supportive moral base, underrepresentation as a problem is always open to attack.

Accordingly, approaches using, for example, benchmarks derived from demographic percentages as bases for rights will not hold in the face of utilitarian challenges. Thus, we must consider ideological and behavioral differences translated as morality politics.

Social justice arguments assume a strong value system in which “everyone deserves equal economic, political, and social rights and opportunities,”³ involving “the fair and proper administration of laws conforming to the natural law that all persons, irrespective of ethnic origin, gender, possessions, race, religion, etc., are to be treated equally and without prejudice.”⁴ In practice, legal, advocacy, and implementation dimensions must be considered (cf. Ignatieff 1999). Assuming universal engagement of social justice goals incurs substantial limits if inconsistent with the economic (and political) interests of powerful stakeholders and actors. These points reference serious engagement with morality politics colored by relational dynamics affecting the underrepresentation of racial minorities in STEM. Thus, we must look to the effects on STEM participation of racism as a fundamental feature of society, with attention to two critical determinant aspects of STEM participation as especially relevant: 1) the social

³ <http://www.socialworkers.org/pressroom/features/issue/peace.asp> (accessed 5 April 2015).

⁴ <http://www.businessdictionary.com/definition/social-justice.html> (accessed 5 April 2015). The reference to “natural law” invokes notions of human rights. Education – and particularly “education of good quality” – has been framed as a human right, as laid down in various international instruments (UNESCO 2013).

organization of science and 2) societal stratification (cf. Frehill et al. 2015). Together, these issues provide organizing principles for considering STEM participation relative to moral judgments and concerns.

Organizing Principles

The social organization of science refers to the relational dynamics and positions reflected in the conduct of science. Societal stratification involves the wider context and impacts the structural and cultural interactions and dynamics of STEM work. Underrepresentation reflects “a continuum of discrimination that embraces the full range of the phenomenon” (cf. Lucas 2008, p. 177), entailing a matrix of discriminatory norms, values, and practices in the broader society and in specific disciplines and communities of practice. Horizontal and vertical relations affect STEM educational and occupational prospects, constituting variation in STEM organization, conduct, and stratification across academia, government, and industry sectors. Ascriptive bias can outweigh meritocratic competency such that practice and decision making tend to be elite-dominated. Although participation can vary across and within fields, in most contexts, minorities are systematically underrepresented in leadership and effective decision-making positions, irrespective of degree attainment and expertise. That is, “the larger structure of marginalization persists” (cf. Frehill et al. 2015, p. 2).

Related processes incorporate the role of pre-labor market and labor market discrimination in affecting educational and employment access, attainment, and opportunity. For example, generally speaking, as degree level increases in STEM fields, so does the intellectual content of the work, with less time spent manipulating things and more time spent manipulating ideas and data. In addition, these higher level manipulations often involve synthesizing information from multiple sources and producing knowledge rather than things. Therefore, while workers may be needed at all educational levels, the most powerful roles typically are played by those with more advanced training.⁵ Who is most likely to get that training, and why? What determines the parameters and content of participation? STEM productive relationships and resources are organized largely as disciplinary communities and, as in any community by definition, there are those who belong and those who are “others.” Even with increasing emphasis on interdisciplinary research, disciplines wield substantial power in prescribing behavior and conferring status within STEM communities. Minority underrepresentation in STEM follows patterns and trends of stratification and discrimination in the larger society, reflecting institutional and cultural barriers to entry and mobility linked to disparities in educational and occupational attainment. As do other professionals, scientists exercise control over entrance into their relative communities (Frehill et al. 2015, pp. 2-3). Accordingly, emphasizing disciplinary cultural construction, learning, and reproduction, we must consider how structures of difference, production, and power are legitimated and perpetuated (Bourdieu and Passeron 1990).

Economically speaking, racism — whether direct or indirect, intentional or unintentional, overt or covert — plays to maximize profits at the expense of racialized “others,” shielded by social institutions, culture, stereotypical assumptions, and tradition (Coates 2008). Thus, understanding

⁵ Frehill, McNeely, and Pearson (2015, p. 3) make this point in reference to women’s participation in the chemical sciences, mathematics, statistics, and computing. It is generalized here in broader reference to STEM and underrepresented minorities.

underrepresentation obviously requires sensitivity to context; the extra-economic social context brings other transaction considerations to the relationship in terms of structure and dynamics. Whether blatant and insidious attacks or hidden behind facades of politeness, political correctness, and expediency, results include inadequate information and lost opportunities for non-elites. More to the point, racism is a self-adjusting process, grounded in institutionalized relations and structures that serve to rearticulate, reproduce, recycle, and redefine methods, attitudes, procedures, and practices “targeting racial non-elites to the benefit of racial elites” (Coates 2008, p. 226), and speaking to the “regenerative and transformative aspects of inequality” (Baldus 2004, p. 578). In this sense, discrimination is analytically central to the morality politics reflected in perspectives on the relevance of STEM underrepresentation.

Morality Politics in Action

On the one hand, politics refers to “the realm in which resources are allocated, public order is maintained, and disputes about how these activities should occur are resolved” (Tronto 1993, p. 6). On the other hand, morality implies an ethical stance encompassing “considerations as to what one thinks is important to do and in what ways; how to conduct one’s relations with other people; and being aware and prepared to be critical of one’s basic approvals or disapprovals” (Emmet 1993, p. 7). Strategically, to be taken seriously as a problem, STEM underrepresentation must be viewed in politically expedient terms bound by inherent power relationships, with morality politics implying how resources “should” be distributed. Accordingly, we again must look to the action orientation of morality politics. With politics understood as the ways in which people gain, use, and lose power, morality politics thus rests on claims of power and political institutions harnessed to achieve the good society, turning on different visions of what that good society is, determined by socio-historical developments and ideas of the individual and group produced by and subject to political power and representation.

Engaging a Foucauldian view of politics diffused in everyday identities and behaviors, this approach has especially broad implications for notions of education as a right. Note that, while virtually every country that outperforms the U.S. in education has a constitutional or statutory guarantee of the right to a quality education, the U.S. does not; there is no legal basis ensuring education as a right in the U.S. (Lurie 2013). Comparative studies confirm that one of the greatest benefits to education is a supportive national culture (Lurie 2013; Pearson 2012), but, while there is political rhetoric asserting responsibility for education in the U.S., where that responsibility lies is unclear. What is clear is that education as a right has fallen through the cracks (Lurie 2013), and practical solutions to the vast educational inequities and disparities remain elusive, especially in application to selected individuals and groups. Race has been a particularly relevant indicator across time for those most disadvantaged in this regard.⁶

Related disparities in resource distributions have broad implications for STEM educational attainment and occupational opportunity. While typically not discussed explicitly as such in STEM communities, racism (as is sexism) is a means of social control, and distributional differences, disciplinary structures, and working relationships are (re)produced and maintained

⁶ Even with the *Brown v. Board* decision against *de jure* discrimination (and there are constant efforts to overturn it), the 14th Amendment has proven inadequate for ensuring *de facto* educational equality across race, status, and income (Lurie 2013).

within the social organization of the relative fields, reflecting the stratification and status attainment system embedded in the broader societal context. Racism serves to restrict and regulate the behavior, life chances, and outcomes of specified groups to the advantage of those in more “privileged” positions. Indeed, racism is a very real and destructive way of escaping notions of an ethic of care and common responsibility (Arendt 1966, p. 236; Tronto 1993). More specifically, it reflects social, political, psychological, ideological, and legal systems of inequality perpetuated through societal control mechanisms. Applied to STEM, these interactive systems serve to define, structure, and limit the experiences of identified groups, reflecting a dynamic conceptualization of racism (cf. Coates 2008, p. 208; Omi and Winant 1994).

Inextricably linked to questions of discrimination, stratification, and inequality and to their uses in society, social justice processes and goals typically are defined relative to a system ideal reflecting conditions of equal access and opportunity, with the triumph of merit over ascriptive social delineators. Again, such a system is based on moral arguments about what “should” occur in a fair and equitable society, with fairness and equity extended to all, not just to some, constituents. Supporting arguments require a moral perspective held in common. However, such arguments are themselves problematic in application. They reflect a strong, and often just plain erroneous, assumption based on an uncritical acceptance of the meaning of morality. Race remains a major determinant of educational, occupational, and social experience in the U.S. In education and employment, decisions about STEM talent and resource distributions that determine individual opportunities “follow lines of identity, providing more of those opportunities to some social groups than to others” (Slaton 2010, pp. ix-x). In a social order where questions of distribution are framed in racialized differentiating terms such as members/others, deserving/undeserving, and economic utility/disutility, one must ask by whom and how that status is determined. Thus, we find ourselves on the horns of a theoretical and practical dilemma, facing the limitations of morality politics defined according to contending positions.

Limitations of Morality Politics

Moral arguments provide an ideological base for social direction and action. However, again, we cannot assume that everyone argues from the same moral base. Morality is perceived in highly relativistic terms and, therefore, must be viewed with caution in consideration of the horizontal versus vertical institutionalization of values and goals in ideology, practice, and effect. Here is a simple, yet no so simple, truth (Tronto 1993, p. 152):

Moralists can prescribe what the correct course of action should be, but if actors believe that their interests are better served by ignoring moral concerns, then they will ignore moral concerns.

Thus, social justice morality politics can be rendered relatively powerless to change disciplinary and occupational cultures, much less society. Diversity has an extremely narrow meaning in many STEM contexts. Interest in a racially and ethnically diverse workforce is often touted, but not necessarily expressed in any significant redistributions or extensions of opportunity. It is for this reason that, rather than equity and rights, economic rationales positing STEM shortages and

minorities as underutilized resources have been made as appeals to dominant interests. However, noting the powerful determinant role of race, can such instrumental arguments lead to intrinsic change? Can such arguments stand against challenges to their fundamental logic outside a context bound by broader claims of rights and equity?

Whether viewing them from a social justice or an economic utility perspective, minority underrepresentation problems as such are functions of discriminatory institutional and cultural processes. Keep in mind that, whether a target or non-target of discrimination, parties need not be actively oriented to it; they may be unwittingly involved in its operation and properties.⁷ STEM workforce diversification implies an idealized goal or vision of what should be in terms of inclusion, acceptance, and opportunity, affirming and institutionalizing values of social justice, participation, equity, and community. Despite the over-individualization of racism in conventional thinking, it refers to more than incidents of interpersonal interaction (Ray 2015); it is “a matrix of norms, values, and support mechanisms” (Lucas 2008, p. 234). Institutionalized racism explains the durability of patterns of minority underrepresentation in STEM and places stress on the point that STEM is practiced and given meaning in the social milieu.

Also, while social justice values arguably represent a call to action in solidarity building among the disenfranchised and supporters, there is a dialectical tension here in that they also can serve as a pacifier and means of social control, diluting the capacity to act and challenge the status quo. As discussed, education itself as a social institution reflects an inherent tension in the functions it serves in society. Moreover, inclusion may be defined not so much in terms of social change, but more as cooptation which, ultimately, supports the status quo and power distribution, determining how, for whom, and for what purposes that power is wielded. The question is to what extent they hold sway. To what extent do they act to constrain access and opportunity? This question speaks to a morality politics that is given meaning and rooted in economic motivations in the broader cultural context. It appears that there has been erosion in the power of values defined in terms of social justice linked to politics in practice. Rather than a theory of a universal morality based on rights and equity, current approaches tend to eschew common responsibility as a virtue and means. Notions of the individual in the U.S. have referred to narrowly “rational” self-interested (read “selfish”) actors, in sharp contrast to the individual conceptualized as possessing an independence of thought which does not preclude commitment to an ethic of care and social responsibility. Especially in a society increasingly ruled by market values and commodification, with caring devalued and social justice ends and processes obscured in politics, consensus is questionable in regard to moral judgments for defining the ontological and structural boundaries of a virtuous and good society.

Discriminatory actions are not necessarily fixed points and related judgments can be highly ambiguous. Patterns of political, cultural, and economic values and control shape the educational and workforce terrain and largely determine who can traverse it. Structural bias is expressed and maintained in practice and effect, and attitudinal bias, even if unconscious, contributes to perpetuating related disparities. While social values provide the frame within which moral arguments are interpreted, this also means that some perspectives are excluded from consideration (cf. Tronto 1993). Thus, for example, rather than held as central to membership

⁷ This observation follows from the critique of dominant legal reasoning and “the discussion of taken-for-granted standard operating procedures that sediment discrimination in institutional processes” (Lucas 2008, pp. 217-218).

and belonging, social justice concerns can be corrupted by broader socio-political, cultural, and economic interests and developments. Moreover, the inability, unwillingness, and resistance of some actors to undertake or respond to efforts to ameliorate related situations — or, indeed, to view them as problems requiring remedy in the first place — denote very real barriers to social justice goals posited as universally applicable.

STEM underrepresentation does not happen in isolation, nor is it monolithic or unidirectional. Broader interrelated processes and mechanisms shape social dynamics and set control over the social environments in which racialized categorical constructions, along with individual relations and attitudes, are reflected and enacted. Moreover, they are defined and embedded in differentiating institutional relations (Ray 2015; Grusky 2014). In STEM education and workforce contexts, as in other arenas of social life, institutional racism operates on multiple levels and modes in terms of differential opportunities and constraints according to ultimately ascriptive characteristics. This is not to say that they are static and unchanging. Rather, they are reproduced and maintained in keeping with broader institutional dynamics and processes that are captured in contending expressions of morality politics.

Conclusion

What is suggested here is not so much a different account of the relationships determining minority underrepresentation in STEM, but, rather, a cautionary note on the assumptions we make regarding different arguments and motivations as platforms for action and change. Moreover, a more strategic use of the concept of morality is suggested. There is a role for the kind of morality politics attending notions of economic utility. However, the morality politics of social justice allows for the articulation of a more comprehensive epistemological approach to STEM participation and its relationship to the social sphere. Also, frankly, diversity arguments drawn from economic utility assertions of STEM workforce needs do not encourage inclusion to the same extent as broader social justice arguments that engage fundamental rights and societal relations. However, given the ideological demise, or at least compartmentalization, of related values and the recognition of economic utility strategies, broader approaches must be engaged relative to commitments for extending access and expanding participation.

So, what would it take to make diversity in STEM (and in society) the norm, to establish sustainable equitable participation processes and outcomes? Simply put, most people would not question it; they would accept it as the right thing to do and would make every effort to achieve it. With that shared belief and commitment, people would encourage one another toward the goal of diversity and, together, their efforts — large and small — would make diversity a routine expectation (cf. Burgstahler 2008, p. 279). Indeed, some programs arguably have facilitated the participation and careers of scientists from underrepresented groups, but racism and systems of inequality encompass *highly adaptable and dynamic processes* (Omi and Winant 1994; Coates 2008), such that

Changing such processes and outcomes would require a paradigmatic break in educational and occupational practice — a fundamental and revolutionary shift in

institutional and cultural principles, attitudes and behavior, and social organizational structures.

The point here is that the first assertion in the above scenario – that most people would accept it as the right thing to do and would make every effort to achieve it – delineates the problem in stark terms. We cannot assume that most people will fully embrace and be deeply committed to this position in ideology or practice. STEM educational attainment and workforce opportunities today would be better served by a flexible notion of social justice beyond morality as the basis for understanding how people should treat each other (“others”). Even if “the right thing to do,” social justice alone is not sufficient as a motivation; related morality politics also must engage questions of power and differential interests and limiting applications. Based on changes in social life dictated by historical and economic developments, the goal then would be to make it more costly to ignore the moral dictates of equity and rights, even in economic utility rationales. Accordingly, we must adapt our assumptions about motivations for social justice.

There is an urgent need for an analysis that steps back and recognizes that the moral base from which minority underrepresentation in STEM is addressed is not the same for all. In fact, even when espoused as such, it can be and is used – directly or indirectly, consciously or unconsciously – in very different ways, including as a pacifier and blind for maintenance of the status quo, and related policies can produce and reproduce power disparities and inequality. Moreover, there may be differences in valuations of outcomes and to conceptualizing disparities as a problem; different ideas about how we ought to live and work together are brought to the fore and made central to political debates motivated in part by morality claims. Underrepresentation reflects social relations and, once social relations are structured, even individuals who do not support the motivation behind their structuring will find themselves embedded in the social relations, obtaining benefits and incurring costs that follow from them (Lucas 2008, p. 179).

In pragmatic terms, cognizance of contending morality politics attached to STEM educational and occupational trends must be invoked in any comprehensive analysis on which policy decisions for increasing minority representation can be based. Morality politics must be brought to bear when gathering and interpreting evidence and in approaches to questions of intervention and policy implementation. It must be considered when addressing challenges to inclusion in STEM and when developing approaches to remedy bias and discrimination effects. More to the point, awareness of the morality dialectic is necessary for any attempt to “normalize” inclusion, to change mainstream attitudes, practices, and assumptions, and to recognize the contextualized nature of merit and achievement in the face of ascription-based processes (McNeely 2015). Doing so will provide a more nuanced understanding of the role and interaction of stratifying forces relative to STEM educational and occupational processes and outcomes. That is, recognizing contending morality politics is critical to the disruption of existing disciplinary, social, and professional paradigms in STEM — assuming that is the goal.

Both social justice and economic utility perspectives typically have focused on change defined as extension and inclusion, *not as fundamentally revised processes*. Yet, ultimately, we are talking about social transformation. Understanding this point requires addressing various questions aimed at exploring models for increasing the supply of qualified STEM professionals, for

advancing productive relationships and engagement, and for identifying opportunities for building inclusive communities of practice. In other words,

- How might other aspects of STEM stratification affect our understanding of discrimination relative to moral positioning?
- What other bases of discrimination should be considered relative to observations of STEM participation?
- When inequality and inequity are built into social structures and relations, how does one go about the project of social transformation and re-structuring?
- To what extent is a real paradigmatic break or revolution necessary if we are to see substantial change in access, opportunity, and participation?
- Can the current institutional and political cultural order provide the means for equity and inclusion as a public good in both moral and practical terms?

Such questions point to systemic issues reflecting horizontal and vertical objectives and top-down and bottom-up dynamics. As discussed, disparities in representation and participation do not just happen; they are the result of complex processes reflecting broader social conditions and dynamics (McNeely 2015). Indeed, these are old, deeply institutionalized, and socially embedded problems. As such, they defy simple explanations. If such issues are to be confronted in reference to broadening STEM access and participation, then we are compelled to stretch our social imaginations and engage attitudes and structures that are often highly contested.

- What is the nature of a good society?
- Can we continue to envision a more just world?
- Whose vision is it that defines the content of that world?
- How should we address challenges attached to the distribution of benefits and burdens in the face of resource constraints and of political expediencies?

Both ideological and practical considerations are at play in the morality politics that frame relative processes and goals. Some require an assumption that racial and ethnic diversity is a desired goal for the STEM workforce, but, given socio-cultural and political trends, that is a strong assumption indeed. We cannot underestimate the diversity of moral positions, nor of what determines them. Accordingly, I restate the central questions:

Whose morality is being referenced and what is its content? Whose morality takes precedence? For that matter, even if overarching moral goals are the same, are their essential elements and applications the same?

Thus, we see contending morality attachments, whether to rights and equity or to rationality and utility given that costs versus benefits can be variably framed relative to distorted contextual perceptions. It is in this conditional sense that “de-biasing” strategies might be discussed in related analyses and policies (cf. Wilson et al. 2002).

Minorities and other underrepresented groups have been identified as a rich, yet underutilized source of STEM workforce capacity, leading to questions of broader inclusion and concerns about increasing participation. Applying an analytically comprehensive approach that actively

considers morality politics in relation to this issue is more capable of dealing with relevant antecedents and consequences as critical features of determinant processes — especially if the aim is to “mainstream” inclusion, equity, and participation, rather than treating them in isolation or as separate from broader social processes and relationships. Invoking morality politics has implications for understanding the current state of STEM representation and, importantly, for identifying opportunities for broadening participation. Moreover, it means focusing not only on those who are underrepresented, but *also on the interactive and affective roles played by those who are broadly represented and in more powerful positions, and on the ways that they need to change*. In short, whether in reference to STEM communities or to society more broadly, improving access and opportunity will require addressing the root causes, not only the symptoms, of inequality and inequity in representation. However, we cannot be naïve and assume a morality politics based on a universally applied and mutually envisioned good society; we must keep in mind that agreement on such a vision of the good society is by no means given.

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