How do we explain the low numbers of undergraduate women and students of color in Science, Technology, Engineering, and Math (STEM) fields across the United States?

Is it because students of color and women come to campus underprepared? Is it because we have academic and cultural deficiencies that need to be remediated? Is it because we are at-risk of dropping out, or perhaps that we face unfortunate circumstances? Lack community? Need better study skills?

How we make sense of the disproportionate numbers of underrepresented students in STEM fields is informative because it reveals our assumptions regarding these disparities. Our answers therefore provide insight into the logic undergirding the programs that we design to assist students. The language that we use to describe underrepresented students in STEM is also important because whether we refer to students as “at-risk” or “academically deficient,” or perhaps “products of their environment,” we make explicit our tacit assumptions regarding individual responsibility, social stratification, and merit. These labels matter for all students, and particularly for underrepresented students in STEM.

The overrepresentation of white males in the STEM fields continues to be cause for concern for a variety of reasons, ranging from the need for a diverse workforce to the desire for a more socially just and equitable society. The disproportionate numbers of women and students of color in the STEM fields is due to a number of factors, including structural mechanisms throughout P-20 education, discriminatory policies and practices, and psychological barriers (see, for example, Steele, 1997), among others (Tsui, 2007). As a response, supplemental programs on college campuses, often referred to as “intervention” programs, aim to increase the recruitment and retention of underrepresented students. These programs are diverse in terms of the populations they serve and the services they provide, and employ a range of theoretical positions regarding student responsibility and possibility.

Administrators of STEM intervention programs on college campuses describe underrepresented students in different ways. As such, it is important to analyze the perspectives of administrators who design, implement, or simply work for STEM supplemental programs because they are central in understanding the goals and philosophical underpinnings of these recruitment and retention efforts. Moreover, administrators’ responses regarding students of color and women reveal how underrepresented students are perceived within the program and the overt and covert messages that they receive, or do not receive.

Methods
Project STEP-UP (STEM Trends in Enrollment and Persistence for Underrepresented Populations) is a multi-year, mixed-methods study funded by the National Science Foundation. Re-
searchers with Project STEP-UP interviewed administrators of STEM intervention programs on college campuses during 2009 and 2010 for the first year and 2011 for the third year. Interviews were conducted in an effort to learn more about the services that they were providing to students, as well as how such programs were designed, structured, staffed, and funded. During the first year of the project, the research team conducted a total of 55 face-to-face, semi-structured interviews with STEM intervention program directors and administrators on public research universities. During year two, the team conducted an additional 33 interviews with new and returning participants. For this analysis, I drew from all interviews and used specific quotes from thirteen different administrators.

Framing the Problem:
Educational Deficit Thinking
One way that administrators of STEM programs described women and students of color was through a deficit lens. Administrators employ deficit thinking when they use the language of repairment when talking about the students they serve or target. When students are seen as the ones who need to be “fixed,” they are seen from a deficit perspective. Educational researcher Richard Valencia (1997; 2010) refers to perspectives that are rooted in bias as educational deficit thinking, which has negative consequences for students. Valencia encourages us to reframe the problem and by shifting the blame away from students. Specifically, he posits that students are not the ones who need an intervention, but the policies, practices, and pedagogies supported by schools need to be changed in order to meet the needs of diverse learners.

Using a deficit model to understand and describe students’ behavior is problematic on a variety of levels, and social and educational scholars have critiqued the employment of this rationale for some time (Menchaca, 1997; Ryan, 1970; Valencia, 1997; 2010). The evolution of deficit thinking in education is most evident in two common types of ideological perspectives used to explain social phenomena in general: genetic inferiority theory and cultural deprivation theory. Genetic inferiority theory originates from the eugenics movement and is less socially acceptable in 2011 as it is predicated on the belief that people of color, women, and other subjugated groups are inherently inferior to white men. This perspective is based on a false biological premise that non-majority persons inherently possess inferior capacities, with women and people of color being labeled as deficient in comparison to white men.

However, the pervasiveness of genetic inferiority theory has been replaced with a softer critique called cultural deprivation theory, which because it is more socially acceptable, maintains a healthy presence within educational discourses (Marger, 1994). Cultural deprivation theory is the idea that such student deficiencies are not biologically inherent but are rather the result of an impoverished culture, which causes the victimized person to suffer. As sociologist Martin Marger (1994) argues, cultural deprivation theory is just as potent as overtly racist biological superiority theories because such perspectives emphasize individual and group shortcomings rather than a social system that continues to discriminate, “thus preventing the bulk of minority group members from attaining economic and social parity with the dominant group” (p. 31). These discourses, despite their relationship to

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eugenics, remain omnipresent within the field of higher education where students of color and women continue to be underrepresented in the STEM fields. In talking with administrators of STEM intervention programs, two clear examples of deficit thinking emerged: the uses of terms “underprepared” and “at-risk” to describe underrepresented students.

The Employment of Deficit Thinking: Students as “Underprepared”

Educational deficit thinking occurs in both blatant and subtle ways. Within education settings, deficit thinking occurs when underrepresented students are blamed for lacking the preparation necessary to achieve academic success, when they are referred to as (and treated as if they were) “at-risk” for failure, or when they are labeled as having an academic, cultural, or other “deficiency.” Through the use of such phrases, the focus is on repairing the student while the institutional norms and values are never questioned or explicitly addressed (or acknowledged). Administrators, however well-intended, may employ deficit thinking when describing the students that they serve. Thus, it is important to recognize these discourses are mobilized.

During interviews, there were times when the language used by administrators to describe underrepresented students was clear and indicative of a deficit orientation. For example, when describing target students, some administrators focused on under-preparation, commenting that underrepresented students arrive to campus lacking the preparation necessary to be academically successful:

“So while we see underrepresented students certainly at all academic levels...a disproportionate number are underprepared....”

“...they [the students in our program] are not prepared.”

In these cases, when referring to preparation, the students themselves were viewed as being underprepared. The blame for underpreparation was placed upon the student, rather than on institutional structures and patterns, for example. In these responses, administrators do not question the adequacy of the curriculum or the resources at the school where students were coming from and therefore, the problem of underpreparation is relegated to the individual student. It is a label that the student is given and because of previous educational experiences, is most likely a label with which she or he is already familiar (Cuban, 1994).

A concern that students possess the academic skills necessary to be successful within postsecondary STEM courses is a legitimate concern. But, not all administrators framed this issue by placing the burden of preparedness on the student. For example, one administrator framed the problem of preparation by challenging the institutional structures that provide and/or limit opportunities for students. In describing the pool of students that she serves, this administrator commented that her institution works with populations who:

“...may come from academically underprepared high schools.”

In this response, while the issue of under-preparation is a reality, her language indicates that students are not the ones to be blamed. Rather, this administrator emphasizes the high school that the student attended and the responsibility is therefore shifted away from the individual student.
and she or he is not marked with the label of “underprepared.”

Preparation was a key concern with almost all of the administrators with whom we spoke. The reality is that many underrepresented students do not have access to the kinds of preparation necessary to be admitted into STEM programs (Tsui, 2007). However, the idea of preparation goes both ways and one administrator’s remarks about preparation provide another angle to understand preparedness:

“We are not saying we don’t want students here, but are we prepared to make sure that domestic students are successful and how are we prepared to do that?”

In this comment, the administrator turns the focus back toward the institution and asks the same question of the university that it asks of the students. By taking this approach, this administrator effectively shifts the logic of preparedness and subsequently protects underrepresented students from being labeled with undesirable traits. This is a critical move on behalf of administrators because labels like “underprepared” and “at-risk” carry heavy consequences for students and those who work with students.

The Employment of Deficit Thinking: Students as “At-Risk”

Another way that administrators mobilized deficit thinking was in describing their concerns about underrepresented students. The term “at-risk” was commonly used among administrators, with little clarity over its meaning. While the label of “underprepared” was clearly a concern for students arriving at the university without the academic skills to be successful, the term “at-risk” seemed to indicate that underrepresented students were “at-risk” for being unsuccessful once they arrived on campus. This sentiment is reflected in the following remarks from different administrators:

“[our program focuses on] definitely high potential and high achieving students that are at, once they get here, are at-risk compared to the rest of the population”

“I oversee our at-risk student programs, and I help all the students that are on probation or academic liability, those that re-enter, things of that nature.”

“We support student organizations that are very keen on establishing a certain climate for students...So, we have the luxury of having students engaged in that way, that promotes further engagement for students that may be at-risk.”

While the above administrators’ do not provide details, their labeling of students as “at-risk” carries with it a fair amount of assumption, both about students and about the environment that administrators help to create for them. When the term “at-risk” is used to describe a student population, one has to wonder just what the students are at-risk for. Valencia’s educational deficit thinking is at play when this phrase is used without context because the institutional norms, structures, and programs are never questioned and the onus of responsibility for success or failure solely lies within the student.

When the label of “at-risk” gets lumped into other non-desirable traits, such as probation and liability, this sends a negative message to underrepresented students and those who work with and on our behalf. This negative messaging is detrimental to students, even when it is used with good intentions. Take, for example, the following use of the term by one administrator:
“We do a lot of intervention stuff...so a lot of times we’ll say, ‘who are our at-risk people?’...[The long term goal for me is] have we increased retention for our at-risk groups?”

This administrator’s response seems to indicate that the students are “at-risk” for exiting the STEM program and he wants to intervene before they drop-out. While the intention may be noble, the discourse that surrounds it continues to place blame on the individual student because she or he is the one who is “at-risk” for failure. The program, major, department, college, or university is not “at-risk” for failing a student or for losing a student, but instead, the attention for possible failure applies only to the student. The individual student holds the responsibility for success or failure and those outcomes, as expressed by one administrator’s responses below, carry high stakes:

“We take some high-risk students, but we don’t take very many...And when you bring in an at-risk student and they fail, then people are so done with you.”

The label “at-risk” carries with it a fair amount of baggage not only for the student, but for administrators who work with students, too. Undoubtedly, administrators want underrepresented students to be successful, but some of the language that they mobilize can be detrimental to students of color and women in their programs. One way to challenge the logic that individual students of color and women are to blame for the overrepresentation of white males in STEM fields is to focus on the use of language.

Reframing the Problem: Toward a New Discourse
A more productive way to frame the underrepresentation of women and students of color in STEM is as a structural phenomenon. Administrators who took this holistic approach considered the complexity of structural constraints that students face and focused instead on the assets that students hold. They emphasized campus climate and the environment designed to serve underrepresented students. A few administrators of STEM intervention programs held a perspective in-line with Valencia’s (1997; 2010) critical argument by acknowledging the collection of forces that create opportunity for students, and this was evident in their language when describing underrepresented students. Take, for example, the following remarks:

“The high schools aren’t preparing these young women...”

“...they don’t have the same kinds of opportunities that students right here [have].”

In these examples the blame is shifted toward institutional structures and the students are not carrying that burden. Programs designed from this logic would not focus on remediating students, but on broader goals such as changing the climate for underrepresented students and creating a more inclusive environment for them. One administrator with whom we spoke was explicit about his commitment to this kind of approach:

“...it’s not about fixing students who need remediation, it is about institution change that creates an environment that is a richer learning environment so that students of varying backgrounds have the opportunity to participate in the educational mission of the university.”

The orientation taken by this administrator, and others like it, effectively challenges deficit logic by reframing the problem of underrepresenta-
tion. Like Valencia, it shifts the focus away from the student toward changing the environment. The way that administrators talk about students, indeed, how all of us talk about students, matters. There is intense power in framing educational phenomena through a deficit lens as the program and policy responses to these kinds of discourses focus on “fixing” the students and their apparent shortcomings; they ignore the kinds of knowledges, histories, and experiences students bring with them into schools as well as the oppressive practices that are legitimated through institutionalized discourses such as individualism, competition, and meritocracy.

If the goal is to change the status quo in STEM fields by increasing representation of traditionally underrepresented groups then it must start with how we understand the problem, which is reflected in the language that we use to describe students. Part of our work as educators, as administrators and researchers too, is to transform our language by reframing the problem so that we can then work to design more effective and responsive programming.

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About Project STEP-UP
The STEM Trends In Enrollment & Persistence for Underrepresented Populations (STEP-UP) project is a study that is investigating the underrepresented undergraduate students’ participation in the Science, Technology, Engineering, and Mathematics (STEM) fields at large, public, research universities. STEP-UP focuses on the experiences of undergraduate women, students of color, and low-income students in STEM majors, and factors that impact their enrollment, persistence, and degree completion in the sciences. STEP-UP project is generously funded by the National Science Foundation (NSF), the Ford Foundation, and the Alfred P. Sloan Foundation.