

# Toward “Inclusifying” the Underrepresented Minority in STEM Education Research

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Research in undergraduate STEM education often requires the collection of student demographic data to assess outcomes related to diversity, equity, and inclusion. Unfortunately, this collection of demographic data continues to be constrained by socially constructed categories of race and ethnicity, leading to problematic panethnic groupings such as “Asian” and “Latinx.” Furthermore, these all-encompassing categories of race and ethnicity exasperate the problematic “underrepresented minority” (URM) label when only specific races and ethnicities are categorized as URMs. We have long seen calls for improved outcomes related to URMs in undergraduate STEM education, but seldom have we seen our own understanding of what it means to be a URM go beyond socially constructed categories of race and ethnicity. If we aim to not only improve diversity outcomes but also make undergraduate STEM education more equitable and inclusive, we must reevaluate our use of the term “URM” and its implications for demographic data collection. The classifications of “underrepresented” and “minority” are more nuanced than simple racial categories. Though there has been development of alternative terms to URM, each with their own affordances, the main goal of this article is not to advocate for one term over another but rather to spark a much-needed dialogue on how we can “inclusify” our collection of racial and ethnic demographic data, particularly through data disaggregation and expanding our definition of what it means to be both “underrepresented” and a “minority” within STEM.

**KEYWORDS** underrepresented minority, URM, disaggregate, race, ethnicity, diversity, equity, inclusion

## PERSPECTIVE

Not in recorded history has there been a nation so demographically complex. So it falls to us, the American citizens of the 21<sup>st</sup> century, to fashion from this diversity, history’s first “world nation.” (Former U.S. census director Kenneth Prewitt [1])

There is a pressing need for the increasing diversity of the United States to be more proportionally represented within the science and engineering (S&E) workforce of the future (2). Admittedly, this association of “diversity” with racial heterogeneity is rather “one-dimensional,” as described by Lehman (3) and Tienda (4) (for a more inclusive definition

of diversity, see the U.S. Office of Personnel Management report titled “Guidance for Agency-Specific Diversity and Inclusion Strategic Plans” [5]). Nonetheless, in our efforts to meet this need, we must enhance our perspective when it comes to collecting student demographic data. Such enhancement involves an equity-oriented disaggregation of student demographic data, as discussed by two especially relevant publications that greatly expand on this topic—*From Equity Talk to Equity Walk: Expanding Practitioner Knowledge for Racial Justice in Higher Education* (6) and *Measuring Race: Why Disaggregating Data Matters for Addressing Educational Inequality* (7). Unfortunately, our collection of student demographic data, particularly race and ethnicity, remains relatively constrained to panethnic groups, such as “Latinx” and “Asian” American. By doing this, we greatly diminish the ethnic heterogeneity *within* these diverse groups that span across intersectional identities (7). For example, in the “Asian” American panethnic group, underrepresented subpopulations such as Hmong Americans, Cambodian Americans, and Laotian Americans are indiscernibly co-categorized with more overrepresented counterparts. In essence, what we may consider the “success” of the Asian American demographic as a whole, often already perpetuated by the model minority stereotype (8, 9), may very well be due to the disproportionate success of specific subgroups, while the struggles of other subgroups remain consistently concealed.

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Moreover, Asian Americans are certainly not alone in this inadvertent homogenization of socially constructed races and ethnicities. Other subgroups, such as the Black descendants of enslaved African Americans are indistinguishably categorized with the children of African immigrants, leading to mismatches between diversity initiatives and the intended beneficiaries (7). If we truly want STEM education to be equitable and inclusive for all, our use of demographic measures like race and ethnicity must shift from panethnic and monolithic categories to more disaggregated categories that break down race and ethnicity into appropriate subpopulations (7). Additionally, we must also solicit other indicators of students' cultural backgrounds that are known to impact the academic opportunity gaps we aim to tackle, such as parental education and parent/student nativity (10). The need to disaggregate is not new, as others have mentioned or supported this same idea, often in the context of enhancing empirical research results (11–16). Presented here is a further call to reevaluation and action—in essence, going from “equity talk” to “equity walk,” as McNair et al. (6) suggest.

### THE CASE OF THE “UNDERREPRESENTED MINORITY”

The National Science Foundation (17) defines “blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives” as underrepresented minority (URM) groups because their representation in S&E education and S&E employment is smaller than their representation in the U.S. population. The use of the strictly race-/ethnicity-based URM label is widely present throughout STEM education literature, along with a multitude of variations that differ based on the degree of demographic aggregation (Table 1). Some of these labels are further aggregated beyond race (i.e., they include low-income or low socioeconomic status [SES] students), while others are presented as more inclusive alternatives to the canonical URM label. In either case, it is important to recognize that aggregation of demographic data is usually done to enhance statistical power (e.g., reference 24), and the lack of disaggregation may be due to constraining factors like the need to ensure concise analyses within manuscripts or the response cost of additional analyses on subpopulations (25). Demographic data aggregation may also be necessary to ensure the anonymity of study participants, particularly when sample sizes are small and only a few study participants identify as members of already underrepresented racial and ethnic groups.

My purpose here is not to endorse any particular one of the labels in Table 1, though I do believe that we should engage in a discussion on what (if any) label, whether already existing or something new, best exemplifies our goal of equity and inclusion for all students. Instead, my purpose here is to at least begin a wider and explicit acknowledgment of the inherent limitations of whatever label we use in our scholarly work. If, for example, we are discussing “historically underrepresented” students, we should make clear

our definition of this population, the diversity within the subpopulations, and the limitations of aggregated analyses based on this label. This recommendation is supported by efforts such as the Racial Heterogeneity Project, which have shown that the seemingly innocuous aggregation of racial and ethnic groups actually undermines the expansive *within-group* diversity inherent to each of the individual groups (26). Furthermore, it is important to recognize that even the canonical URM label has been critiqued as a “tool of oppression” (20) and even regarded as “degrading and dehumanizing” (27). Clearly, there is an opportunity for improvement here, not only because of the problematic nature of aggregate labels like URM, but also because there are pedagogic benefits—and subsequent research benefits—to the collection and analysis of more nuanced, disaggregated student demographic data.

### USING DATA DISAGGREGATION TO “INCLUSIFY” URM

In the ongoing effort to promote diversity, equity, and inclusion (DEI) in STEM education, an “add-diversity-and-stir” approach is not enough. Simply increasing the raw numbers of “diverse” students will not suffice, though it is an important step in the overall process of improving DEI outcomes in STEM education. We must consider students as more than just diverse and instead consider how students come from a range of intersectional identities, especially those who have been historically or are presently excluded. With this more expansive framing, we can better ensure that we are not only “diversifying” STEM education, but also “inclusifying” STEM education. Diversity and inclusion are not the same (4), and without inclusion, we may unintentionally compromise our efforts to promote diversity within STEM education (28). Specifically, though the URM label may be useful in our efforts to diversify STEM education, we can further inclusify this label by enhancing it through a more disaggregated lens. For example, Mukherji et al. (10) propose a redefinition of URM that includes disaggregated demographics such as the country of birth of the student, the country of origin of the parent, and parental educational achievement. They argue that these additional data points, along with disaggregated racial and ethnic subgroups, can “increase the social sensitivity in identifying factors that will close the academic achievement gap and promote educational equality for all the diverse groups” (10). Instead of classifying URM based on a singular, panethnic demographic data point, we can use multiple demographic data points (such as those available through the university registrar or undergraduate admissions department) to form a more representative “composite” URM label, similar to an individual diversity index (29). Importantly, we must remain cognizant of the incredible complexity within students' backgrounds and life experiences—a complexity that can never be fully encapsulated through any type of label, however composite it may be.

To add more context to this call for inclusifying the URM label, the Association of American Medical Colleges

TABLE I  
Variations of the URM label

Label <sup>a</sup>	Description
African Americans/Blacks, Hispanic/Latino(a), and Native Americans/Alaskan Natives (AHN) (19)	First letters of “African Americans/Blacks,” “Hispanic/Latino(a),” and “Native Americans/Alaskan Natives”; directly embraces and references racial and ethnic identities. <sup>b</sup>
Black, Indigenous, and people of color (BIPOC)	First letters of “Black,” “Indigenous,” and “people of color”; directly references racial and ethnic identities.
Excluded identity (EI) (20)	Suggested replacement for URM; foregrounds the education system as the active agent of exclusion. Recognizes that identities are multidimensional (some privileged, some not) and that individuals may experience intersecting and compounding forms of marginalization or exclusion.
First-generation and underrepresented ethnic minority (FG-URM) (21)	First-generation African American, Latino/a, and Native American students for whom neither parent obtained a 4-yr college degree.
Historically underrepresented, underserved, minoritized, marginalized	Usage is somewhat interchangeable, primarily based on racial/ethnic categories; may include women in STEM, may include low-income or low socioeconomic status (SES) students.
Minoritized groups in STEM (MGS) (16)	Low-income or URM students
Nondominant (22)	This label “better accounts for key issues of power and power relations than do other existing labels and conceptions (e.g., ‘minority,’ ‘underrepresented,’ ‘underserved’). Non-dominant also challenges normative notions of members of cultural communities, while simultaneously addressing the legacy of inequality for such communities.”
Person excluded because of their ethnicity or race (PEER) (23)	In U.S. science, persons who identify as Black or African American, Latinx or Hispanic, and peoples indigenous to the spaces comprising the United States and its territories.
Underrepresented (in medicine) (18)	Racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.
Underrepresented minority (URM) (e.g., reference 17)	Blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives who are underrepresented in S&E. That is, their representation in S&E education and S&E employment is smaller than their representation in the U.S. population.

<sup>a</sup>The labels are alphabetically arranged. Labels were chosen based on a nonexhaustive review of representative literature. From that literature, representative examples were chosen based on their prevalence, level of aggregation, or if they were explicitly suggested as alternatives to other labels.

<sup>b</sup>Williams also emphasizes that, “the right to rename a group lies within the hands of its members.”

(AAMC) provides a model of change through their own redefinition of URM (18). In 2004, based on the *Grutter v. Bollinger* Supreme Court decision, the AAMC redefined URM as “racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.” Monolithic racial or ethnic groups were no longer part of the definition. According to the AAMC, this change accomplished three objectives:

- i. A shift in focus from a fixed aggregation of four racial and ethnic groups (Blacks, Mexican-Americans, Native Americans, and mainland Puerto Ricans) to a continually evolving underlying reality. The definition accommodates including and removing underrepresented groups on

the basis of changing demographics of society and the profession.

- ii. A shift in focus from a national perspective to a regional or local perspective on underrepresentation.
- iii. Stimulation of data collection and reporting on the broad range of racial and ethnic self-descriptions.

Each of these objectives can also inform how we in STEM education (re)define URM. Interestingly, after the AAMC implemented their redefinition, an analysis of URM definitions used by diversity programs across U.S. academic health centers showed that there can still be considerable variation in defining URM. However, the majority of programs used definitions that were not strictly confined to specific races and ethnicities (30). Just as Page et al. (30) recommended, a 2016 report by the AAMC (31) also concluded that the future of

diversity and inclusion efforts in medicine must utilize disaggregated race and ethnicity data: “The disaggregation of racial and ethnic minority subpopulations is pivotal to grasping a full view of barriers and challenges in professional and graduate education.” The same can and should be said for STEM education.

Importantly, there is also a pedagogical basis for considering diversity beyond race and ethnicity (3), particularly when it comes to understanding the role of culture. As Gutiérrez and Larson (32) point out, “Too often educators equate culture with race and ethnicity and make assumptions about students’ cultural practices based solely or primarily on the students’ membership in a particular racial or ethnic group” (32). Again, the monolithic view of race and ethnicity proves to be problematic. Instead, culture should be viewed as a verb, consisting of “repertoires of practice,” rather than as a noun, or simply as belonging to a particular racial or ethnic community (32, 33). Based on this conceptual shift, when we are interested in collecting information about who our students are and where they are coming from, we must be especially cognizant of the cultural practices they participate in and their history of participation in those practices—not just their racial and ethnic identities. Though collecting this type of data may not be the typical demographic data we are accustomed to analyzing, it can be a jumping-off point into a variety of new research questions and insights rooted in a cultural-historical analysis.

### “A SINGLE THOUGH IMPORTANT ELEMENT”

To conclude this research-based call to action, I would like to share a critical personal reflection that inspired me to delineate these ideas more formally through this letter. For most of my life, it was easy enough—I simply checked off “Asian” as my racial identity. But eventually, my level of comfort with selecting this racial identity began to change. As I started doing education research, I came to learn that by checking off “Asian,” I was automatically grouped into an “overrepresented majority” category, specifically in the context of STEM education. However, throughout my life, and especially in my STEM education, I have never felt “overrepresented.” As a Muslim, Pakistan-born child of immigrant parents without college degrees, my time spent in STEM (both as a student and researcher) has seldom been with those who share similar identities. Yet for some reason, this concealment of my cultural identity by the monolithic racial identity of “Asian” has long felt like an unquestioned norm. This personal reflection makes me think about others who would fall into this same predicament, like the Syrian refugee student who ends up selecting “white” or the Rohingya refugee student who selects “Asian”—both of whom would be terribly miscategorized as both “overrepresented” and part of a “majority.”

We as researchers have an opportunity to better respect the cultural identities of our students by ensuring that our demographic data collection goes beyond the historically normative yet limiting concepts of race and ethnicity. Of course,

those categories are still important, and they certainly matter (23). I recognize that there is quite an entrenched (and needed) relationship between funding efforts and the promotion of racial diversity (e.g., references 34, 35). This is good, but it needs to get better. Just as STEM disciplinary cultures are not a monolith (36), neither are our students’ cultural backgrounds. By collecting and analyzing more disaggregated demographic data, whether related to race and ethnicity, nativity, parental education, cultural practices, etc., not only are we opening up the possibility for even more potential insights in our own research, we are also empowering students with a more inclusive way to express who they are and how they identify themselves. And perhaps most importantly, we are also showing them that the monolithic categories of race and ethnicity are not *all* that matter. I am reminded of Justice Powell’s opinion as he delivered the judgment of the Supreme Court in the landmark case of *Regents of Univ. of Cal. v. Bakke* (1978):

The diversity that furthers a compelling state interest encompasses a far broader array of qualifications and characteristics of which racial and ethnic origin is but a single though important element. (37)

Let us continue to recognize racial and ethnic origin as an important element in the pursuit of necessary diversity outcomes, while also recognizing that it is just one element in our students’ expansive repertoires of sociocultural practices and experiences.

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