Advancing Diversity in Humanitarian Engineering Education: Unveiling the Value of Investing in Marginalized Graduate Students' Cultural and Social Capital.

In early 2020, amidst global shifts driven by social justice movements, activists, scholars, and stakeholders urged increased representation of practitioners from marginalized racial backgrounds and nationalities in leadership roles within the HE sector. Consequently, there was a concerted push for greater enrollment of marginalized community members in HE educational programs [1], [2], [3]

While the call to increase diversity within HE educational programs appears universally desired, achieving tangible progress proves challenging within the structure of modern university systems. These systems were intentionally structured to cater to and perpetuate the values, culture, and ambitions of predominantly white upper and middle-class communities [4], [5]. Students from differing racial, ethnic, and income backgrounds faced barriers within these university systems as their cultural and social capital was marginalized and not valued [6], [7], [8].

Given that HE graduate programs have reported struggling to increase the presence of students from low-income countries [3], **employing educational frameworks, such as the community cultural wealth (CCW) framework [5], may help to uncover how students from marginalized nationalities and racial backgrounds feel HE learning experiences support, or could further support their cultural and social capital.**

Rooted in Critical Race Theory [9], the CCW framework renders visible marginalized students' cultural and social capital and cultural resources passed to students from their families and communities. Six forms of capital are identified in the CCW framework: aspirational, navigational, social, linguistic, familial, and resistant [5], shown in Figure 1. Using this framework, this study asks:

- What are the perceptions of students from marginalized racial backgrounds and nationalities regarding the supportive nature of learning environments within Humanitarian Engineering (HE) programs?

The ability to maintain hopes and goals for the future, even in the face of real and perceived barriers.

The knowledge and skills fostered from the history of communities of color living in resistance to subordination results in a student's ability and determination to increase equality.

The extensive education, resources, and support families and communities of color nurture in their students.

The networks of people, communities, and institutions students of color utilize as resources and support in navigating their education and broader life

The inner resources, social competencies, and cultural strategies that students of color carry to survive and recover across various institutions, including those not created for communities of color.

The communication skills from experiences in multilingual communities, navigating communication tendencies across different groups, and engaging in traditions of storytelling, poetry, and oral history.
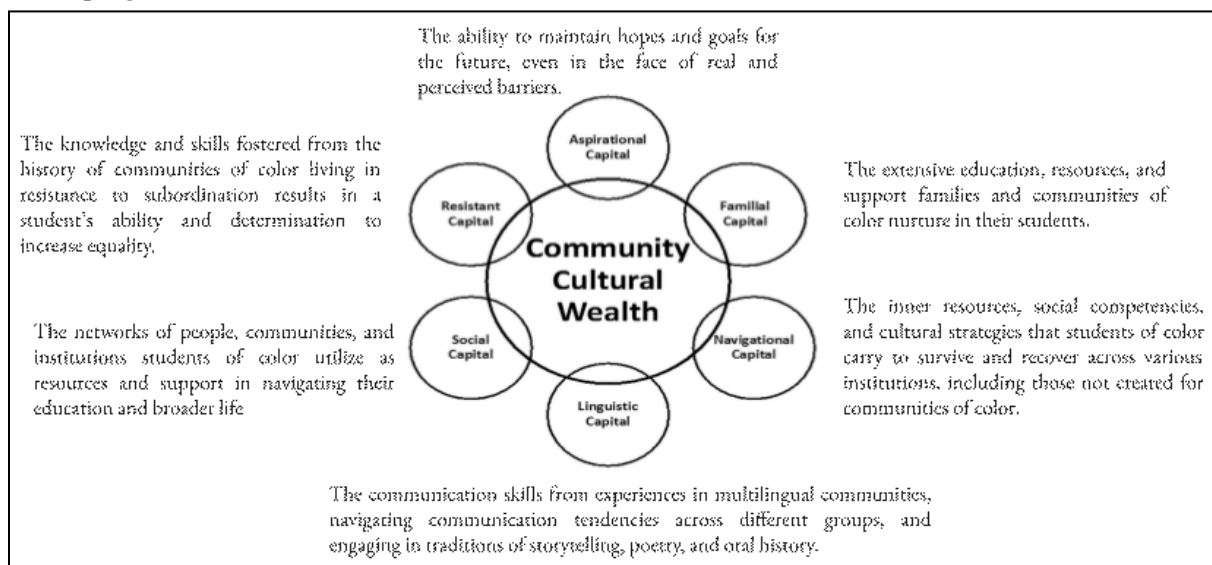
Figure 1: Six Forms of Community Cultural Wealth

Methods

To address our research questions, we interviewed 19 graduate students across six Humanitarian Engineering programs, all identifying as students of color or from low- or middle-income countries. We conducted four interviews with each student across two years, following IRB 21-0207. Interviews focused on participants' educational experiences, career aspirations, and perspectives on social justice and how their identity influenced each item. For instance, students were asked general questions like "Describe the story of what led you to your current career goals" and CCW-focused questions including "When is a time when you found parts of your home culture helped you navigate graduate school?" Audio recordings were transcribed using Trint software [10] and imported into NVivo for qualitative coding [11].

The transcriptions underwent two rounds of coding. Firstly, to center the study on students' social and cultural capital, interviews were deductively coded under a unified code, "CCW," whenever students discussed values, skill sets, or knowledge corresponding to any of the capital definitions outlined in Figure 1. Secondly, we conducted inductive coding of interview segments to identify themes in students' sentiments or feelings regarding the supportiveness of their learning environments.

Findings

Students' sentiments regarding the supportiveness of their cultural and social capital revealed learning environments that were 1) unreceptive, 2) receptive but not investing, and 3) receptive and investing.

Unreceptive

Yeah, (my professor), is the one who I feel undermined working in (the region I am from) the most. They brush it away.

When a student is restrained or discouraged from expressing their capital and/or the expression of capital is more of a burden than an aid.

Receptive but not Investing

I think they need to rethink how they find commonality in the diversity of (our grad cohort). (...) I shouldn't always have to be the one to fill in the space for the theories that a professor is trying to teach.

When student is able to and often encouraged to express their capital but is not supported in developing it further.

Receptive and Investing

(These mentors) seek inputs (the student's opinions on HE projects) that they know are different (than their own) and have also helped me build that rapport with my supervisor and managers, and build a community of mentors.

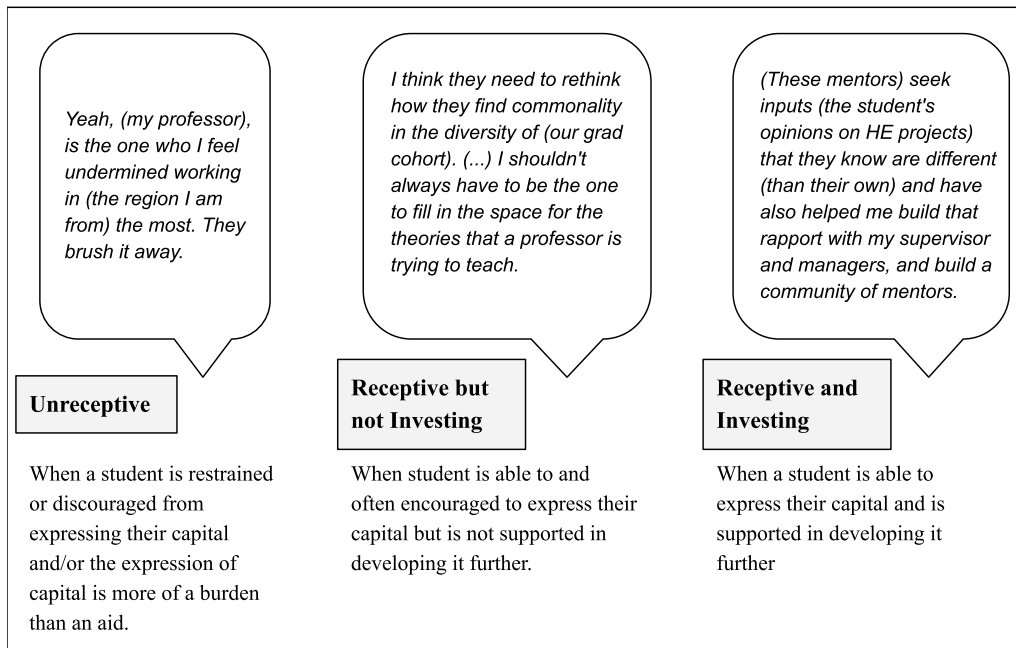When a student is able to express their capital and is supported in developing it further

Figure 2: Coding Definitions for Receptiveness and Investment of Cultural Wealth with Example Quotes

Students reacted to these learning environments differently. Specifically, when students perceived learning environments as:

1. Unresponsive, they often expressed low self-esteem, frustration, and a sense of being misunderstood or misplaced within their HE program. For instance, some expressed irritation at merely 'surviving the process.'
2. Receptive but not investing, students reported feeling overwhelmed with their workload. While they utilized their CCW to enhance HE spaces, they often felt unsupported, unrecognized, and sometimes tokenized or exploited, as their capital was used to improve others' education and career aspirations without adequate acknowledgment, support, or compensation. They also often felt like outsiders to the HE culture but held hopes or ideas for its improvement.
3. Both receptive to and investing in CCW, they expressed passion for their work and integration into their future career goals. They felt a sense of belonging and pride in their skill set, and their aspirations were supported by peers, mentors, and community, enabling them to voice their opinions and aspirations effectively and confidently.

Overall, this research aims to make HE educational programs more valuable and receptive to students of color and students from low- and middle-income countries by characterizing the cultural wealth students bring to HE programs and suggesting ways to enhance learning experiences by being receptive to and investing in student's social and cultural capital.

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