

STARTING CONVERSATIONS ABOUT CULTURE IN STEM:

A RESEARCH-BASED GUIDE FOR ACADEMIC DEPARTMENTS



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It has become widely recognized that the culture of graduate departments is a root cause of inequities in access and degree completion in STEM disciplines. For example, a [2023 report from the National Academies of Sciences, Engineering, and Medicine](#) highlights how the culture (i.e., practices, values, beliefs, and norms) of departments influence climate, structures, and individual experiences within a department. Many STEM departments embody cultures that were [historically constructed by predominantly white and male communities](#). Such organizational cultures often exclude racially minoritized students from feeling a sense of belonging in STEM graduate departments even in the present day—thus upholding and reproducing racial disparities and inequalities in STEM. Institutional change efforts that focus on shifting policies and practices can be one way that graduate departments can work to [change their departmental cultures](#) to be more inclusive of racially minoritized students in the long term.

STUDY BACKGROUND



The recommendations in this guide were developed from the findings of an IGEN Research Accelerator project led by Radomir Ray Mitic at the University of North Dakota. Mitic, along with graduate students Maire Brandenburg and Tiffany Moore, conducted 18 in-depth interviews with current graduate students in the space sciences. All of the interviewed graduate students identify as members of a racially minoritized community (Black / African American, Hispanic / Latino / Latina / Latinx, Indigenous / Native American, Southeast Asian, East Asian, South Asian, Native Hawaiian / Pacific Islander, Middle Eastern, or Bi / Multiracial).

To help departments initiate the work of culture change, this resource guide offers conversation starters about common areas that need to be revisited. The prompts are anchored in research, and the guide provides quotes from real students in the geosciences whose perspectives have been systematically analyzed. Whether you use the discussion prompts in faculty meetings, department retreats, or other gatherings, we hope these conversation starters and associated student voices perspectives can take you beyond conformity with a list of best practices into a more thoughtful, locally resonant self-assessment. The key themes that organize the conversation starters in this resource guide are:

- **Pathways and Community** - the environment that is created to promote racially minoritized students' sense of belonging and success
- **Institutional Policies and Structures** - the actions that institutions and programs take to support such pathways and communities
- **Teaching and Learning** - the pedagogical and socializing efforts in classrooms and labs to foster growth
- **Support from Faculty** - the linkages that faculty make for their students as they enter the scientific profession

CONVERSATION STARTER



Question to help begin the work

WHY HAVE THIS CONVERSATION?



Based on this study's findings

GRADUATE STUDENT VOICE



Quote from the study

PATHWAYS & COMMUNITY

How does our program work towards equitable representation in labs and classrooms?

Students benefit from and want to see representation within the program.

“Yeah, I think my PI is also a Black man, which really helps. He's the only Black faculty member in both Chemical Engineering (which is his lab), as well as he's jointly appointed in my department. So, in Environmental Engineering, he's one of two I guess now ... I think the lab dynamic he made really early on was one that was very welcoming and just helpful. I don't really get the toxic lab environment that I see from other chemical engineering labs here. I think when I had first gotten into the university and was doing my rotations in his lab, everyone was just really nice and very willing to help out. I'd say we're a very diverse lab.”

- Marcus on representation in mentorship and diversity in the instructional setting

What outreach opportunities do we have to encourage relationships with local communities?

Students appreciate opportunities to engage in community outreach for younger racially minoritized demographics.

What types of peer networking opportunities do we offer that embrace cultural diversity and empower our students?

Peer support groups play a pivotal role in creating safe-spaces, building self-advocacy skills, and fostering networking opportunities for racially minoritized students.

What resources do we have in place to support persons of color who are in mentorship roles?

Advanced graduate students of color feel burdened by the mentorship of incoming students and want to find ways to include white students in meaningful mentorship practices with students of color.

“I think it also inadvertently (because it is a representation thing), sometimes I do end up feeling tokenized in almost a way.

I don't mind helping, but then also at the same time, it's like there are other students who want to help and are willing to help, but then the burden is sometimes unfairly placed on me.”

- Kara on tokenization as a student

How can students report experiences with microaggressions?

Students do not feel there is a clear pathway for students or faculty to follow to address microaggressions experienced within the program.

INSTITUTIONAL POLICIES & STRUCTURES



TEACHING AND LEARNING

To what extent does assessment of instructional quality include attention to cultural responsiveness?

Students want a responsive program that addresses marginalization among instructors and peers.

“My mentor, he was really good at educating himself. He’s a white man, but he was really good at educating himself on these issues that minorities face. He made it a point to always make me feel heard and seen in a room. There are times where I guess I would [pause]. It’s just really cute because it was like I would maybe say something that wasn’t really heard by the broader audience, but he would be nodding his head. I knew someone was listening. There were little things like that and just me being able to open up to him about all of my struggles and him just reassuring that I belong in the space. Yeah. Those things were really powerful. I’m going to cry, but I shouldn’t cry.”

-Riley on positive culturally responsive mentor experience

How do instructors and mentors respond to personal and systemic attacks on students of color’s character and place in science and academia?

Students need instructors and mentors that challenge popular and toxic notions that students of color do not belong in science or academia.

SUPPORT FROM FACULTY

What is the program’s review process for faculty’s culturally responsive mentorship practices?

Effective faculty evaluation processes typically center research productivity, career success for graduates, and teaching, but many do not emphasize or evaluate culturally responsive mentorship.

“Networking is hard... but, I really have seen it be a little difficult for me in the recent times that I’ve been to conferences. I’ve only been to about two so far, but visually, I [pause]. Usually there’s a lot more white older men at the conference. Usually, I’m very introverted. I don’t really like speaking to people or networking that much, but my advisor this past summer has been very understanding that I’m an introverted person. I may be quieter but they’ve been encouraging like, ‘Okay. Maybe you can or maybe you don’t feel like going to this day at the conference or this day, but you can go to one Zoom or maybe attend for a couple of hours and talk to one person. Then maybe that will be your goal for that day. Maybe even just for the week.’ Being encouraging and being helpful and then also wanting to know what I need and what I can get from them to make it a better time for me during these conferences.”

-Blue on the value of networking and overcoming

How do faculty prepare students for conferences and other forms of networking?

Conferences and publications bolster student confidence and development of scientist-identity.

FINAL THOUGHTS



Transforming graduate programs to be more inclusive of students from racially minoritized backgrounds starts with an assessment of current departmental climate. The questions and conversation starters in this resource guide can help. By understanding the current state of inclusivity for racially minoritized graduate students in their graduate programs, departments can identify areas of improvement to their policies, practices, and overall climate and culture. Below, we offer some example best practices these conversation starters might lead to:

- Departments investing in community partnerships for students and faculty.
- Student groups being actively involved in program development, and helping to create focused initiatives, such as those that work on building advocacy skills.
- Mentoring that honors the unique and diverse experiences of students from different backgrounds. It does not lump them together under a single “URM” or other umbrella.
- Clear pathways being created for students, advisors, and administration to act when a student experiences discrimination or microaggressions within the program.
- Faculty engaging in professional development and personal reflection that develop culturally responsive mentorship and instructional practices.

Through targeted and research-based shifts, programs can broaden participation in their graduate programs, which will ultimately help to ensure innovation and stability in the sciences for years to come.

FURTHER READING

ON STEM CULTURE AND CREATING INCLUSIVE CLIMATES

Bernard, R. E. & Cooperdock, E. H. G. (2018, April 30). No progress on diversity in 40 years. *Nature Geoscience*.
<https://www.nature.com/articles/s41561-018-0116-6>

Gohd, C. (2020, July 8). Space has a diversity problem – and big institutions like universities can do something about it. *Space.com*.
<https://www.space.com/space-research-diversity-program-team-up-study.html>

Griffin, K. A. (2019). Achieving diversity at the intersection of STEM culture and campus climate. *American Council on Education*.
<https://www.acenet.edu/Documents/Achieving-Diversity-Intersection-of-STEM-Culture-and-Campus-Climate.pdf>

Laird, R. (2023, October 2). Why the space industry needs more inclusive and diverse conferences. *The Space Communicator*.
<https://www.linkedin.com/pulse/why-space-industry-needs-more-inclusive-diverse-ryan-laird/?trackingId=GLCoANPqRqucTwiq%2BGe1QA%3D%3D>

National Center for Science and Engineering Statistics (NCSES) (2023). *Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023*. (Report No. NSF 23-315). National Science Foundation. <https://nces.nsf.gov/pubs/nsf23315/>

Perdrial, J.N., Kincaid, D.W., Wheaton, D., Seybold, E.C., Stewart, B., Walls, L., Blouin, M., Toolin, R., Chorover, J., & Lewis, C. (2023). Equity, diversity, and community as the basis for critical zone science and education. *Earth's Future*, 11(2).
<https://doi.org/10.1029/2022EF002812>

Sohn, R. (2021, November 16). NASA, ESA experts weigh in on diversity and inclusion in space. *Space.com*.
<https://www.space.com/spaceflight-diversity-nasa-esa>

Wright, B., Gunther, O., & Bitar, J. (2023, July 4). Why STEM equity must address the experiences of women of color. *The Education Trust*. <https://edtrust.org/resource/why-stem-equity-must-address-the-experiences-of-women-of-color/>

Wofford, A. M., Burton, A., Dennin, K., & Gardner, R. T. (2023). The Equity-Minded Mentoring Toolkit. *Equity in Graduate Education Resource Center*. <https://equitygraded.org/rsrc/4399047/>



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