

The Benefits of Empowering Community College Geoscience Faculty

Creating spaces and partnerships tailored to 2-year-college faculty can improve perceptions of how they fit into the geoscience community and boost diversity in the discipline more broadly.

By Tess Weathers, Sheldon Turner, and Kusali Gamage

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Merry Wilson, Tess Weathers, Karen Menge (left to right, foreground), and other participants identify plankton using microscope lenses that attach to smartphones in a lab on the R/V *Thomas G. Thompson* during a November 2023 research cruise catering to 2-year-college (2YC) faculty. Credit: Nicole Murray

In November 2023, 13 faculty members from 2-year colleges (2YCs) across the United States boarded the R/V *Thomas G. Thompson* and set sail from Seattle to Honolulu. During the 10-day cruise, through both rough

Workshop Wisdom

and calm seas, these faculty explored oceanography concepts, operated marine instruments and sampling tools, and learned the ropes of leading such cruises (figuratively and literally, as the cruise included a knot-tying workshop).

But this trip wasn't only about the participants' edification in the ocean sciences and conducting research at sea; nor was it a sightseeing excursion, though there were plenty of stirring scenes to take in on the open ocean (including visits from photogenic wildlife like whale sharks). The expedition, part of the Science, Technology, Engineering, and Math Student Experiences Aboard Ships ([STEMSEAS](#)) program, was designed as an opportunity to engage 2YC faculty in the geosciences more deeply and motivate their efforts to attract a diverse range of students to the discipline.

Whereas STEMSEAS cruises typically [cater to undergraduate students](#) for the purpose of exposing them to ocean sciences and careers in marine operations, this was the first-ever cruise for 2YC faculty. The faculty cohort—including us—was intent on learning how to recruit future student participants and faculty mentors to the program.

An unexpected benefit of the experience was the ability for the faculty members to network and bond with other passionate, equity-focused educators, an opportunity most of the participants reported was rare. Indeed, the shortage of such opportunities can contribute to 2YC faculty lacking a sense of belonging in the geosciences and feeling little motivation to recruit students to their classes and to the discipline.

Amid the geosciences' well-documented [lack of diversity](#), and the many [calls to improve it](#), we contend that increasing engagement of 2YC faculty is an effective means both to support these important members of the community in their careers and to achieve greater diversity and equity in the discipline. The STEMSEAS 2YC expedition is a standout example of that sort of engagement. Considering feedback from the expedition's faculty cohort, we also suggest other avenues to overcome barriers and broaden participation among both faculty and students.

Reaching the Teachers Who Reach the Students

On the whole, geoscience professionals are not as diverse in terms of [race, ethnicity](#), or gender as the population we serve. In contrast, the more than 10 million students enrolled at U.S. community colleges and 2YCs are far more

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Adapting to Change in the Educational Landscape





Science, Technology, Engineering, and Math Student Experiences Aboard Ships (STEMSEAS) 2YC participants Rebecca Sperry (left) and Merry Wilson record atmospheric temperature and pressure during a storm. Credit: Dana Vukajlovich

representative of the population at large. This [body of students](#), who make up 38% of all U.S. undergraduates, is 28% Hispanic, 12% Black, 6% Asian/Pacific Islander, and 1% Native American.

Many of these students are pursuing nontraditional academic paths—for example, as older or returning students, or students with vocational training who are changing programs—and have faced systemic barriers to education such as financial instability, food and housing insecurity, family obligations, discrimination, and a lack of a family tradition of higher education. The emphasis at 2YCs on teaching and student engagement through small classes and community-based programs, as well as 2YCs’ flexibility (e.g., with online courses and part-time enrollment options), is critical in helping students overcome these barriers.

By improving access and opportunities [in the geosciences for 2YC students](#), we can significantly diversify the population and enrich the experiences of future geoscientists. A key constituency in achieving this greater access is the 2YC faculty, who can leverage the unique student-teacher relationships at community colleges and be assets in recruiting students to and retaining them in the discipline.

Much like their students, these faculty can also benefit greatly from increased support. Engagement and intentional inclusion of 2YC faculty in research, conferences, and professional development opportunities should become common practice across geoscience professional organizations, research programs, and funding entities.

Inspiration, Motivation, Outreach, Empowerment

Last November’s STEMSEAS expedition was a tangible example of how effective 2YC faculty engagement can be. To understand the expedition’s broader impacts on racially and ethnically diverse institutions (Figure 1), we surveyed the participants about the outreach endeavors they executed once they returned to land.



Fig. 1. Participants on the STEMSEAS 2YC cruise came from community colleges across the United States. The participants, their institutions, and the racial and ethnic breakdown of each institution are shown, along with the cumulative demographics (bottom left) of the communities served by the STEMSEAS 2YC faculty cohort. Click image for larger version. Credit: map, U.S. Geological Survey; adapted by T. Weathers

Each member of the cohort pursued outreach through various channels, including on-campus presentations, emails, press releases, social media, and more. In total, these efforts reached an estimated 15,000+ students and faculty within their institutions (Figure 2), and it appears the efforts made an impact: In 2023, STEMSEAS applications from 2YC students made up 10% of the total applicant pool, but in 2024, after the STEMSEAS 2YC faculty expedition and outreach, that figure increased to 38%. Any of these students could become future geoscientists, but without the efforts of the 2YC faculty cohort, they might not have learned about the immersive research and career-building opportunities available to them through STEMSEAS.

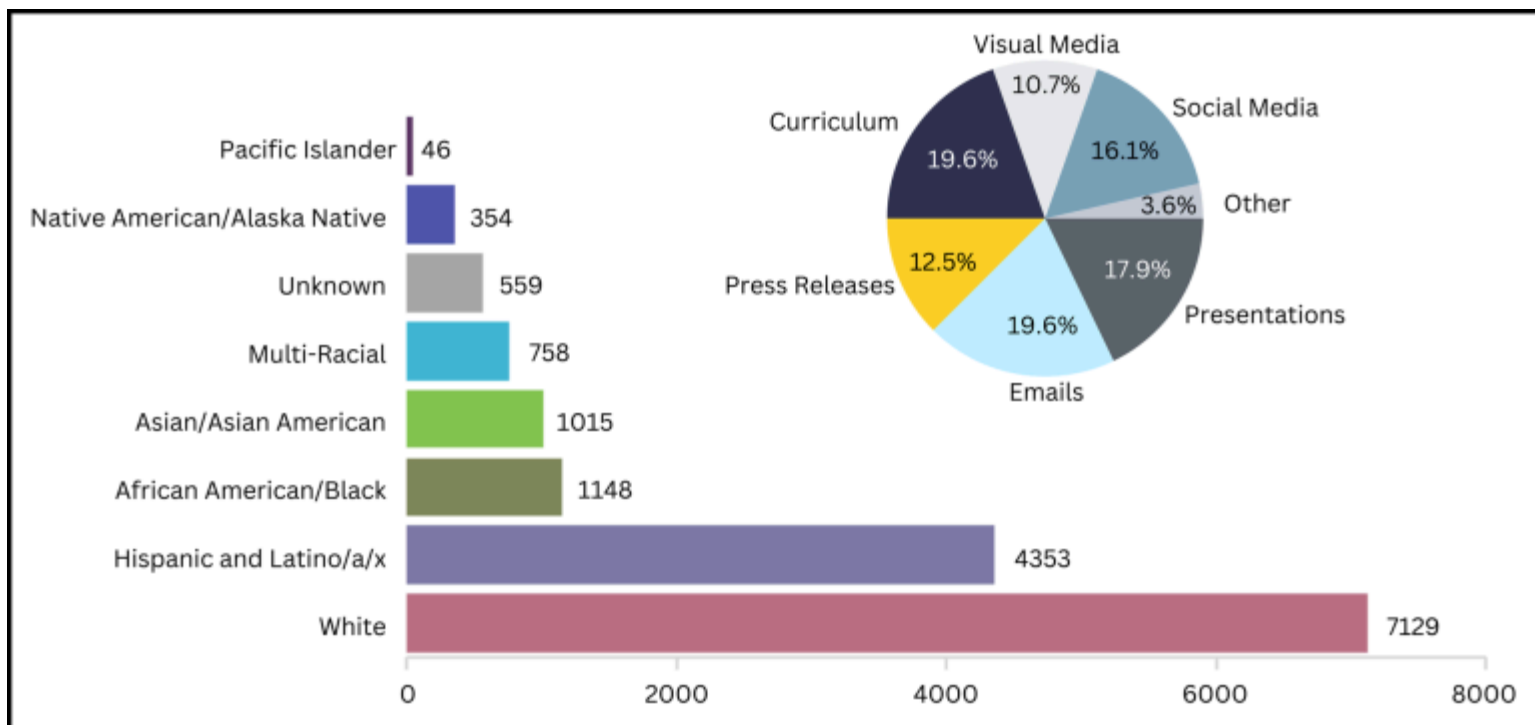


Fig. 2. Following the STEMSEAS 2YC cruise, faculty participants engaged in various types of outreach at their home institutions (pie chart). Outreach channels included formal presentations to faculty peers, students, and the public; campus- or discipline-wide emails; press releases; incorporating STEMSEAS into course curricula; visual media such as distributed flyers or posters; social media; and other efforts like one-on-one discussions. Numbers of students exposed to these outreach efforts (bar chart) were estimated by multiplying each participant's outreach estimates by the demographic breakdown at that participant's institution and then summing across the 13 institutions. Credit: T. Weathers

The cohort was also asked about the challenges they face engaging in professional development, and the types of assistance needed to advance as 2YC educators. Respondents noted that having a hands-on professional development opportunity on a research vessel was profound, and that they felt motivated and inspired by collaborating with like-minded educators.

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All participants strongly agreed that experiences such as STEMSEAS are vital for their personal growth as educators and for helping them empower their students.

The survey results thus encourage the use of specialized professional development opportunities for 2YC faculty that can act as entry points to participation in the broader geoscience community and can help break the stigma surrounding the perceived deficiencies of the 2YC system. In the words of a participant, “It is critically important to empower... faculty in order to address and dismantle the stigma against the community college system.”

Providing engagement opportunities specifically for 2YC faculty can be incredibly fruitful, but making these opportunities accessible is challenging. In their feedback, the participants discussed several barriers to participation and belonging for 2YC faculty and their students as well as solutions to reduce these barriers.

Access to Professional Development

The most common response from the faculty cohort about barriers to their participation in STEMSEAS was the cruise's midsemester timing: Programs during the academic year are often prohibitive to community college faculty. Many universities have cultures that recognize the importance of conferences, fieldwork, and other research opportunities for faculty. Conversely, most community college systems focus solely on teaching, so participation in programs that interrupt the semester usually requires lengthy justifications to college administrators as well as significant planning to reschedule classes or line up substitute instructors.

The challenge is compounded by the teaching load of most community college faculty, for whom one missed week may affect four or five different classes. Substitutes can be especially difficult for geoscience faculty to find, as they are often the only geoscience instructor on their campus. Meanwhile, adjunct faculty teaching at multiple institutions must submit paperwork and find substitutes for their classes at each school.

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geoscience community. Other barriers to conference participation include the costs—funds available for faculty meeting attendance from 2YC institutions often barely cover registration fees, let alone travel fees if the conference isn't local—and that it can be overwhelming for faculty who are mentoring, guiding, and providing support for large groups of students new to such spaces.

Two participants reported that the conferences they have attended (including AGU's Annual Meeting) did not have sessions relevant to their professional development or to which they could contribute. These concerns, along with often being the only 2YC faculty in a room at conferences, enhance feelings of alienation that some participants reported. Consider AGU's [Annual Meeting 2023](#) (AGU23), attended by 27,342 participants. Although AGU currently does not require meeting participants to report academic institution types in their registrations, 11,205 AGU23 attendees opted to share this information; of these, only 57 (0.51%) were from 2YCs.

One STEMSEAS faculty participant brought 15 community college students to AGU23, and although the students reported feeling inspired, many also said they felt out of place without any immediately relevant sessions or

One solution is for professional development opportunities aimed at 2YC faculty to be held during extended academic recesses, for example, over summer or winter breaks. However, this may not always be feasible, especially when the opportunities are part of programs targeting broader academic audiences, such as major conferences.

The STEMSEAS faculty cohort brought up the same concerns regarding timing as barriers to attending academic conferences, yet most agreed that such conferences are an extremely effective way to help 2YC faculty (and their students) see themselves as part of the

workshops. [AGU's Education section](#) has been a productive space to enable pedagogic research presentations from community college faculty, but 2YC student-centered programming through AGU has been limited.

Reasonable solutions to these concerns exist. Creating a reduced registration fee structure for 2YC faculty and providing conference travel funding opportunities are ways to address cost barriers. These approaches are already commonplace for K–12 students and those from tribal colleges, as well as for early-career professionals and undergraduate students. In a positive step, AGU recently partnered with the U.S. National Science Foundation to help address this issue by [accepting applications](#) for 2YC and Primarily Undergraduate Institution faculty travel grants to attend its 2024 Annual Meeting in December.

Other measures include intentionally involving and respecting community college participants in programmatic planning of conferences and professional development opportunities. Session planners can encourage and support sessions specific to pedagogy and 2YC geoscience curricula, and they can organize panels and workshops tailored toward first- and second-year college students. Further, meeting organizers can track conference attendance and participation by institution type; these data can help identify and address gaps and biases in recruitment, advertising, and support.

Building Belonging and Dismantling the Stigma

Even though most 2YC faculty teaching STEM subjects have graduate degrees, scientific research is typically a diminished or nonexistent part of their current careers, which can undermine their sense of belonging in research-centered environments. Respondents highlighted this point in the STEMSEAS faculty cohort survey.

One member wrote about joining the STEMSEAS cruise that “my biggest barrier was my own lack of confidence in my ability to be successful in an area I didn’t know. Imposter syndrome!” Another pointed out that research at their 2YC “isn’t a big focus, so leading up to the adventure of a lifetime, it was a challenge to allow myself to feel like I belong in those spaces.”

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Overcoming these feelings is difficult, as few opportunities exist for 2YC faculty to pursue research. Many cannot conduct research with students at their home institutions, as they lack facilities, institutional funding, and student time commitment, and because student turnover is more rapid than at 4-year institutions. Instructors at 2YCs who do have chances to collaborate with university researchers sometimes report feeling as if they are included merely to “check a DEI [diversity, equity, and inclusion] box,” as one STEMSEAS participant put it, and do not perceive benefits that come from meaningful research collaborations.



STEMSEAS 2YC participants Sheldon Turner, Marina Halverson, and Tess Weathers (left to right) observe plankton and microplastics in water samples aboard the R/V *Thomas G. Thompson*. Credit: Dana Vukajlovich

Just as some university students, faculty, and administrators may see community colleges as inferior academic options, some 2YC faculty and students also hold this stigma. [Meaningful research partnerships](#) between faculty from 2YCs and 4-year colleges and universities (4YCU) can go a long way toward changing opinions on both sides and improving student success in their continuing education and ultimately in their careers.

These partnerships can also help boost diversity in the geosciences. Faculty at 2YCs are a direct conduit to systemically underrepresented populations in the geosciences and can help recruit and expose students to the discipline and support these students as they transfer to 4YCU. Also, through involvement in 2YC-4YCU partnerships, these students can gain wider professional networks, more research experience, and a greater sense of belonging in STEM and will be more likely to persist in their educational voyage.

Additional strategies for creating mutually respectful and beneficial partnerships between 2YCs and 4YCU include both sides understanding the institutional mission, policies, and capacity of their partners and developing an awareness of 2YC students' cultural profiles (e.g., communication, values, and learning

mindsets). Successful collaborations would also include meeting the needs of both students (e.g., childcare and work obligations) and faculty (e.g., decreased teaching loads).

How can these partnerships be initiated? Faculty at 4YCU can help by valuing and capitalizing on 2YC faculty expertise by codeveloping curricula and research grants, hosting tours of labs and facilities at both institutions, and exchanging guest speakers. These types of engagements, along with dedicated sessions at conferences, offer chances for 2YC and 4YCU faculty to meet, form relationships, and discuss opportunities for collaboration. Beyond that, 4YCU can welcome proposals for research partnerships from community colleges and can themselves suggest meaningful collaborations and sharing of lab spaces and other essential resources.

Entry Points for Engagement

The stigma often associated with 2YCs, both among the 2YC community and outside it, is a fundamental hurdle to cross-institutional collaboration and student success that must be broken down. A first step in this process involves

providing opportunities to connect, learn, and build a community of practice for 2YC faculty.

We propose that professional societies, funding agencies, and academic institutions mindfully enable and create spaces for 2YC faculty to make these connections. As demonstrated by the STEMSEAS 2YC expedition, such opportunities create entry points to further engagement in the geosciences for the participants. These individuals are more likely to continue to grow their peer networks and pursue additional opportunities for professional development and collaboration, and they are more motivated to share their firsthand experiences and news of opportunities in the geosciences with their students and colleagues. Indeed, if it weren't for connections made through a 2YC-specific experience, you wouldn't be reading this article now.

In addition, further supporting and enabling 2YC-4YCU partnerships will benefit both sides, open the geosciences to a broader range of students, and result in a more diverse, equitable, and innovative geoscience community.

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