Abstract

Science librarianship has barely scratched the surface when grappling with the injustice in our profession and the disciplines we support. Here we provide one example of how STEM librarians can work within the academy to resist systemic barriers and support students from marginalized communities. This paper will explore how librarians and libraries can partner with various diversity support programs and undergraduate research programs targeted toward undergraduate students with marginalized identities. We will then share the perspective of two women of color who have developed this partnership. This article provides the separate and shared perspectives of a science librarian and undergraduate research director in working together to remove barriers students may face in their higher education journeys by creating relationships and meaningful connections.

Keywords: Equity, Undergraduate research, Diversity support programs, Science librarianship, Outreach
Introduction

In recent years, many academic libraries and librarians have focused their work on equity, diversity, and inclusion (EDI). This focus may be the result of aligning with larger university goals or the priority of individuals within the library. The focus on EDI has led to new initiatives, the creation of positions incorporating EDI, and spaces within the library. However, EDI work is just the beginning in the fight against the injustice and white supremacy present in higher education and library spaces. While striving for social justice, it is crucial to acknowledge that our efforts cannot exist in a bubble. The constraints of shrinking budgets and personnel in libraries demand that we explore external avenues for supporting and connecting with students from marginalized communities. Integrating EDI initiatives into our approach allows us to forge meaningful connections beyond our walls, amplifying our impact and fostering an inclusive environment that goes beyond mere resource limitations in order to work collectively towards a more equitable and inclusive environment. To our knowledge, there is no research that evaluates how diversity programs utilize and partner with librarians toward supporting STEM students participating in undergraduate research experiences (URE), much less how librarians and these specific programs partner to provide holistic support to students engaging in UREs. However, publications can bring more awareness to these programs and partnerships, increasing interest and helping more underrepresented students participate in undergraduate research.

Thus, we propose to look at a single case study to showcase the promising practice of how partnerships between undergraduate research programs, librarians, and diversity programs not only have the potential to support underrepresented students in STEM by removing barriers to access and creating more inclusive environments, but also make libraries more accessible. This article will be valuable because it helps inform not only librarian practitioners but those who lead undergraduate research experiences and diversity programs in why and how these partnerships support underrepresented students in navigating higher education and beyond.

Literature Review

Librarianship has not been exempt from the conversations around social justice and higher education. The move to reflect critically on our teaching, research, and learning has brought awareness of how our practices are rooted in white supremacy and maintain systemic barriers for students from marginalized communities (Leung & López-McKnight, 2020). Special DEI issues of journals, conferences dedicated to critical librarianship (Critical Librarianship and Pedagogy Symposium), and special programs and scholarships (ALA Spectrum), are just a few examples of how the profession engages with systemic injustice in our communities. However, the specific work of science librarianship is still lacking (Bussmann et al., 2020). Analysis of works published
in major journals in the field also shows a lack of publications engaging with social justice goals (Lester & Ruth, 2022). This does not mean that social justice work in science librarianship is not happening. Writing and publishing is not a requirement for all librarians and impactful work centering social justice in science librarianship could be happening without being written about. Lester & Ruth (2022) acknowledge work published in publications that are not considered in their analysis, and we would like to similarly recognize the work being done by STEM librarians that is not included in publications.

High-impact practices, such as undergraduate research, have been demonstrated to be an effective tool to enrich student experiences and success, especially for students from groups historically underrepresented in postsecondary institutions (Kuh, 2008). Undergraduate research experiences (UREs) are an experiential learning opportunity where students engage in discipline-based inquiry in collaboration with a faculty mentor (Council on Undergraduate Research, n.d.). The National Academies of Sciences, Engineering, and Medicine states, “exposure to undergraduate research experiences remains a predictor of successful outcomes for students of color in STEM, including the pursuit of post-graduate STEM education” (2017, p. 117). Additionally, educational research has pointed to undergraduate research as a promising tool for increasing retention and access for minoritized STEM students and facilitating bachelor’s degree attainment (Pierszalowski et al., 2021; Qaqish et al., 2020; Schneider et al., 2015). These opportunities allow for engaged practice reinforcing knowledge while teaching and encouraging students to use critical thinking skills to address a specific problem (Dewey, 1938); which can lead to their academic and professional development.

In addition to furthering student success, undergraduate research has been shown to provide a sense of belonging and identity development to historically underrepresented minority (URM) students (Estrada et al., 2018; Palmer et al., 2015). A recent large-scale study by Hernandez et al. (2018) showed that URM students who completed ten or more hours of co-curricular, faculty-mentored research per week across two or more academic semesters or summers were more likely to: graduate with a science-related bachelor’s degree; be accepted into a science-related graduate training program; and/or be training for or working in the scientific workforce six years after graduation. Extended research experiences tend to provide and sustain mentoring, academic, social, and funding support, as well as professional opportunities for URM students (Robnett et al., 2015); thus, UREs may be most effective when specifically designed for the unique needs and complex lived experiences of URM students.

Being involved with undergraduate research projects is an opportunity for librarians to work with students to strengthen information literacy skills, introduce library resources, and make connections across campus (Stamatoplos, 2009). Librarians have served as mentors, been embedded in undergraduate research programs, and provided support outside a formal partnership (Hensley, 2015; Hufford, 2017; Knapp et al., 2014). While librarians tout the benefits of library support to the undergraduate research experience, librarians have also used these experiences to show their value to campus.
Partnerships between libraries and student support programs are increasing. Although not all partnerships include sharing space, this is a common practice, as libraries can provide a prominent space on campus. Tutoring, writing centers, tech help, and other student support services are frequently seen in academic libraries. At Miami University-Hamilton, the library shares space with the Federal TRIO Programs Student Support Services; one of the first publicized examples of a diversity support program partnering with a university library (Girton et al., 2018).

There are many benefits and arguments in favor of the importance of undergraduate research experiences. However, many students face barriers to participation. Multiple studies examining students' perspectives in these programs have discovered common barriers, including difficulty navigating the administrative requirements, mismatched expectations between students and faculty, and inequitable access to opportunities (Luo et al., 2022; Sharma et al., 2022). Although more research is being produced in examining the bias and barriers, many of these studies group all marginalized identities together or focus on gender. Research on library support for women in STEM is readily available (Davis, 2023; Palumbo, 2016); however, there is still a gap in the literature on the perspectives of students of color in undergraduate research programs and library support (Pierszalowski et al., 2021).

Overview of Programs at Oregon State University

One goal of this paper is to introduce librarian practitioners to the different diversity programs that may be available on each campus. At Oregon State University (OSU) there are many federally funded programs to provide support for undergraduates (Table 1). These programs are rich and unique in history that serve students who have traditionally been underrepresented in higher education (e.g., first-generation (neither parent has a four-year degree), low-income, or students with physical or learning disabilities). While this is not a comprehensive list, it does provide the opportunity to review what programs may be on your campus as a way to start making meaningful connections to support students from marginalized communities.

Within these programs, services vary and may include tutoring, mentoring, assistance with applications for scholarships and financial aid, opportunities for research, or other scholarly activities (e.g., summer internships or research experiences for undergraduates). Specifically, the Department of Education TRIO programs have a clear intention to serve students with limited English proficiency, students with disabilities, students who are homeless, students who are in foster care or are aging out of the foster care system, or other disconnected students. At OSU, many of the federally funded programs are administered by our Educational Opportunities Program (EOP). This program “supports the academic, personal, and professional development of students who have traditionally been denied equal access to higher education” (Oregon State University, n.d.).

Not all of these programs are specifically for students in STEM majors or provide access to an undergraduate research experience. However, many of these programs act as a gateway to introduce students to people and resources and can eventually lead to a research experience. These programs also provide a cohort experience that can help
students build community, encourage feelings of belonging on campus, and grow academically. Although not the primary reason students go to graduate school, participating in these programs can help students learn about graduate school and other opportunities.

### Table 1. List of federally-funded diversity programs at OSU

<table>
<thead>
<tr>
<th>Program</th>
<th>Student Population Served</th>
<th>Funded by</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Assistance Migrant Program (CAMP)</td>
<td>Migratory or seasonal farmworkers (or children of such workers) in their first year of</td>
<td>Department of Education</td>
</tr>
<tr>
<td></td>
<td>undergraduate studies</td>
<td></td>
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<tr>
<td>Louis Stokes Alliances for Minority Participation (LSAMP)</td>
<td>African Americans, Hispanic Americans, American Indians, Alaska Natives, Native Hawaiians, and Native Pacific Islanders majoring in Science, Technology, Engineering and Mathematics (STEM)</td>
<td>National Science Foundation (university alliances)</td>
</tr>
<tr>
<td>TRiO-Student Support Services (SSS)</td>
<td>Students enrolled in two-year institutions and applying for admission to, and obtaining financial assistance for enrollment in four-year programs</td>
<td>Department of Education</td>
</tr>
<tr>
<td>TRiO-Upward Bound</td>
<td>High school students from low-income families; and high school students from families in which neither parent holds a bachelor's degree</td>
<td>Department of Education</td>
</tr>
</tbody>
</table>

In addition to these national programs, there are other grant-funded programs that are specific to OSU. The STEM Leaders program, funded by a National Science Foundation (NSF) grant, is an example. The URSA (Undergraduate Research, Scholarship, and Arts) is not a STEM-focused program but provides a paid research experience for undergraduates across disciplines, with many research projects being STEM-related. Not mentioned here are the discipline-specific undergraduate research opportunities that span the campus – these programs, while valuable, are outside the scope of this article.

### Working Within the System

As women of color engaging in higher education work at predominantly white institutions (PWI), we are not alone in the shared frustrations of the “unseen work” (Babcock et al., 2022) that often is not recognized formally, but has a significant impact for our students. It has been meaningful for the students we work with to come and ask for letters of recommendation, provide a safe place to share acts of microaggressions during their research experiences, and learn how to navigate difficult life and academic experiences. We recognize that we cannot change an entire system, especially when they are rooted in systems of oppression (Delgado, 1995; Solorzano, 1998), but we do strive to support students in our respective roles to impact how they experience higher education as they work towards their future goals. With this mindset, we provide our two perspectives on the work we have done together and separately. While the focus of this article is on librarianship, the work of social justice cannot be done alone, and this is evident in our partnership. So, we provide our unique and intersecting perspectives on our work in building a more equitable and welcoming space for students at OSU.
Diana’s Perspective

I started at OSU as a Science Librarian in the fall of 2018. My first introduction to the STEM Leaders program was when a fellow science librarian invited me to help with the library workshop shortly after I started at OSU. I became the liaison for the STEM Leaders program in 2019 and was formally introduced to Stephanie, the program coordinator then. We worked together to discuss goals and outcomes for the students in the program. During the fall term, I would provide a workshop on library resources/conducting a literature review. In the winter, I would help with poster presentations, and in the spring, I would attend the poster presentations to see the culmination of their projects. As a librarian, most of my teaching outside the STEM Leaders program consisted of one-shots, with a few workshops scattered throughout the year. I rarely had the opportunity to see students learning and making connections; being part of the STEM Leaders program provided that opportunity.

We continued to work together when Stephanie became the Associate Director for Undergraduate Research, Scholarship, and the Arts (URSA). With this new program, I assisted in reviewing applicants, working one-on-one with students that needed in-depth research help, and being a resource in creating poster presentations. Over time, I started to do more outreach and teaching with other student support services on campus, such as the programs housed in our Educational Opportunities Program. Stephanie’s new role also had many intersections with the EOP programs, and we worked together to bridge students and staff to the resources our units provided. As I made more connections, I saw the overlap in student populations with these programs and those conducting undergraduate research. While I continued working with my usual liaison departments, I started to prioritize working with students and staff in these programs. This move was, in part, motivated by my own desire to work with students and communities experiencing barriers in higher education and STEM disciplines. As a former first-generation college student, I had a difficult time navigating the “hidden curriculum” during my years in college, but over time I realized the importance of obtaining and using this knowledge to succeed. As a science librarian supporting diversity programs, I envision my role as a teacher and an advocate for students who experienced the same systemic barriers that I had previously. While my work cannot dismantle these systems, I hope that I am able to support the students to not only succeed in their academic journeys, but also have a smoother experience in navigating academia.

Stephanie’s Perspective

I started as the National Science Foundation (NSF) funded STEM Leaders program Coordinator in the fall of 2017. The STEM Leaders program was established as an early intervention to support first-generation and low-income college students with access to early-career undergraduate research experiences. One program component was a 10-week course that helps create a cohort setting for students to engage with the program staff and other students. Each week participants are introduced to topics regarding different processes related to undergraduate research, such as how to identify and connect with professors for undergraduate research opportunities and what types of questions to ask professors when first meeting with them. We also brought support
services from across campus to give presentations on resources available to them, such as the basic needs center, counseling and psychological services, and the academic success center.

Having had my own past experiences in undergraduate research, I must acknowledge that the library was a primary hub which enabled me to conduct my own research and scholarship. Thus, a crucial aspect of my student support strategy involved nurturing a library partnership. This collaboration aimed to equip students with essential skills, such as efficient research article search and access techniques, comprehension of scholarly articles, and familiarity with various tools and resources to help them excel within their research groups. I contacted our science librarian because not all students have these skills or the confidence to see themselves as researchers. At the same time, students cannot depend on research faculty mentors to be the source of all knowledge, nor can these programs and staff be the end-all. Students need additional points of contact. Thus, it is important to create opportunities for students to connect with other professional staff that they may not otherwise meet on their own. Having diverse representation in spaces of higher education—like Diana and me, who are two women of color working with students at a predominantly white institution—is critical for students from underrepresented communities. Quite often, these students do not encounter faculty or staff who represent them (Bitar et al., 2022). Increased diversity of faculty and staff not only enriches the campus, but is increasingly important in providing models of representation to inspire students and motivate them to persist.

**Limitations**

All of the previously mentioned programs are interventions at the postsecondary level. While these programs are invaluable in supporting students with marginalized identities, studies have shown that many students face barriers early in their educational journeys, especially regarding STEM education (Hurtado, 2010; Malcom, 2016; Pearson, 2022). While we continue to support students in accessing undergraduate research opportunities, we recognize that many students have already been deterred from pursuing a STEM degree.

The National Academies of Sciences, Engineering, and Medicine recommends “administrators and faculty at all types of colleges and universities should continually and holistically evaluate the range of UREs that they offer” (2017, p. 223). Gathering and analyzing data on the different types of UREs for students is needed to help researchers better understand whether these UREs are accessible and welcoming to students from varying backgrounds. When assessing undergraduate research programs, Schneider et al. (2021) found that this information is limited due to technology, time, and/or resources of individual programs. By shedding light on the gaps in support, this research can reveal the deficiencies in services provided to first-generation, underrepresented, nontraditional, and socioeconomically disadvantaged students. Consequently, it becomes evident where social justice efforts are falling short, and it underscores the need for increased attention and resources. These findings pave the way for the creation of more equitable and effective support systems that make the most of existing resources to better address the needs of these students.
Conclusion

Support for many programs mentioned in this article does not necessarily fall to one department, discipline, or librarian. The cross-departmental nature of these programs is what makes them invaluable, but also difficult to support for units that have rigid support structures. Based on the success of our partnership, we encourage other science or STEM librarians to look beyond the discipline-specific nature of liaison relationships and consider the gaps. Our outreach strategy is designed to be inclusive and dynamic, reaching students through multiple avenues. Formal undergraduate research programs and diversity support programs serve as valuable forums for direct interactions, where we can connect and engage with students on a personal level. Beyond that, we are committed to working together to actively initiate introductions to individuals who might find value in our services. The power of word-of-mouth is not to be underestimated, because interactions with us are shared by students to their peers outside of these programs. Additionally, we seize opportunities to engage with students in various contexts and recognize that even brief encounters can lead to meaningful connections, expanded relationships, and a sense of belonging. If we are trying to make our institutions more inclusive and welcoming, we cannot wait for students to come to us. By meeting them where they are—in this case, as students of a diversity or undergraduate research program—we are taking the first step in demonstrating that their presence is valuable and wanted on our campuses. Working with existing programs saves time and effort, and may lead to successful partnerships. The intersection of undergraduate research experiences, diversity programs, and libraries demonstrates how much time, effort, and resources are needed to create a more diverse community of scientists.

Working in white supremacist spaces can be disheartening and enraging as two women of color. While we work within the system to create a more welcoming environment for our students, we realize we cannot do it alone. By working together, we resist the status quo and fight against the misconceptions that act as barriers to our student's success in STEM and higher ed. Instead of siloed efforts, we build solidarity and commit to our shared goals of removing systemic barriers. Only then can our institutions be more equitable and inclusive spaces.

References


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