



The SciCommDiversity Travel Fellowship: The Challenge of Creating a Sustainable Intervention

Alberto I. Roca^{1*}, Cynthia-Lou Coleman², Tara S. Haelle³ and Danielle N. Lee⁴

¹ DiverseScholar, Irvine, CA, United States, ² Department of Communication, Portland State University, Portland, OR, United States, ³ Independent Journalist, Arlington, TX, United States, ⁴ Department of Biological Sciences, Southern Illinois University Edwardsville, Edwardsville, IL, United States

OPEN ACCESS

Edited by:

Anders Hansen,
University of Leicester,
United Kingdom

Reviewed by:

Bruno Takahashi,
Michigan State University,
United States
Katherine Nicole Canfield,
United States Environmental
Protection Agency (EPA),
United States

*Correspondence:

Alberto I. Roca
aroca@DiverseScholar.org

Specialty section:

This article was submitted to
Science and Environmental
Communication,
a section of the journal
Frontiers in Communication

Received: 20 September 2019

Accepted: 23 June 2020

Published: 31 July 2020

Citation:

Roca AI, Coleman C-L, Haelle TS and Lee DN (2020) The SciCommDiversity Travel Fellowship: The Challenge of Creating a Sustainable Intervention. *Front. Commun.* 5:51. doi: 10.3389/fcomm.2020.00051

Diversifying a community requires outreach, recruitment, and retention which in this case targets the science communication (SciComm) workforce. Establishing a strategy to accomplish such diversification includes designing, launching, and sustaining the new intervention. Here we review the 6-years history of the DiverseScholar SciCommDiversity Travel Fellowship. This intervention was designed to build a community of minority science communicators that would interact with experienced professionals at the ScienceWriters conference. The travel fellowship reduces the financial burden of conference attendance while introducing the fellows to mentors who facilitate networking and knowledge-building during the event's professional development opportunities. The first two years of the fellowship were catalyzed by Idea Grants from the National Association of Science Writers—producers of the ScienceWriters event. Two strategies were used to engage potential fellowship applicants. First, we sought minority journalists interested in STEM topics who wished to extend beyond their standard reporting beats (tech, politics, etc.). Such student and professional journalists were found by networking with and producing conference panels at the National Association of Black Journalists and the Native American Journalists Association annual events. For the second strategy, we found minority scientists who were interested in exploring how to convert their social media and blogging activities to professional writing/reporting careers. We attracted such individuals through our activities at annual conferences such as the Society for the Advancement of Chicanos and Native Americans in Science as well as the Annual Biomedical Research Conference for Minority Students. Overall, one particular challenge of an intervention is financial sustainability once catalytic (grant) funds end. Here, we describe our model for a sustainable and synergistic intervention that positions the SciCommDiversity Travel Fellowship within the overall program of DiverseScholar's doctoral recruiting services. The fellowship is now funded internally from advertising sales revenue from the DiverseScholar MinorityPostdoc.org career portal. The website, though, is more than just a job board since the travel fellows contribute original reporting to the online magazine. Thus, beyond just reducing financial barriers, the fellowship's mentoring, and publishing opportunities can advance a fellow's entry into the SciComm profession.

Keywords: science journalism, environmental journalism, health journalism, science communication, SciComm, workforce diversity, ethnic/racial underrepresented minority

INTRODUCTION

A national call-to-action asks how “science communication [can] reach and be tailored to meet the needs of audiences that vary by race, ethnicity, language status, income, and education level” (National Academies of Sciences Engineering and Medicine, 2017). In describing the complexities of communicating science, the same report notes “that certain communication channels, modes, *messengers*, or messages are likely to be effective for communicating science with some groups and not others.” We emphasized the word “messengers” in this quote to underscore that the diversity of the science journalism/communication workforce will be important for reaching specific audiences within the United States such as people of color who will tip the nation to be majority-minority by the 2050’s (Pew Research Center, 2008). This demographic change is driven by the growth of the Latinx/Hispanic population which is estimated to reach one-third of the country’s total population within a few decades.

Articles in the recent *Frontiers in Communication* “Inclusive Science Communication in Theory and Practice” collection argue for a new approach to public engagement that is sensitized to the needs of historically marginalized and minoritized peoples. A symposium has catalyzed a community of scholars and practitioners to work toward this goal (Canfield et al., 2020). In that report and others, fundamental definitions, goals, and theories map out the relationship of diversity, equity, and inclusion (DE&I) ideals to science communication (Polk and Diver, 2020). Furthermore, specific practical advice for science communicators is explained for reaching the multicultural audience that will become the norm in the United States (Landis et al., 2020). Our own contribution to this movement is the creation of a diversity fellowship to encourage minority participation in science communication.

For this community case study about our fellowship program, we use “science communication” (SciComm) to refer to the work of both news reporters and STEM researchers who inform the public about science, health, environment, and other related topics primarily through a written medium. This narrow definition of science communication reflects the applicant pool targeted for our fellowship intervention and so does not include informal education conducted in museums, nature centers, out-of-school time programs, etc.

We have not found specific controlled studies in the science communication empirical literature exploring the effect of communicator-audience diversity (mis)matching with respect to science news. However, testimonials describe the benefit to a reported story when a science journalist practices inclusive SciComm, for example (Kleyman, 2013; Mandavilli, 2013; Howard, 2014a; Crow, 2016; TON Editors, 2018; Haelle, 2019a,b). We suspect DE&I underlies “trust” issues in source-communicator-audience relationships (Fiske and Dupree, 2014).

SciComm practitioners can learn from the DE&I-related literature in the field of informal science education, for example (Streicher et al., 2014). A qualitative study examined the participation of low-income, minority ethnic individuals in science museum activities in the United Kingdom (Dawson, 2018). The study found that marginalized minorities experienced

exclusion due to cultural imperialism and powerlessness since their SciComm interactions reflected the values and practices of dominant groups at the expense of the marginalized. More recently, a study interviewing underserved audiences in Germany described material and especially emotional factors that play a role in excluding certain groups from science communication engagement (Humm et al., 2020). This raises the concern that science journalism also replicates these potential inequities leading to exclusion.

Notably, some scholars are promoting an improved socially inclusive practice of science communication (Massarani and Merzagora, 2014; Canfield et al., 2020). Since “the public” is not a monolithic, homogenous population, who then are the reporters and communicators that are attuned to the (science) needs and interests of the heterogeneous “publics?” This is a particular concern for niche audiences that consume ethnic media. Indeed, there is an urgent call to reach underserved audiences who are “beyond the choir” that current science communication is often preaching to (Scheufele, 2018).

Journalism Diversity

According to a newsroom census, the wider journalism workforce is largely a white, male monoculture (American Society of News Editors, 2018). In the United States, specific culturally-minded professional societies serve to diversify the journalism workforce (Bravo and Clark, 2020). Relevant organizations for our work reported here include the Native American Journalists Association (NAJA), the National Association of Hispanic Journalists, and the National Association of Black Journalists (NABJ). As an example, we briefly describe the media ecosystem that informs NABJ’s advocacy work.

Social justice-based news coverage in media outlets that target African-American and Black audiences often fail to see how STEM access and science literacy is a social justice issue. Opportunities to report on recent discoveries at Historically Black Colleges and Universities or by African-American scientists has largely been overlooked by the media that targets African-American audiences (Lee, 2010, 2013e). Additionally, lack of news coverage by ethnic news organizations on important topics such as energy, the environment, technology, product safety, personal health, and other science issues is partly due to the unease general news reporters may have in covering science-intensive stories (Lee, 2010) or the lack of freelance journalists pitching science news to these outlets (Lee, 2013e).

The African-American and Black community’s relationship with science and medical research communities has been fraught with many challenges. News of African-American patients being used as unwilling research subjects or being left untreated by care professionals has been a widely known problem since at least the Tuskegee Syphilis experiment contributing to a sense of mistrust of science (Freimuth et al., 2001; Scharff et al., 2010). These misgivings about science continue among multiple generations of African-Americans (Lee, 2014d). However, we encourage an increased commitment to communicate both basic and applied science to African-American audiences. This may yield not only a better informed public but may also attract more diverse

individuals to science and science communication careers (Lee, 2010, 2012, 2013e).

With a membership of more than 4,000, the National Association of Black Journalists may be the largest ethnic affinity professional journalism association in North America. The organization is charged with supporting the professional development of Black journalists as well as critiquing whether the news media covers the Black community fairly and inclusively. Founded in 1975, the membership is subdivided into professional divisions called Task Forces. Over a dozen NABJ Task Forces offer professional development and career preparation for its membership. Task Forces are sub-groups of professional and student journalists who work in Print, Broadcasting, and Digital Media or who cover common beats such as Arts and Entertainment, Politics, or Sports. More recently, focal topics have established Task Forces that bring attention to LGBT issues, Global Journalism, or Black Press (Lee, 2011b). Moreover, there is a history of social justice engagement among the NABJ membership at its annual meetings and at special events. Although news related to health disparities and environmental injustice experienced by African-Americans has attracted attention, NABJ has yet to establish a Science Communication Task Force (Lee, 2011b).

Science Journalism Diversity

Membership society demographics can act as a proxy of the diversity of the science-specific journalism workforce in the United States. The Society of Environmental Journalists (SEJ) states that its membership was 7% people of color (Nauman, 2015). The Association of Health Care Journalists (AHCJ) membership is 6% Asian-American/Pacific Islander, 3% Hispanic/Latino, 3% African-American/Black, 3% Multiracial/Mixed, and 1% American Indian/Alaska Native (Association of Health Care Journalists, 2019). Finally, a demographic survey of the National Association of Science Writers (NASW) described its membership as 2.8% Asian/Pacific Islander, 2.5% Hispanic/Latino, 2.1% South Asian, and 0.8% Black or African-American (Davis, 2015). We caution against any definitive conclusions or comparisons of those statistics between organizations since the surveys were conducted independent of each other. Furthermore, it is unknown if domestic vs. non-domestic residents were disaggregated for the various ethnic groups, (e.g., U.S.-born Hispanics vs. Latino/a citizens from Central and South America since these organizations attract an international membership).

This lack of diversity has motivated interventions to improve minority recruitment and retention in the science journalism workforce. A grassroots survey of minority science writers found that financial concerns were a reason why minorities may be underrepresented in science journalism (Diep, 2014). Such financial barriers are addressed by fellowships and travel award initiatives. The American Association for the Advancement of Science offers the Minority Science Writers Internship. SEJ has a Diversity Travel Fellowship for its annual conference. An Ethnic Media Health Journalism Travel Fellowship exists for the AHCJ annual meeting. The Metcalf Institute had a National Science Foundation funded Diversity Fellowship in Environmental

Reporting. Lastly, NASW has offered a summer internship supplementary Diversity Fellowship. To our knowledge, none of these fellowships have been described in the peer-reviewed literature thus leaving a gap in how such diversity interventions are conducted and evaluated.

Hosting a Travel Fellowship

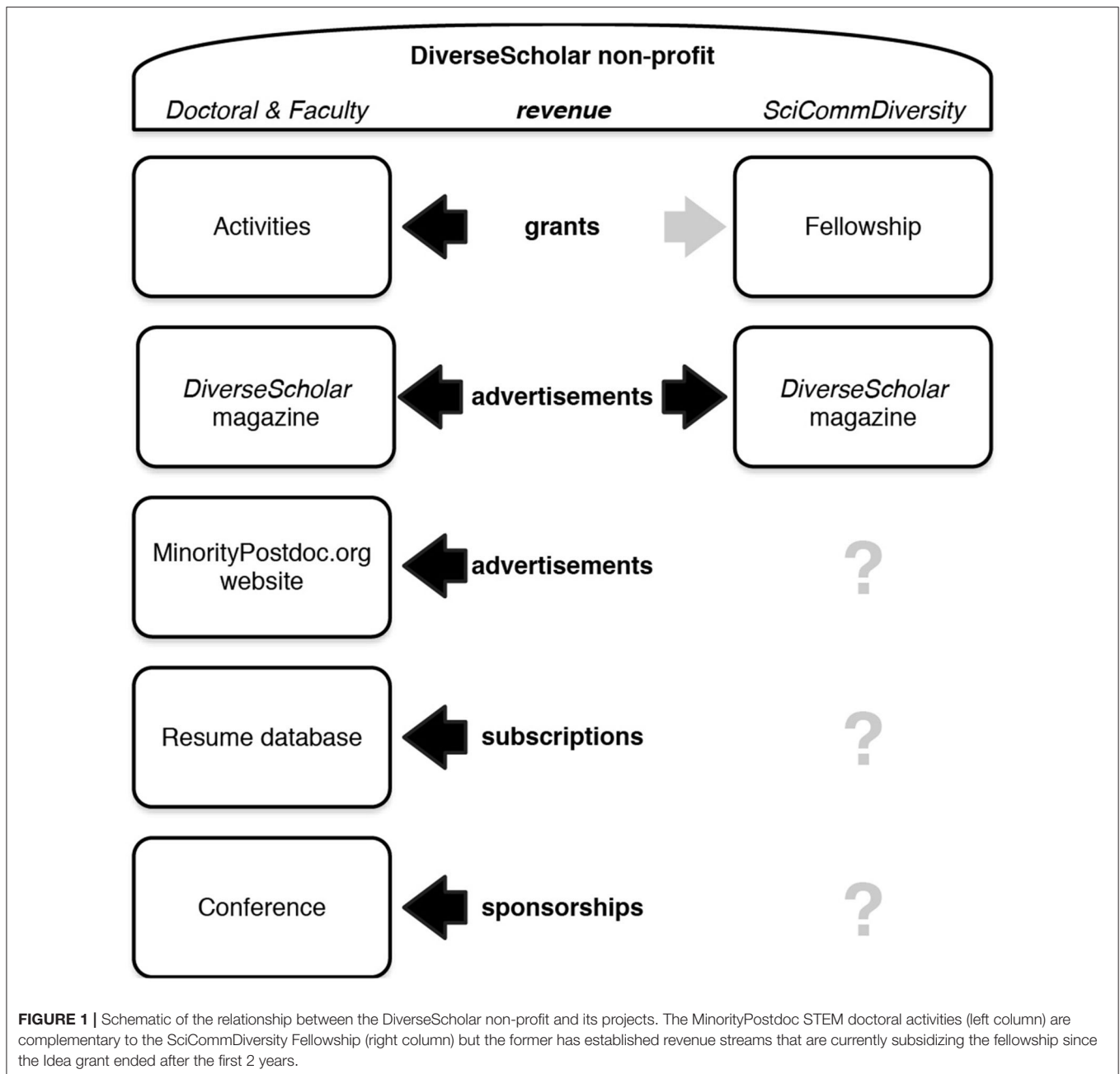
The lead author of this report, Roca, founded the non-profit DiverseScholar (fiscally sponsored by Community Partners) with the mission to diversify higher education faculty (Roca, 2011). Roca and co-author Lee conceived of the diversity travel fellowship to bring minorities to the annual ScienceWriters conference co-organized by NASW (Lee, 2014b). The operational overview of DiverseScholar illustrates how the travel fellowship is currently sustained (**Figure 1**). Co-author Coleman joined the DiverseScholar Advisory Board to add academic expertise about science communication to the project as well as her perspective about American Indian and Native American issues (Coleman, 2012b). This complements Roca's and Lee's practitioner SciComm experience since their formal education is in biochemistry and biology, respectively. Finally, co-author Haelle joined the application review committee and served as a mentor to the fellows drawing from her experience as an independent journalist and active NASW and AHCJ member (Haelle, 2019a,b).

DiverseScholar's MinorityPostdoc.org web portal serves as a career advice site and job board targeted to the audience of diverse PhD graduate students and postdocs. The monthly email newsletter to 1,100+ postdocs and the original articles of the online *DiverseScholar* magazine are additional communication channels. The DiverseScholar Doctoral Directory is a database of *curricula vitae* and resumes sourced from the listserv membership. Finally, similar to that of a diversity science professional society, the DiverseScholar Postdoctoral Conference is a mentoring and recruiting event meant to prepare PhD trainees for their careers and to introduce them to employment hiring managers, especially faculty search committees (Rodriguez and Roca, 2017). Importantly, all these activities generate revenue through website/newsletter advertising, database subscriptions, and event exhibitors/sponsors (**Figure 1**).

In this report, we describe our DiverseScholar SciCommDiversity Travel Fellowship, our outreach and diversity advocacy activities, as well as review relevant DE&I literature, advocacy, and testimonials. Much of the review cites practitioners publishing in online media/blogs.

TRAVEL FELLOWSHIP INTERVENTION

Our long-term goal is to diversify the science communication workforce in both the private sector and academia. Nurturing a talent pipeline to diversify a workforce requires outreach, recruitment, and retention of minority students and professionals. In the United States, many initiatives for diversifying the STEM and biomedical workforce (National Academies of Sciences Engineering and Medicine, 2011) can serve as models for interventions to affect the SciComm community. Such models and our own personal experience informed the design of our travel fellowship.



A logic model of the SciCommDiversity travel fellowship describes the intervention's inputs, activities, outputs, and outcomes (Table 1). This simplified model describes basic aspects of the intervention that the DiverseScholar non-profit administered allowing fellows to attend the ScienceWriters conference. This annual 5-days event is co-produced by NASW—a professional society of over 2,300 members consisting mostly of science journalists (Davis, 2015). The specific practical objectives of the SciCommDiversity fellowship are to reduce any financial and networking barriers to full ScienceWriters conference participation. This allows fellows to learn informally from the professional development sessions that discuss craft,

to be recruited by hiring employers, and to meet experienced journalists who can mentor a fellow's career. The networking includes the opportunity to interact with editors to pitch story ideas so that news outlets can diversify their pool of freelance reporters. Thus, our theory of change is that the fellowship intervention facilitates the short-term career prospects for the fellows enabling a more diverse SciComm workforce in the long-term.

Note that we lacked the capacity to conduct a formal evaluation of the fellowship intervention. Furthermore, it was beyond the scope of the current report to conduct a social science study of the experience of the fellows. We leave that

TABLE 1 | Simplified logic model of the SciCommDiversity fellowship that the DiverseScholar (DivSch) non-profit administered allowing fellows to attend the ScienceWriters (SciWri) conference.

Inputs	Activities	Outputs	Outcomes
Applicants	Informal learning	Fellows	<i>Short-term:</i> improved career prospects
Mentors	Mentoring	Knowledge	<i>Long-term:</i> diversifying SciComm workforce
Funds	Networking	Relationships	
DivSch staff & volunteers	Peer-to-peer interactions	Psychosocial support	
SciWri event	Reporting assignment	Top-edited articles	

to future work drawing upon the theory and studies in science communication such as those about training (Schmidt, 2017; Menezes, 2018; Newman, 2020) as well as DE&I especially in higher education (Smith, 2009) and STEM (National Academies of Sciences Engineering and Medicine, 2011; Segarra et al., 2020).

The fellowship online application consists of a questionnaire collecting contact information, career stage, personal/professional demographic characteristics, and a *curriculum vitae* that includes citations to their published writing portfolio. The consideration of an applicant's publication portfolio underscores that this fellowship emphasizes writing skills. The application also required a 500+ word essay describing the role of diversity in journalism, summarizing the applicant's diversity advocacy experience (if any), and describing how ScienceWriters conference attendance would advance their professional career goals. The applicants were made aware that these essays would be considered for publication as *DiverseScholar* magazine articles for the final awardees.

The judging of the applications was conducted by the four co-authors Haelle, Coleman, Lee, and Roca representing their perspectives as a freelance science/health writer, science communications faculty, social media (#SciComm) advocate, and STEM diversity advocate, respectively. Each judge independently reviewed the applications and ranked their top choices. Roca combined the results and finalized the awardee selection process. As a new activity, we had no formal rubric for judging applicants. Considerations for ranking an application included the following questions. How was the quality of the writing? What was the applicant's experience or potential as a journalist? Who was most likely to contribute actively toward diversity as a journalist or science writer? How much did applicants depend upon the travel funds to attend the conference? Who would benefit most from the learning and networking opportunities at the conference? Whose essay demonstrated a clear understanding of DE&I? Which individuals would represent communities underrepresented in the science journalism workforce?

The SciCommDiversity.org webpage maintains a complete public roster of fellows, their biographies, and their social media accounts so we do not reproduce that information in this report. From 2014 to 2017, we awarded 20 travel fellowships. During the first 2 years, the fellowship was supported by two 1-year

NASW Idea Grants with five fellows in 2014 and 10 fellows in 2015. The latter cohort was larger because more grant funds were allocated to the fellowships in the second year. In 2016, four fellows were funded using a combination of internal advertising revenue, donations raised from the DiverseScholar advisory board, and a contribution from science author Steve Olson. In 2017 and 2019, a single fellowship was awarded each year to an Honorable Mention awardee from previous application cycles using advertising sales revenue from DiverseScholar. Each fellow received \$1,000 as a reimbursement toward their registration, travel, and lodging expenses incurred during their ScienceWriters conference participation.

During 2014–2016, 15 individuals were awarded an Honorable Mention—a “runner-up” category with an honorific title but without funding. The title also represented applicants who had scored well by the judges but ultimately were not able to attend the conference. Strategically, this category allowed us to identify future awardees in subsequent years without administering a full competition which we used to identify fellows in 2017, 2018, and 2019. Note that the single 2018 awardee canceled their conference participation which then voided the fellowship that year.

We wished to support both individuals still in training (i.e., bachelors or masters students), as well as those professionals already in the workforce. However, the lack of experience among students made it difficult to compare those applicant types especially with respect to the quantity of their published articles. Thus, within each awardee cohort, we attempted to balance the number of students and professionals supported by ranking them separately.

Among the fellows, eight of the 11 professional (non-student) awardees were freelancing for their writing work. This underscores the financial barrier that may exist for participation among journalists who do not have an employer to cover conference expenses. NASW offers their own travel fellowships funded by the Authors Coalition of America derived revenue which is the same funding source for the NASW Idea Grant competition now known as the Peggy Girschman Idea Grant (National Association of Science Writers, 2018).

Eighty-two individuals had applied for the fellowship between 2014 and 2016 yielding an overall award rate of ~24%. The personal demographics of the applicants was not made available to the judges except for Roca who managed the entire application process. Among the 74 applicants who reported their age, the average was 31 ± 11 years old. Approximately 27% of the applicants identified as males while 85% of the applicants were U.S. citizens. All but two applicants self-identified their race/ethnicity (**Figure 2**) and were allowed to select more than one category such that the following numbers do not add to 100%: 37% Black or African-American, 33% Hispanic American, 17% Asian-American, 17% White or Caucasian (non-Hispanic), 6% American Indian or Alaska Native, and 4% Other. These racial/ethnic statistics were not drastically different when the non-U.S. citizens were removed from the calculation except that the “Other” category was reduced to 0%. We also collected affinity characteristics representing other categories of representation as follows for the applicants: 29% low socioeconomic background,

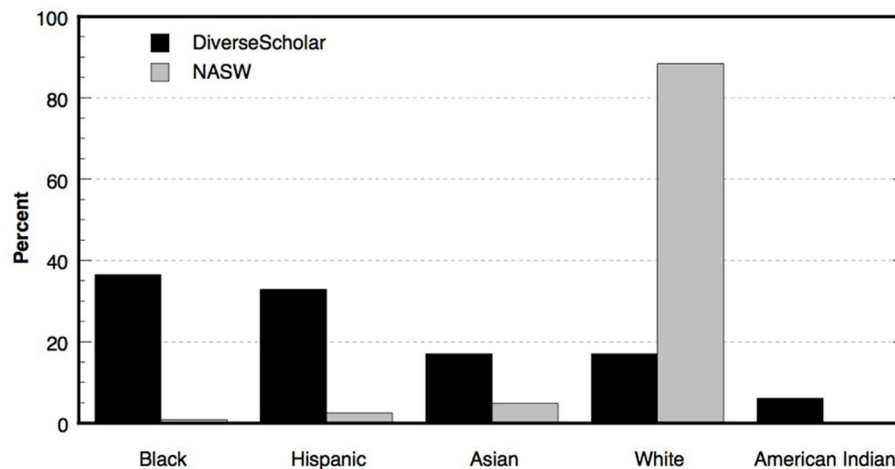


FIGURE 2 | Comparison of the ethnic/racial diversity of the DiverseScholar fellowship applicant pool (black) vs. the NASW membership (gray). The fractional percentage of the 82 fellowship applicants is compared to the ~1,100 NASW membership survey respondents for the indicated ethnic/racial groups. Note that the depicted NASW “Asian” category combines the reported statistics for both Asians and South Asians since the DiverseScholar travel fellowship application combined these two groups.

27% first generation in higher education, 11% LGBTQ, 6% disability, and 2% military service / veterans. Finally, the disciplinary interest of the applicants was distributed as follows: 46% Life Sciences; 35% Environment; 32% Health; 39% Physical Sciences; 26% Education; 23% Social, Behavioral and Economic Sciences; 22% Career; 20% Tech; 17% Traditional Knowledge; 16% Clinical Research; 16% Engineering; 11% Agriculture; 9% Animals; and 7% Mathematics/Statistics.

At the ScienceWriters conference, fellows attended professional development and science-specific sessions that were of interest to them. An expectation of the fellowship was a reporting assignment chosen by Roca that typically focused on a particular conference session negotiated after a fellow’s interests became clear. At a reception or group meal, fellows engaged with each other and designated mentors (**Figure 3**). The mentors were experienced science freelance or staff journalists drawn from our professional networks. When possible, we matched fellows and mentors based upon their primary science specialty. Mentors were instructed to serve as a resource about career insights especially for fellows new to the profession. Importantly, the mentors provided developmental editing critiques of the fellow’s reporting assignment both during and after the conference by reviewing a draft article. When Idea Grant funds were available, mentors received a nominal honorarium for this editing work. We are very grateful to the mentors who volunteered their time. Some mentors were members of NASW’s new Diversity Committee so our SciCommDiversity Travel Fellowship and NASW shared mutual goals and complementary activities.

The fellowship reporting assignment was designed to capture a fellow’s conference experience, to document activities around a DE&I topic, and to allow a fellow to practice their science reporting skills. In some cases, published articles included a fellow’s diversity essay from their application. The articles were edited by either the fellowship selection committee and/or

the mentors. Such top-edited and bylined articles published in the *DiverseScholar* magazine add to a fellow’s portfolio that can be especially critical for student’s beginning their career. We note that NASW student membership requires two top-edited articles. Also, NASW demands membership application endorsement by two sponsors which our mentor-fellow introductions can address. Thus, our intervention helps the fellow meet expectations toward professional qualifications for formally joining the NASW community.

A selection of the article assignments demonstrate that the fellows are contributing to the discussion about science communication/journalism’s diversity, equity, and inclusion challenges (**Table 2**). The published assignments also include original science reporting facilitated by the ScienceWriters conference’s joint CASW New Horizons in Science seminars. Some of the fellows were assigned a particular seminar/topic but were also expected to include a DE&I angle to fall under the *DiverseScholar* magazine mission. The perspective could be relating a science discovery to a marginalized community (Landry, 2015; Wang, 2015; Parks, 2016), finding a story source about underrepresented minorities from an expert’s research group (Hill, 2015; Park, 2016), or describing the state of the discipline’s diversity/inclusion (Shastri, 2015; Skibba, 2015).

As *DiverseScholar* Editor, Roca helped the fellows identify a diversity angle by drawing upon his experience thinking of STEM-related story ideas (Roca, 2018) that began when co-curating the Diversity in Science Blog Carnival series (Lee, 2009; Roca and Yoder, 2011). The carnival series and the fellow’s articles can serve as examples for how allies can refine their own science reporting to cater to the interests of minorities. Notably, some of the fellows went beyond just producing written science deliverables for a typical U.S. audience. One fellow produced an audio story adding to *DiverseScholar*’s emerging multimedia offerings (Martel, 2016b). Some of the



FIGURE 3 | Group photo from the 2015 ScienceWriters conference including 10 DiverseScholar SciCommDiversity Travel Fellows. The three mentors pictured are Tara Haelle (2nd from left), Maggie Koerth-Baker (6th from left), and Dr. Matthew Francis (3rd from right). DiverseScholar Advisory Board member, Dr. Cynthia-Lou Coleman, is at the far right. Mentor Nidhi Subbaraman is not pictured. Note that written informed consent was obtained from the identifiable individuals for the publication of this image.

articles included an accompanying Spanish translated version thereby expanding the reach of our potential audience (Gonzalez, 2014a; Rodriguez Mega, 2015). Finally, we highlight one fellow's leadership achievements who went on to become a member of the NASW Diversity Committee as well as guide the San Diego Science Writers Association (Skibba, 2018).

SCICOMM OUTREACH

A fellowship intervention only succeeds if there are applicants, which requires reaching a target audience of underrepresented people of color, for example. We were operating under the assumption that there were two potential applicant pools: (1) minority journalists who could consider science reporting, and (2) minority scientists who could consider SciComm careers (Figure 4). We tailored our in-person outreach efforts accordingly.

We first used internet channels for publicizing the fellowship opportunity such as the ScienceWriters conference webpage. We marketed through our online web presence such as the MinorityPostdoc.org website, the *Scientific American The Urban Scientist* blog (Lee, 2014b), and our Twitter social media accounts—@MinorityPostdoc and @DNLee5, for Roca and Lee, respectively. Organizations that also publicized our call for applicants included Ciencia Puerto Rico, Culture Dish, Red Comunciencia, and the NABJ Digital Journalism Task Force. The DiverseScholar non-profit also made announcements via its monthly email listserv to over 1,100 postdocs including historically underrepresented populations.

To accomplish in-person direct recruiting, the NASW Idea Grants subsidized our participation at diversity conferences to meet minority students and professionals from either the journalism or science sectors. Below we describe these efforts

centered on our SciComm sessions that also discuss relevant DE&I issues.

National Association of Black Journalists

Since 2009, NABJ has sponsored a conference programming track called Healthy NABJ that hosts panels, major presentations, seminars, technical training, and professional development workshops at the annual convention and separately at the NABJ Media Institute (Dodson, 2013; Johnson, 2013). Although not a Task Force, the Institute serves a very similar role in drawing attention to health disparities and news coverage about health-related issues about African-American and other minority audiences. There is a small but passionate contingent of NABJ members who advocate about science, health, and environmental topics, with respect to access, disparity, and inequity.

We attended the 2013 NABJ meeting and participated in a "Science Journalism 101" session that focused on helping NABJ members cultivate relationships with media-ready African-American scientists and engineers and identify science-related news stories (Lee, 2013a,d). The panel included Dr. Ivan Oransky, Global Editor Director, *MedPage Today*; Dr. Robin Lloyd, News Editor at *Scientific American*; Dr. David Kroll, Director of Science Communications, North Carolina Museum of Natural Sciences, Raleigh, NC; and co-author Dr. Danielle N. Lee who had proposed the session. The panel was moderated by long-time NABJ member Jamila Bey, East coast radio show host.

In attendance were NABJ members who cover health, environment, technology, and weather news as well as those who served as information and outreach officers for health-related institutions. Despite their experience, many of these journalists had not self-identified as science communicators or connected their work with science communication in any form. This is why the outreach efforts of the session were critical—to help minority journalists identify

TABLE 2 | Fellow's reporting assignments documenting diversity issues and published as *DiverseScholar* magazine articles.

Title	References
Hispanic Audiences and Diversity in Science Journalism	*Gonzalez, 2014a
Culture Dish Diversity Mixer: Building Connections Between Science Writers	Gonzalez, 2014b
Science, Health, and Environmental Reporting for Indian Country	Hansen, 2014a
Applying "Diversity in Science Writing" to Native Journalists	Hansen, 2014b
A Tough Newsroom Discussion: Why Diversity Is Needed in Science Journalism	Howard, 2014a
Science, Journalism, and Diversity: What Science Writers Are Doing About That Diversity Problem	Howard, 2014b
Engaging the Science-Poor	Sobowale, 2014a
Enlightening Testimonials from Diverse Science Writers	Sobowale, 2014b
Black Journalists Pitch Their Stories to Advance Science	Cofie, 2015
Missed Opportunities for Inclusion at Science Writers: #SciWri15 #SciWriWomen reaction	Hotchkiss, 2015
Science Is Only Half the Story: Know Your Audience	Quevedo, 2015
Is <i>America Latina</i> Present in Science Journalism?	*Rodríguez Mega, 2015
How to Communicate <i>Ciencia</i> to Bicultural Audiences	Martel, 2016a
Science Journalism in Latin America: Perils and Possibilities	Rodriguez, 2017
Writing as a Japanese-Mexican American Woman	Takemura, 2019a
The Real Dangers of a Diversity Deficit in Science Writing	Takemura, 2019b

The indicated articles (*) included an accompanying complete Spanish translation.

additional professional and networking opportunities for their existing work.

The following year, the Healthy NABJ programming track hosted three professional panels (Lee, 2013b, 2014c). The panel "Using Social Media for Informed and Influential Reporting" offered important advice for journalists of all specialties, including how to use social media responsibly when covering sensitive topics, how to include your personal brand in your reporting, how to protect yourself legally while using social media professionally, and what is on the horizon for new technology. Another panel was "Reporting to Readers, Viewers, and Listeners for Better Health: The Politics of Health in the Midterms." The panel discussed the importance of reporting on health issues to impact policies that affect minority women disproportionately and Black women's experiences specifically. Finally, Healthy NABJ track featured a presentation by academic leader Dr. Louis Sullivan, President Emeritus of Morehouse School of Medicine.

In 2015, the NABJ conference included a "Science and Health Pitch Slam." Modeled after the professional development

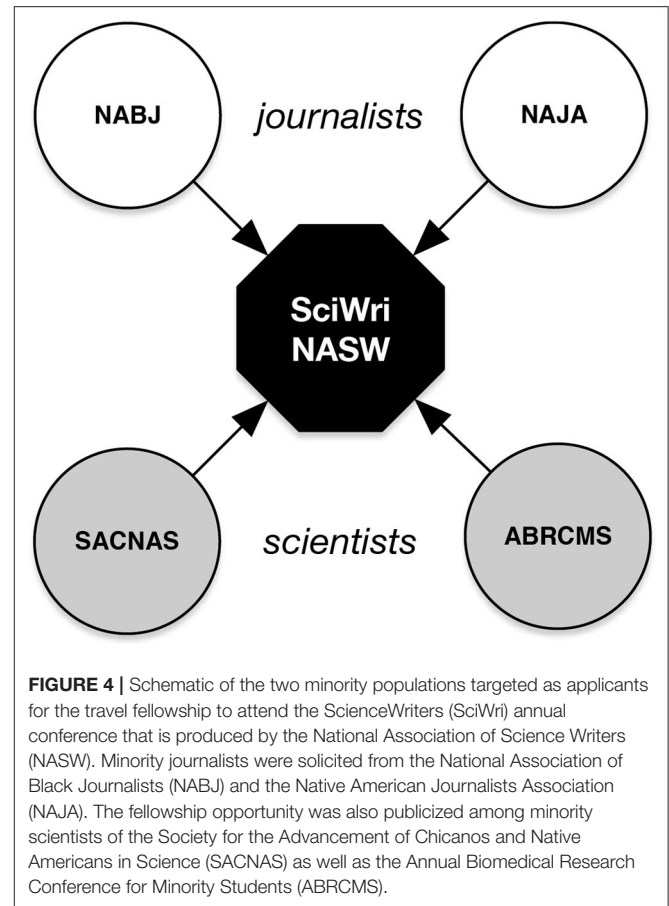


FIGURE 4 | Schematic of the two minority populations targeted as applicants for the travel fellowship to attend the ScienceWriters (SciWri) annual conference that is produced by the National Association of Science Writers (NASW). Minority journalists were solicited from the National Association of Black Journalists (NABJ) and the Native American Journalists Association (NAJA). The fellowship opportunity was also publicized among minority scientists of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) as well as the Annual Biomedical Research Conference for Minority Students (ABRCMS).

workshop offered at the annual ScienceWriters meeting, this panel presented a rare opportunity for NABJ participants to pitch work directly to science and health editors looking for new talent (Cofie, 2015). This networking opportunity can catalyze employment opportunities for some freelancers. Editors on the panel included Laura Helmuth (Science and Health Editor of *Slate* magazine), Mary Hoff (Editor in Chief of *Ensisia*), Jenny Bogo (Executive Editor of *Popular Science*), Becky Lang (Senior Editor of *Discover* magazine), and Tim de Chant (Senior Digital Editor of *Nova*). Freelance science writer and NASW Diversity Committee member, Maggie Koerth-Baker, served as the moderator. Participants received pertinent advice for developing their science reports while editors indicated strong interests in these culturally-focused health, environment, and science news ideas.

Our goal was to build relationships with diverse journalists and media outlets who attend this national convention to network with colleagues and to promote our SciCommDiversity Fellowship. We understand that presenting science-related news stories in a way that is timely and culturally-relevant influences who participates in science, health, and environmental careers and policy conversations surrounding these topics. We anticipate that attending this conference also helped to foster conversations about potential relationships between NASW and NABJ.

Native American Journalists Association

At the 2015 Native American Journalists Association annual conference, Roca produced the session “Culture Matters: Best Practices for Science & Health Reporting in Indian Country” (Crane, 2016). Roca moderated the panel that included co-author Cynthia-Lou Coleman, Ph.D., Terri Hansen (correspondent of the Indian Country Today Media Network and SEJ member), and Teresa Lamsam, Ph.D. (Associate Professor of Communication at the University of Nebraska at Omaha). The panel discussed reframing the ways that “science” is reported in Indian Country. News coverage of science, health, risk, and environmental issues is usually framed as merely reporting the facts leaving the audience to make its own, rational decisions. Instead, we argued that coverage should reframe science news so that culture, not science, is central to the reporting. One example is the reporting about Kennewick Man, which has been widely characterized in mainstream media as a battle between science and Native American religion (Coleman and Dysart, 2005). By contrast, reporting should embrace American Indian ways-of-knowing, sometimes categorized as “Traditional Knowledge,” so that indigenous perspectives are legitimized. Session participants also received professional development advice about how to enter health, science, and environmental journalism careers either as a freelancer or staff reporter. Specifically, we presented community resources for career advancement such as the NASW, AHCJ, and SEJ professional societies as well as our SciCommDiversity Fellowship.

Science Diversity Conferences

The NABJ and NAJA sessions represent our efforts to recruit minority journalists to consider science beats. The complementary outreach method for the SciComm profession and our travel fellowship specifically is to recruit minority scientists to consider communication/journalism careers (Figure 4). In higher education in the United States, there are over 70 diversity professional societies many of which are in the STEM disciplines and most are stratified by specific cultural identity such as the National Organization of Black Chemists and Chemical Engineers or the National Organization of Gay and Lesbian Scientists and Technical Professionals. The MinorityPostdoc.org Stakeholders page maintains a roster of these organizations as well as their annual conferences.

Building on our previous efforts in STEM workforce diversity (Roca, 2005), the NASW Idea Grant funds allowed us to produce a SciComm session at the 2014 conference of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS). Since the primary outcome of the SACNAS event is to recruit minority undergraduate students into science graduate programs (Chemers et al., 2011), our session proposal was pitched as a SciComm skills training opportunity. The session “Science Writing to Support Your Career: from Blogging to Journalism” included speakers Dr. Coleman and Dr. Lamsam (introduced above) as well as Daniela Hernandez, Ph.D., Reporter and Community Manager at *Wired Digital* and a University of California, Santa Cruz Science Communication Program graduate. Roca moderated a discussion about how writing online can promote a scholar’s science and career.

Panelists described how they used social media such as blogging and Twitter to discuss science, engage the public, and publicize accomplishments. We promoted our travel fellowship and also advised how to translate SciComm skills into a journalism career covering topics such as science, tech, and health. This panel followed Roca’s earlier work at the 2011 SACNAS conference with his session on “Blogging, Tweeting, and Writing: How an Online Presence can Impact Science and Your Career” (Hernandez, 2011).

Roca has produced similar sessions at related conferences that attract large Black and African-American audiences such as the NIH-centered Annual Biomedical Research Conference for Minority Students (ABRCMS) as well as at the NSF-centered Emerging Researchers National Conference in STEM (ERN) that was catalyzed by the NSF Historically Black Colleges and Universities—Undergraduate Program. For these sessions, Black academics such as co-author Dr. Lee and Michael Johnson, Ph.D. (Assistant Professor of Immunobiology, University of Arizona) would describe their SciComm and social media experience to a largely student audience.

Since role models can inspire a student’s journey in learning a skill or in pursuing a career, in these sessions Roca promotes his online roster of Diversity Bloggers published at the MinorityPostdoc.org website cataloging over 70 individuals/blogs. Other useful resources are the online #BLACKandSTEM Twitter community and the book *Science Blogging: The Essential Guide* to which two of the co-authors contributed chapters (Lee, 2016; Roca, 2016). With nearly 100 other professional development sessions vying for the attention of thousands of attendees, we crafted session titles and abstract descriptions to be engaging. The event public agenda can serve to educate about skills/careers to even those conference delegates who did not attend our sessions. Thus, we included the specific resources mentioned above in the online panel descriptions which incorporate the easily memorable and search engine optimized labels of MinorityPostdoc and SciCommDiversity for more information.

DIVERSITY OUTREACH AND ADVOCACY

There are challenges in using the aforementioned conferences to disseminate awareness about SciComm opportunities/careers. While those conferences consist of a large attendee pool which may populate a minority talent pipeline, none of these annual events focus exclusively on SciComm diversity topics and interventions. The conferences are either for minority journalists or minority scientists but not the intersection of diversity in science communication. Thus, there is no guarantee that those event’s Program Committees (particularly of the journalism conferences) will accept or continue sessions on the SciComm topic. In fact, during the Idea Grant time period, our proposal for the National Association of Hispanic Journalists was rejected on the topic of “Building Skills and Diversity in Health/Science Journalism.” Similarly, the co-authors have not had the success or capacity to repeat these sessions at subsequent NABJ or NAJA conferences. Conversely, while the SACNAS conference does

have a SciComm track of sessions, that diversity conference does not attract any substantial number of journalism students or professionals.

We have not explored using sponsorship/exhibitor opportunities at these conferences mostly because of time and funding limitations. It is also not clear that the return-on-investment would be reasonable when many exhibit booths are competing for conference attendee's attention especially from corporations with direct employment opportunities. Capacity restrictions also prevent exploring the diversity journalism organizations that separately cater, for example, to the Asian-American, South Asian, and LGBT communities.

An alternative strategy would be to network at recruiting events that are specific to SciComm diversity. However, to our knowledge, none exist that have the size or the publicity/marketing channels of established professional societies/events similar to the ones described above, (i.e., with thousands of attendees). Perhaps the new ReclaimingSTEM (Valdez-Ward and Cat, 2019) and InclusiveSciComm (Canfield et al., 2020) events can grow to achieve such status. Parenthetically, DiverseScholar is a sponsor/advisor to ReclaimingSTEM and Roca presented at InclusiveSciComm about our fellowship project.

DE&I sessions have occurred at general SciComm events. For example, from 2011 to 2014 at the now defunct ScienceOnline annual conferences, the co-authors Lee and Roca were involved in producing panel discussions on the topic of "Broadening the Participation of Diverse Populations in Online Science" that featured general discussions (Clancy, 2011; Lee, 2011a, 2014a; Roca, 2014) or particular themes as representative speakers from the LGBT (Lee, 2013c) and Native American (Coleman, 2012a,b; Lee, 2012) communities were invited. Separately, Dr. Lee was a panelist for the topic "Communicating with Diverse Audiences" at the 2016 national ComSciCon workshop. Similarly, we had a panel on "Practical Strategies for Science and Health Journalism Diversity" at the 2016 ScienceWriters conference (Crow, 2016) which coincided with the last year of our open call for applicants to our SciCommDiversity travel fellowship. With the lack of diversity in the science journalism profession, though, it is unclear how effective these venues are for *increasing* minority participation in the absence of direct interventions such as our own travel fellowship.

Since 2017 after the NASW Idea Grant funds were expended, DiverseScholar general funds became the funding source to offer a travel fellowship to a past Honorable Mention awardee so that one individual could attend the ScienceWriters conference. We anticipate continuing this model until another SciCommDiversity-specific grant/sponsor source can be identified to return to a larger open call for applications. More importantly, DiverseScholar general funds are being used to create and to sustain the SACNAS, ABRCMS, and ERN sessions described above. Also, a new initiative has been explored where general funds are used to sponsor the ComSciCon workshop (Houston, TX site) as well as the SciCommCamp event in Los Angeles, CA. The funds for the SciCommCamp event subsidize their travel scholarships therefore serving as a smaller model of our SciCommDiversity fellowship (Francis, 2018).

Finally, participants of DiverseScholar's annual Postdoctoral Conference practice SciComm skills for both technical and public audiences (Rodriguez and Roca, 2017). In particular, the 2019 conference had a specific plenary on "Using SciComm Skills to Achieve STEM Diversity" by Dione Lee Rossiter, Ph.D., former Director of the AAAS Mass Media Science Fellows Program (Rossiter, 2019). Thus, these events serve to continue building a community of diverse SciComm practitioners.

DISCUSSION

As an academic endeavor, interventions require more long-term resources than typical scholarly research deliverables. Namely, a particular research project objective can end after a few years with a peer-reviewed publication outcome that will stand on its own as a knowledge milestone and dissemination vehicle. By contrast, a training or education intervention needs sustainability to continue serving new cohorts year after year. Specifically, while the SciCommDiversity travel fellowship was catalyzed by NASW Idea Grant funds, the challenge will be to secure future funds to continue offering the opportunity and perhaps expand to other conferences (such as AHCJ and SEJ) and to other activities (internships, layoff bridge funds, pandemic relief funds, alumni network, independent events, etc.).

However, the precarious nature of the journalism industry with its declining employment security [including traditional science reporting jobs (Tenore, 2009)] makes the prospect of a workforce recruiting intervention difficult. Why would a person want to become a reporter much less one covering a topic area that does not draw the same attention as say entertainment, sports, or politics? The response is that while the profession is changing (Carr, 2019), science journalism as a need and opportunity is growing (Hayden and Hayden, 2018). Combining that reporting opportunity with the U.S.'s diversifying population underscores the need for minorities to enter the profession. Thus, we remain motivated to continue our work.

The SciCommDiversity Travel Fellowship was strategically designed to be complementary and synergistic to the non-profit DiverseScholar's main project of doctoral STEM workforce diversity (Roca, 2013). As shown in **Figure 1**, all of the doctoral-level services could be replicated for the growing SciCommDiversity fellows community that we are building. For example, an independent SciCommDiversity conference could have its own sponsorships. Perhaps the revenue generated from such SciCommDiversity assets would fund future cohorts of the fellowship. However, currently, the DiverseScholar revenue is subsidizing the SciCommDiversity project since the Idea Grant funding has ended.

The MinorityPostdoc and SciCommDiversity projects are synergistic for three reasons. First, the travel fellow's reporting assignments create content for the *DiverseScholar* magazine (**Table 2**). In some cases, the fellows are reporting about the non-profit's own activities such that they then serve as an internal communications staff. Second, travel fellows who decide to pursue doctoral graduate studies in the social sciences could become future professors of science communication. Thus,

during their PhD education, such SciCommDiversity “alumni” would benefit from the DiverseScholar/MinorityPostdoc resources and activities. Third, science journalism will improve when there is more diversity in reporting sources (Kleyman, 2013; Crowell, 2019). Under the DiverseScholar umbrella, the SciCommDiversity fellows can network with an emerging group of diverse PhD professionals. For example, if the SciCommDiversity fellows witness the science talks at the DiverseScholar Postdoctoral Conference, then this networking mimics their experience at the ScienceWriters New Horizons in Science seminars but with more presenter diversity.

A future direction that would inform our understanding of the science communication workforce climate would be to study the experience of minority communicators and reporters. A thorough study of the fellows was beyond the scope of the current work. However, the SciCommDiversity fellowship applicant pool is the desired research population for future rigorous social science inquiry since this population is much more diverse than the general NASW membership (Figure 2) or of the respondents to an informal survey of minority science writers (Diep, 2014). Capacity limitations also prevented a thorough analysis of the impact of the travel fellowship experience on the NASW community and the larger science communication workforce.

Future research could assess the SciComm skills preparation, media career knowledge, and STEM-topic interest among minority journalists/scientists. For example, previously published survey instruments (Schmidt, 2017) could be applied to our diverse study population. This could probe their interest in reporting about basic vs. applied SciComm news topics such as the environment vs. environmental justice as well as health vs. health disparities.

Much research needs to be done with respect to understanding our conference travel intervention itself and the psychological/sociological dimensions of the fellowship experience. Future work can draw from the studies about interventions that encourage minorities to pursue STEM careers (Fagen and Labov, 2007; DePass and Chubin, 2009; Segarra et al., 2020). Research has been conducted about conferences as interventions specifically examining the SACNAS (Chemers et al., 2011) and ABRCMS events (Casad et al., 2016). We propose that the fellowship creates informal learning opportunities improving a fellow’s social/cultural capital, identity as a communicator, science writing self-efficacy, and career skills. The fellowship may also facilitate peer-to-peer and

mentor-to-fellow individual relationships and networks that provide psychosocial support (Table 1).

In closing, the SciCommDiversity Travel Fellowship with its financial support and associated mentoring could have an important role in diversifying a profession entrusted with stewarding science awareness for the demographically changing United States. As has been noted, “public understanding [of science] cannot be divorced ultimately from issues of cultural identification...” (Wynne, 1992).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

AR, DL, TH, and C-LC collaborated on this article. All authors contributed to the article and approved the submitted version.

FUNDING

Steve Olson and also the DiverseScholar non-profit’s advisory board were critical for raising funds for the 2016 fellowship cohort. Certain activities were funded in part by a grant from the National Association of Science Writers. Reference to any specific commercial product, process, or service does not necessarily constitute or imply its endorsement of or recommendation by the National Association of Science Writers, and any views and opinions expressed herein do not necessarily reflect those of the National Association of Science Writers.

ACKNOWLEDGMENTS

We thank SciCommDiversity fellowship mentors Matthew Francis, Maggie Koerth-Baker, and Nidhi Subbaraman. Sebastian Lopez, Stephani Page, and the reviewers provided useful comments on the manuscript.

REFERENCES

- American Society of News Editors (2018). *Newsroom Employment Diversity Survey* Columbia, MO.
- Association of Health Care Journalists (2019). *Board of Directors Report*. Baltimore, MD: ASNE & Pew.
- Bravo, V., and Clark, N. (2020). “Diversity in news organizations,” in *The International Encyclopedia of Journalism Studies*, eds T. P. Vos, F. Hanusch, D. Dimitrakopoulou, M. Geertsema-Sligh, and A. Sehl (Hoboken, NJ: John Wiley & Sons, Inc.). doi: 10.1002/9781118841570.iejs0225
- Canfield, K. N., Menezes, S., Matsuda, S. B., Moore, A., Mosley Austin, A. N., Dewsbury, B. M., et al. (2020). Science communication demands a critical approach that centers inclusion, equity, and intersectionality. *Front. Commun.* 5:2. doi: 10.3389/fcomm.2020.00002
- Carr, T. (2019). *Revisiting the Role of the Science Journalist*. Undark. Available online at: <https://undark.org/article/science-journalism-communications/> (accessed April 17, 2020).
- Casad, B. J., Chang, A. L., and Pribbenow, C. M. (2016). The Benefits of Attending the Annual Biomedical Research Conference for Minority Students (ABRCMS): the role of research confidence. *CBE-Life Sciences Education* 15:ar46 doi: 10.1187/cbe.16-01-0048
- Chemers, M. M., Zurbriggen, E. L., Syed, M., Goza, B. K., and Bearman, S. (2011). The role of efficacy and identity in science career commitment

- among underrepresented minority students. *J. Soc. Issues* 67, 469–491. doi: 10.1111/j.1540-4560.2011.01710.x
- Clancy, K. (2011). *Science Online 2011: Underrepresentation Hurts Us All. Context and Variation Blog*. Available online at: <http://professorkateclancy.blogspot.com/2011/01/science-online-2011-underrepresentation.html> (accessed August 18, 2019).
- Cofie, E. N. (2015). *Black Journalists Pitch Their Stories to Advance Science*. *DiverseScholar* 6:10. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-10-cofie-NABJ> (accessed April 25, 2020).
- Coleman, C. L. (2012a). *The Science Conversation Bubble. Musings on Native Science Blog*. Available online at: <https://nativescience.blog/2012/01/23/the-science-conversation-bubble/> (accessed September 14, 2019).
- Coleman, C. L. (2012b). *American Indian Ways-of-Knowing are Broader Than Science*. *DiverseScholar* 3:3. Available online at: <https://www.minoritypostdoc.org/articles/2012-3-3-coleman-scio12> (accessed April 25, 2020).
- Coleman, C. L., and Dysart, E. V. (2005). Framing of Kennewick Man against the backdrop of a scientific and cultural controversy. *Sci. Commun.* 27, 3–26. doi: 10.1177/1075547005278609
- Crane, L. (2016). *Native American Journalists on Science and Environment Reporting*. *DiverseScholar* 7:1. Available online at: <https://www.minoritypostdoc.org/articles/2016-7-1-crane-NAJA> (accessed April 25, 2020).
- Crow, D. (2016). *Diversity Advice for Science Communication-Journalism*. *DiverseScholar* 7:6. Available online at: <https://www.minoritypostdoc.org/articles/2016-7-6-crow-SciCommDiversity> (accessed April 13, 2020).
- Crowell, R. (2019). *Including LGBTQ+ Scientists as Sources*. *The Open Notebook Blog*. Available online at: <https://www.theopennotebook.com/2019/03/12/including-lgbtq-scientists-as-sources/> (accessed June 22, 2020).
- Davis, T. (2015). *Dispatches from the Director*. Berkeley, CA: ScienceWriters.
- Dawson, E. (2018). Reimagining publics and (Non) participation: exploring exclusion from science communication through the experiences of low-income, minority ethnic groups. *Public Underst. Sci.* 27, 772–786. doi: 10.1177/0963662517750072
- DePass, A. L., and Chubin, D. E. (2009). *Understanding Interventions that Encourage Minorities to Pursue Research Careers: Building a Community of Research and Practice*. Brooklyn, NY: American Society for Cell Biology.
- Diep, F. (2014). *Diversity in Science Writing: A Survey*. *The Open Notebook Blog*. Available online at: <http://www.theopennotebook.com/2014/09/23/diversity-in-science-writing-a-survey/> (accessed June 7, 2020).
- Dodson, V. (2013). *NABJ to Host Third Annual Media Institute on Health Disparities in California*. *NABJ News*. Available online at: <https://www.nabj.org/news/142586/NABJ-to-Host-Third-Annual-Media-Institute-on-Health-Disparities-in-California.htm> (accessed February 11, 2017).
- Fagen, A. P., and Labov, J. B. (2007). Understanding interventions that encourage minorities to pursue research careers: major questions and appropriate methods. *CBE-Life Sci. Educ.* 6, 187–189. doi: 10.1187/cbe.07-06-0034
- Fiske, S. T., and Dupree, C. (2014). Gaining trust as well as respect in communicating to motivated audiences about science topics. *Proc. Natl. Acad. Sci. U. S. A.* 111, 13593–13597. doi: 10.1073/pnas.1317505111
- Francis, M. R. (2018). *Diversity and Authenticity at SciCommCamp 2018*. *DiverseScholar* 9:2. Available online at: <https://www.minoritypostdoc.org/articles/2018-9-2-francis-SciCommCamp> (accessed April 13, 2020).
- Freimuth, V. S., Quinn, S. C., Thomas, S. B., Cole, G., Zook, E., and Duncan, T. (2001). African Americans' views on research and the Tuskegee syphilis study. *Soc. Sci. Med.* 52, 797–808. doi: 10.1016/S0277-9536(00)00178-7
- Gonzalez, I. F. (2014a). *Hispanic Audiences and Diversity in Science Journalism*. *DiverseScholar* 5:4. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-4-gonzalez-SpanishScienceJournalism> (accessed May 30, 2020).
- Gonzalez, I. F. (2014b). *Culture Dish Diversity Mixer: Building Connections Between Science Writers*. *DiverseScholar* 5:12. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-12-gonzalez-DiversityMixer> (accessed April 26, 2020).
- Haelle, T. S. (2019a). *Identity-First vs. Person-First Language is an Important Distinction*. *AHCJ Covering Health Blog*. Available online at: <https://healthjournalism.org/blog/2019/07/identity-first-vs-person-first-language-is-an-important-distinction/> (accessed May 11, 2020).
- Haelle, T. S. (2019b). *Inequality in Corresponding Authors Means Reporters Need to Balance the Scales*. *AHCJ Covering Health Blog*. Available online at: <https://healthjournalism.org/blog/2019/10/inequality-in-corresponding-authors-means-reporters-need-to-balance-the-scales/> (accessed December 17, 2019).
- Hansen, T. (2014a). *Science, Health, and Environmental Reporting for Indian Country*. *DiverseScholar* 5:6. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-6-hansen-IndianCountry> (accessed April 26, 2020).
- Hansen, T. (2014b). *Applying “Diversity in Science Writing” to Native Journalists*. *DiverseScholar* 5:10. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-10-hansen-SciWriNative> (accessed April 26, 2020).
- Hayden, T., and Hayden, E. C. (2018). Science journalism's unlikely golden age. *Front. Commun.* 2:24. doi: 10.3389/fcomm.2017.00024
- Hernandez, D. (2011). *“Social” Science: Experimenting With Social Media to Build Science Communities*. *DiverseScholar* 2:4. Available online at: <https://www.minoritypostdoc.org/articles/2011-2-4-hernandez-social> (accessed April 27, 2020).
- Hill, K. J. (2015). *From MIT Chemical Engineering to Tech Entrepreneurship: Meet Role Model Chris Davis*. *DiverseScholar* 6:9. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-9-hill-MITEngineerDavis> (accessed April 27, 2020).
- Hotchkiss, S. (2015). *Missed Opportunities for Inclusion at Science Writers: #SciWri15 #SciWriWomen Reaction*. *DiverseScholar* 6:6. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-6-hotchkiss-SciWriWomen> (accessed April 27, 2020).
- Howard, J. (2014a). *A Tough Newsroom Discussion: Why Diversity is Needed in Science Journalism*. *DiverseScholar* 5:3. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-3-howard-ToughDiscussion> (accessed May 30, 2020).
- Howard, J. (2014b). *Science, Journalism, and Diversity: What Science Writers are Doing About That Diversity Problem*. *DiverseScholar* 5:7. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-7-howard-ScienceWritersDiversity> (accessed May 24, 2020).
- Humm, C., Schrögel, P., and Leßmöllmann, A. (2020). Feeling left out: underserved audiences in science communication. *Media Commun.* 8, 164–176. doi: 10.17645/mac.v8i1.2480
- Johnson, T. (2013). *NABJ Addresses Health Disparities at 5th Annual Media Institute on Health*. *NABJ News*. Available online at: <https://www.nabj.org/news/121084/NABJ-Addresses-Health-Disparities-at-5th-Annual-Media-Institute-on-Health-April-4-6-in-Washington.htm> (accessed October 14, 2015).
- Kleyman, P. (2013). *Diverse Sources Key to Richer, More Nuanced Stories*. *Association of Health Care Journalists: Covering Health Blog*. Available online at: <https://healthjournalism.org/blog/2013/05/diverse-sources-key-to-richer-more-nuanced-stories/> (accessed September 25, 2017).
- Landis, B. Y., Bajak, A., de la Hoz, J. F., Gonzalez, J. G., Gose, R., Tibbs, C. P., et al. (2020). *ComoSciWri: resources to help science writers engage bicultural and bilingual audiences in the United States*. *Front. Commun.* 5:10. doi: 10.3389/fcomm.2020.00010
- Landry, A. (2015). *Satellites: Coming Soon to a Lab Near You*. *DiverseScholar* 6:14. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-14-landry-TinyThrusters> (accessed May 25, 2020).
- Lee, D. N. (2009). *Diversity in Science #1: Black History Month Celebration*. *Urban Science Adventures! Blog*. Available online at: <http://urban-science.blogspot.com/2009/02/diversity-in-science-1-black-history.html> (accessed June 21, 2020).
- Lee, D. N. (2010). *Understanding Push-Pull Market Forces and Promoting Science to Under-Served Audiences*. *Urban Science Adventures! Blog*. Available online at: <http://urban-science.blogspot.com/2010/03/understanding-push-pull-market-forces.html> (accessed October 20, 2011).
- Lee, D. N. (2011a). *Confronting Marginalization: External Influences*. *SouthernPlayalisticEvolutionMusic Blog*. Available online at: <https://web.archive.org/web/20120126005554/http://hiphopevolution.southernfriedscience.com/?p=131> (accessed January 26, 2012).
- Lee, D. N. (2011b). *National Association of Black Journalists Host National Convention, but Where are the Black Science Journalists?* *Scientific American The Urban Scientist Blog*. Available online at: <https://blogs.scientificamerican.com/urban-scientist/nabj-black-science-journalists/> (accessed September 14, 2019).

- Lee, D. N. (2012). #scio12: *The Big Takeaway From the Broadening Participation Panel*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/scio12-the-big-takeaway-from-the-broadening-participation-panel/> (accessed September 14, 2019).
- Lee, D. N. (2013a). *NABJ Proposal: Science 101 for Journalists or so, You Want to be a Science Writer?* Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/nabj-proposal-health-science-reporting-for-under-represented-audiences/> (accessed September 14, 2019).
- Lee, D. N. (2013b). *NABJ Proposal: Health Science Reporting for Under-Represented Audiences*. Scientific American The Urban Scientist Blog. Available online at: <http://blogs.scientificamerican.com/urban-scientist/2013/01/10/nabj-proposal-health-science-reporting-for-under-represented-audiences/> (accessed April 15, 2013).
- Lee, D. N. (2013c). #Scio13 *Diversity Session: North Carolina Offers Support to LGBT Students*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/scio13-diversity-session-north-carolina-offers-support-to-lgbt-students/> (accessed September 14, 2019).
- Lee, D. N. (2013d). *Notes From the #NABJ13 Science Journalism 101*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/notes-from-the-nabj13-science-journalism-101/> (accessed August 2, 2019).
- Lee, D. N. (2013e). *Improving Science News in the Black Media: Lessons Learned From my Ebony Magazine Twitter Encounter*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/improving-science-news-in-the-black-media-lessons-learned-from-my-ebony-magazine-twitter-encounter/> (accessed October 22, 2019).
- Lee, D. N. (2014a). #Scio14 *Expanding the Dialogue on Diversity: Privilege and the Pursuit of Science*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/scio14-expanding-the-dialogue-on-diversity-privilege-and-the-pursuit-of-science/> (accessed July 18, 2019).
- Lee, D. N. (2014b). *Interested in Science Communication? Apply for Science Writers 2014 Diversity Travel Fellowship*. Scientific American The Urban Scientist Blog. Available online at: <https://blogs.scientificamerican.com/urban-scientist/interested-in-science-communication-apply-for-science-writers-2014-diversity-travel-fellowship/> (accessed September 14, 2019).
- Lee, D. N. (2014c). #NABJ14 #HealthyNABJ *Recap: Cultivating Diversity in Science Communication*. Scientific American The Urban Scientist Blog. Available online at: <http://blogs.scientificamerican.com/urban-scientist/2014/10/16/nabj14-healthynabj-recap-cultivating-diversity-in-science-communication/> (accessed March 18, 2015).
- Lee, D. N. (2014d). *Will Black People Ever Trust Clinical Trials?* EBONY Magazine. Available online at: <https://www. Ebony.com/health/will-black-people-ever-trust-clinical-trials-043/> (accessed January 29, 2020).
- Lee, D. N. (2016). "The deal with networks" in *Science Blogging: The Essential Guide*, eds. C. Wilcox, B. Brookshire and J. Goldman (New Haven, CT: Yale University Press), 60–69.
- Mandavilli, A. (2013). *Alone in a Room Full of Science Writers*. LadyBits on Medium Blog. Available online at: <https://medium.com/ladybits-on-medium/883869e27cb3> (accessed September 14, 2019).
- Martel (2016a). *How to Communicate Ciencia to Bicultural Audiences*. DiverseScholar 7:4. Available online at: <https://www.minoritypostdoc.org/articles/2016-7-4-martel-ComoSciWri> (accessed May 25, 2020).
- Martel (2016b). *Listen how to Communicate Ciencia to Bicultural Audiences*. DiverseScholarTV. Available online at: <https://www.minoritypostdoc.org/TV/2016-TV-1-martel-ComoSciWri> (accessed May 30, 2020).
- Massarani, L., and Merzagora, M. (2014). Socially inclusive science communication. *J. Sci. Commun.* 13:C01. doi: 10.22323/2.13020301
- Menezes, S. (2018). Science training for journalists: an essential tool in the post-specialist era of journalism. *Front. Commun.* 3:4. doi: 10.3389/fcomm.2018.00004
- National Academies of Sciences Engineering and Medicine (2011). *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*. Washington, DC: The National Academies Press.
- National Academies of Sciences Engineering and Medicine (2017). *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press.
- National Association of Science Writers (2018). *About the Peggy Gishman Idea Grants*. Available online at: <https://www.nasw.org/article/about-peggy-gishman-idea-grants> (accessed July 30, 2019).
- Nauman, T. (2015). *SEJ Struggles to Achieve Long-Standing Diversity Aims*. SEJnews. Available online at: <https://www.sej.org/publications/sejournal-wi15/sej-struggles-to-achieve-long-standing-diversity-aims> (accessed September 16, 2015).
- Newman, T. P. (2020). *Theory and Best Practices in Science Communication Training*. New York, NY: Routledge. doi: 10.4324/9781351069366
- Park, I. (2016). *Bringing DNA Structure and Function to the 3D realm*. DiverseScholar 7:5. Available online at: <https://www.minoritypostdoc.org/articles/2016-7-5-park-3Dgenome> (accessed April 13, 2020).
- Parks, C. (2016). *Grassroots Science Detectives Solve Arsenic Mystery*. DiverseScholar 7:3. Available online at: <https://www.minoritypostdoc.org/articles/2016-7-3-parks-GardenRoots> (accessed May 25, 2020).
- Pew Research Center (2008). *U.S. Population Projections: 2005–2050*. Washington, DC.
- Polk, E., and Diver, S. (2020). Situating the scientist: creating inclusive science communication through equity framing and environmental justice. *Front. Commun.* 5:6. doi: 10.3389/fcomm.2020.00006
- Quevedo, L. (2015). *Science is Only Half the Story: Know Your Audience*. DiverseScholar 6:8. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-8-quevedo-OtherStories> (accessed May 25, 2020).
- Roca, A. I. (2005). *20/20 Foresight: the New Postdoc Programs at SACNAS*. SACNAS News Newslett. Available online at: <https://web.archive.org/web/20160321011943/http://www.minoritypostdoc.org/view/2005-roca-SACNAS.html> (accessed March 21, 2016).
- Roca, A. I. (2011). *We are all Minorities, so let's Help Each Other: Introducing DiverseScholar*. DiverseScholar 2:0. Available online at: <https://www.minoritypostdoc.org/articles/2011-2-0-roca-welcome> (accessed April 17, 2020).
- Roca, A. I. (2013). *Minority Postdocs are the Source for Future Faculty of Color*. DiverseScholar 4:2. Available online at: <https://www.minoritypostdoc.org/articles/2013-4-2-roca-KoFoC> (accessed April 3, 2020).
- Roca, A. I. (2014). #scio14 #scioDiversity #privilege session. Wakelet (originally Storify) Blog. Available online at: <https://wakelet.com/wake/d5726fa5-cbaa-4a11-b2d4-9a568cd3f2be> (accessed September 14, 2019).
- Roca, A. I. (2016). "Using social media to diversify science" in *Science Blogging: The Essential Guide*, eds C. Wilcox, B. Brookshire, and J. Goldman (New Haven, CT: Yale University Press), 104–115.
- Roca, A. I. (2018). *Communicate to Consume, Else Capitulate: Minorities and Allies Using Social Media to Diversify Science*. DiverseScholar 9:4. Available online at: <https://www.minoritypostdoc.org/articles/2018-9-4-CommunicateConsume> (accessed June 6, 2020).
- Roca, A. I., and Yoder, J. B. (2011). *Online LGBT Pride: Diversity in Science Blog Carnival*. DiverseScholar 2:1. Available online at: <https://www.minoritypostdoc.org/articles/2011-2-1-roca-carnival> (accessed May 25, 2020).
- Rodriguez Mega, E. (2015). *Is America Latina Present in Science Journalism?* DiverseScholar 6:7. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-7-rodriguez-SciWri15Latina> (accessed May 25, 2020).
- Rodriguez, B. A. (2017). *Science Journalism in Latin America: Perils and Possibilities*. DiverseScholar 8:3. Available online at: <https://www.minoritypostdoc.org/articles/2017-8-3-rodriguez-LatAmSciJournalism> (accessed April 13, 2020).
- Rodriguez, B. A., and Roca, A. I. (2017). *DiverseScholar Conference Preps Underrepresented Postdocs for Faculty Jobs*. DiverseScholar 8:2. Available online at: <https://www.minoritypostdoc.org/articles/2017-8-2-rodriguez-DivSch17> (accessed April 3, 2020).
- Rossiter, D. L. (2019). #DivSch19 *Plenary: Watch Using Scicomm Skills to Achieve STEM Diversity*. DiverseScholarTV. Available online at: <https://www.minoritypostdoc.org/TV/2019-TV-1-rossiter-SciCommDiversity> (accessed May 30, 2020).
- Scharff, D. P., Mathews, K. J., Jackson, P., Hoffsuemmer, J., Martin, E., and Edwards, D. (2010). More than tuskegee: understanding mistrust

- about research participation. *J. Health Care Poor Underserv.* 21, 879–897. doi: 10.1353/hpu.0.0323
- Scheufele, D. A. (2018). Beyond the choir? The need to understand multiple publics for science. *Environ. Commun.* 12, 1–4. doi: 10.1080/17524032.2018.1521543
- Schmidt, H. C. (2017). Training tomorrow's environmental journalists: assessing the extent of environmental-themed training in college-level journalism programs. *Appl. Environ. Educ. Commun.* 16, 17–28. doi: 10.1080/1533015X.2016.1273154
- Segarra, V. A., Vega, L. R., Primus, C., Etson, C., Guillory, A. N., Edwards, A., et al. (2020). Scientific societies fostering inclusive scientific environments through travel awards: current practices and recommendations. *CBE Life Sci. Educ.* 19:es3. doi: 10.1187/cbe.19-11-0262
- Shastri, D. (2015). *The Cutting Edge of Genetics can be a Lonely Place*. *DiverseScholar* 6:11. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-11-shastri-WhatsaUCE> (accessed May 30, 2020).
- Skibba, R. (2015). *Sara Seager's Search for Distant Habitable Worlds*. *DiverseScholar* 6:5. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-5-skibba-ExoplanetScience> (accessed May 30, 2020).
- Skibba, R. (2018). Finding my way from astronomy to science writing. *Nat. Astron.* 2, 2–3 doi: 10.1038/s41550-017-0345-4
- Smith, D. G. (2009). *Diversity's Promise for Higher Education: Making It Work*. Baltimore, MD: Johns Hopkins University Press.
- Sobowale, K. (2014a). *Engaging the Science-Poor*. *DiverseScholar* 5:5. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-5-sobowale-SciencePoor> (accessed May 30, 2020).
- Sobowale, K. (2014b). *Enlightening Testimonials From Diverse Science Writers*. *DiverseScholar* 5:8. Available online at: <https://www.minoritypostdoc.org/articles/2014-5-8-sobowale-SciWri14Diversity> (accessed May 30, 2020).
- Streicher, B., Unterleitner, K., and Schulze, H. (2014). Knowledge rooms – science communication in local, welcoming spaces to foster social inclusion. *J. Sci. Commun.* 13:C03. doi: 10.22323/2.13020303
- Takemura, A. F. (2019a). *Writing as a Japanese-Mexican American Woman*. *DiverseScholar* 10:1. Available online at: <https://www.minoritypostdoc.org/articles/2019-10-1-Takemura-Diversity> Essay (accessed April 13, 2020).
- Takemura, A. F. (2019b). *The Real Dangers of a Diversity Deficit in Science Writing*. *DiverseScholar* 10:2. Available online at: <https://www.minoritypostdoc.org/articles/2019-10-2-Takemura-SciWriDiversity> (accessed April 13, 2020).
- Tenore, M. J. (2009). *Angier: Newspaper Science Reporting is 'Basically Going Out of Existence'*. Poynter. Available online at: <https://www.poynter.org/reporting-editing/2009/angier-newspaper-science-reporting-is-basically-going-out-of-existence/> (accessed August 25, 2019).
- TON Editors (2018). *Introducing the Diverse Voices Series*. The Open Notebook Blog. Available online at: <https://www.theopennotebook.com/2018/10/09/introducing-the-diverse-voices-series/> (accessed July 14, 2020).
- Valdez-Ward, E., and Cat, L. A. (2019). *ReclaimingSTEM: Addressing the Gap in Diverse and Inclusive Trainings*. *SisterSTEM* Blog. Available online at: <https://sisterstem.org/2019/06/17/reclaiming-stem/> (accessed March 11, 2020).
- Wang, F. K. (2015). *How Technology Designers will Dictate our Civic Future*. *DiverseScholar* 6:12. Available online at: <https://www.minoritypostdoc.org/articles/2015-6-12-wang-AppsRule> (accessed May 30, 2020).
- Wynne, B. (1992). Public understanding of science research: new horizons or hall of mirrors? *Public Underst. Sci.* 1, 37–43. doi: 10.1088/0963-6625/1/1/008

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2020 Roca, Coleman, Haelle and Lee. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.