

Identity Matters: Communicating About Equity and Opportunity for Students in Minority-Serving Institutions

Terrence P. McGlynn^{1,2,3}

¹Department of Biology, California State University Dominguez Hills, Carson, CA (terry.mcglynn@gmail.com), ²Department of Entomology, Natural History Museum of Los Angeles County, Los Angeles, CA, and ³Corresponding author, e-mail: terry.mcglynn@gmail.com

Subject Editor: Margaret Hardy

Received 2 March 2017; Editorial decision 21 May 2017

Abstract

The entomological community recognizes the imperative for diversifying our profession, by promoting an agenda to broaden participation of junior scientists who are members of groups underrepresented in our discipline. Progress has been inadequate. I describe approaches to professional development and recruitment of students from Minority-Serving Institutions that can result in more equity and diversity in our community. I describe an informal science communication project, using a blog and social media, to communicate with other scientists about effective practices supporting the inclusion of undergraduates in the context of a Minority-Serving Institution. I provide a set of recommendations for entomologists who wish to support the professional development of students from underrepresented groups and communicate about this work more broadly.

Key words: blogging, diversity, outreach, STEM, underrepresented group

The entomological community recognizes the need to prioritize efforts to increase ethnic diversity, equity, and inclusion (ESA 2017). Our field historically has not been known for inclusivity, and change requires intensive and strategic efforts (Richmond and Whitney 1990, Pearson 1992). The demographic composition of the academic community remains far short of representing the broader public. This discrepancy is morally wrong and compromises the future competitiveness of research (James and Singer 2016). There is no shortage of academic research on the causes and consequences of inequity in academia (Tsui 2007). Efforts to promote inclusion are constrained by the failure of our community to recognize and counteract pervasive biases against members of marginalized groups, and one does not simply reduce bias by trying to reduce bias (Paluck and Green 2009). Classic approaches to teaching and mentorship prevailing in research universities are less effective for the marginalized members of these communities, including first-generation college students (Hurtado et al. 2011, Chang et al. 2014, Arcidiacono et al. 2016). From the student perspective, experiences at Minority-Serving Institutions are different from primarily white institutions (Nelson Laird et al. 2007, Hurtado et al. 2009, Perna et al. 2010), and many in our community are not directly informed about the nature of these differences.

Here, I will describe approaches to engagement that result in effective teaching and professional development for students in entomology and other STEM careers. Second, I describe my experience with developing a project that communicates within the academic community about opportunities to support and recruit students enrolled in Minority-Serving Institutions.

Communicating Within the Academic Community About Minority-Serving Institutions

The diversity of the scientific community has improved somewhat over the past few decades, but there is a long way to go and circumstances remain extraordinarily inequitable (Toven-Lindsey et al. 2015). Many of the approaches and philosophies about promoting diversity adopted by primarily white institutions are well-intentioned, but do not adequately address the conditions that limit the recruitment and retention of underrepresented students in the so-called “pipeline” (Perna et al. 2010, Chang et al. 2014, Dika and D’Amico 2016). Minority-Serving Institutions are experienced with serving their own student population and are well aware of the approaches and resources that are required to promote the success of their students (Byars-Winston 2014, Fakayode et al. 2014). Nevertheless, resources that target the professional development of underrepresented students are often toward research-intensive institutions, even though these efforts are more effective by close partnerships with Minority-Serving Institutions, which have the student body and the expertise that is required for diversification (Thao et al. 2016). What, then, are structural impediments to the recruitment of entomologists from underrepresented groups, and what can we and our institutions do to better serve this population and increase the diversity of our profession? I highlight some aspects of this multifaceted issue.

The prevailing philosophy in high-prestige institutions is that underrepresented minority students of particularly high “quality”

must be recruited and provided with proper support for them to succeed, and that this population is rather limited in number and recruitment poses a major challenge (e.g., Zax 2014). Nevertheless, the academic ability and research potential of students in Minority-Serving Institutions is on par with nonminority students enrolled in primarily white institutions (Cummins 1986, Passow and Frasier 1996). When research institutions emphasize recruitment of academic talent over the development of competitive students, the rates of retention and success will not increase. An alternative approach is to foster preparation of minority students within universities where they are enrolled in large numbers, and to partner with these institutions to provide tangible support that results in research training and preparation for graduate research (Jones et al. 2010, Flores and Park 2013). The notion that there are small numbers of underrepresented students prepared for graduate work in entomology and other STEM disciplines can only be derived from lack of experience working in institutions with underserved students that are replete with talent and research potential. Rather than focusing on indicators to identify this potential, a more fruitful approach is to emphasize the development of undergraduate students and the capacity for faculty at primarily white institutions to recognize talent where it lies.

How, then, does one identify talent of students from underrepresented groups that are enrolled in nonprestigious institutions? This much is clear: traditional quantitative indicators that are used to screen applicants to graduate programs are not predictive of future success. Scores on standardized tests and grade point averages are simply not informative (Kuncel et al. 2010, Weiner 2014). While publications and research experience as an undergraduate are always desirable, keep in mind that access to research experiences with quality mentorship and potential for presentation and publication is inequitably distributed. Students with more social capital—who are more likely to be enrolled in well-funded private institutions and primarily white public universities—are more likely to be provided access to rich research opportunities (Kruse et al. 2015, Dika and D'Amico 2016). On the other hand, a recent research project has identified a strong predictor of research success among admitted graduate students in a biomedical program: letters of recommendation from their undergraduate professors (Hall et al. 2017). This result supports the argument that research potential is identified with qualitative determination: You know it when you see it (Stewart 1964). The recruitment of a graduate student based on the strength of a recommendation from a colleague that you do not personally know might seem like a high risk. This risk can be minimized with collaborations among faculty at primarily white universities and Minority-Serving Institutions, and more extended opportunities for prospective minority graduate students to interact with potential graduate mentors prior to the application process.

While there are systemic challenges in the graduate recruitment process, activities in the “pipeline” select against students from underrepresented backgrounds throughout the undergraduate experience. While the predominant mode of classroom instruction in universities is a lecture, a broad range of approaches that can be characterized as “active learning” have been shown to increase learning, and also minimize performance gaps between white students and those from underrepresented minorities (Quitadamo et al. 2008, Perna et al. 2010, Haak et al. 2011, Meyer and Crawford 2011, Graham et al. 2013, Chang et al. 2014, Freeman et al. 2014, Bradforth et al. 2015). Academic advising and support from mentors is particularly critical for students from underrepresented groups and first-generation college students (Gross et al. 2015). Students at underfunded institutions often do not have reliable access to

academic advising, or do not make avail of academic advising and mentorship resources that are available (Schwartz et al. 2016). Faculty members that proactively seek out students to support them, and those that develop mentoring schemes among students with different levels of experience, will support progress toward careers in science (Wilson et al. 2012).

Finally, we as a community are failing to cultivate a social perception that scientists are derived from a breadth of socioeconomic and cultural backgrounds. This failure is a major impediment to the diversification of our disciplines, starting with elementary education and continuing through the careers of senior scientists (Shanahan 2009, Chemers et al. 2011, Byars-Winston 2014). The self-identity of students as scientists, which is heavily influenced by the identity of their professors and mentors, has an oversized effect on influencing the professional trajectory of students (Reveles and Brown 2008, Hurtado et al. 2009, Meyer and Crawford 2011, Chang et al. 2014). White faculty members, regardless of personal background or socioeconomic history, are not personally equipped to serve as a role model for students in this manner; this is why the recruitment of minority faculty is so important. In addition to serving as a careful and dedicated mentor, faculty members can support students from underrepresented groups by creating opportunities for them to interact with and receive mentorship from scientists with similar cultural backgrounds. Students invest into the pursuit of a scientific career when they can credibly recognize that they have a possible future within the profession. The development of close professional relationships with role models from similar backgrounds is a powerful and critical ingredient in the professional training of undergraduates from underrepresented groups.

These ideas are not often communicated among our peers, and the research underlying the best practices for communication and social change are absent from the academic literature that most scientists read. Though we entomologists are not trained in pedagogical or sociological research, it is within our purview to learn from this body of work to more effectively build an inclusive community for ourselves. Below, I describe an informal communication project that was designed, in part, to help develop this form of dialogue in the scientific community.

Using Blogs and Social Media to Communicate About Minority-Serving Institutions

Here I describe the causes and consequences of a science communication project. In 2013, I started a blog named *Small Pond Science*, designed to discuss concerns of researchers at teaching-intensive institutions. Science blogs are created for a broad variety of purposes (Jarreau 2015), and this site was designed to fill gap in the professional development of junior scientists. Doctoral students are not prepared to perform the tasks that are often expected of them after graduation (Nadelson et al. 2015), including running a research laboratory in a primarily undergraduate institution (Hancock and Walsh 2016). *Small Pond Science* publishes over 100 posts per year on a range of issues for academic scientists, and in addition to thousands of subscribers is viewed ca. 30,000 times per month. The three contributing editors are all entomologists, and guest posts have been authored by 10 additional scientists.

Outreach via blogs is leveraged by the development of a community (Jarreau and Porter 2017), and engagement with social media can expand the reach to new audiences (Neeley 2016). While metrics can be used to measure the visibility of a science blog (Shipman 2016), understanding actual impact requires more qualitative assessments. Many scientists are eager to understand the

perspectives of other scientists, with respect to career development, mentorship, and navigating the arcane politics of academic life. This medium of scientific communication is wide-reaching mechanism to communicate with fellow scientists and the broader public, and presents an avenue to reach an audience greater than with work published in scholarly journals.

Whereas location-based programs enroll and track the outcomes of participants, there is no clear template for measuring the outcomes of communication efforts in blogs and social media. Much of the feedback has come from communication about the challenges facing faculty and students in Minority Serving Institutions, and those working to increase equity in other institutions. Using sporadic feedback volunteered by readers, I have anecdotal reports that *Small Pond Science* has contributed to altering the professional development of junior scientists. At least several institutions have altered their admissions and recruitment practices to enhance the inclusion of students from underrepresented groups, in part, because of communication from *Small Pond Science*. Communicating regularly in an informal manner among other scientists can be a powerful approach to influencing how decisions are made by individuals, departments, and universities. Best practices are established and validated through research, and the impetus for implementing best practices may be activated by consistent dialogue among peers, which may overcome the inertia that drives our institutions.

Informal venues such as blogs and social media may build momentum for steps that lead to institutional change, and I offer a couple examples in which posts about underrepresented minorities have translated into more tangible actions in the academic community. One post addressed the inequitable distribution of National Science Foundation graduate fellowships supporting undergraduates from more prestigious undergraduate institutions (McGlynn 2015). This increased some awareness of this issue in a general sense, but more tangibly, conversation sparked by this post directly resulted in the creation of a new workshop for undergraduates in the California State University system to prepare competitive applications for graduate fellowships. Another post on *Small Pond Science* addressed how recruitment practices of doctoral programs fail to create ethnically diverse cohorts of students, because the many talented students that are attending less prestigious minority-serving institutions are not recruited and are not as competitive based on traditional indicators (McGlynn 2016). This piece of writing was circulated among some faculty in graduate programs in STEM fields, some of which altered efforts to broaden participation as a result.

Science communication is a profession and an academic field of its own accord. To scientists, engaging in science communication can be daunting because it involves working in a realm beyond one's training. As a researcher and university educator, I seek to act as a "public scientist," to share and involve the public with my work as a scientist. When public scientists share their scholarship, teaching, and mentorship practices, this contributes to a more cohesive, resilient, and equitable academic community. Below, I have developed a set of recommendations for communicating with students, other scholars, and the public to support broadening participation in the research community.

Recommendations for Broadening Participation and Communicating About Diversity in Entomology

- Build meaningful long-term collaborations with faculty and students in Minority-Serving Institutions.
- When focusing on diversity for seminar series and symposia, take into account not only gender and ethnic diversity, but also institutional diversity.
- Develop broader impacts for research proposals that provide training opportunities for undergraduates in underserved institutions, because implementation of broader impacts fostering the inclusion of underrepresented groups is uncommon (McGlynn 2013a). However, parachuting into institutions to recruit the "quality" candidates without building relationships with the faculty and supporting long-term mentoring relationships will not serve the purpose of broadening participation (McGlynn 2013b).
- For graduate admissions, eliminate the GRE requirement and lower GPA thresholds.
- Observe or participate in conversations in social media with academics representing a range of ethnic, cultural, and institutional backgrounds.
- Emphasize quality over quantity when developing a piece of work for communication (e.g., blog post, video, podcast). Low-quality work rarely reaches its intended audience.
- If you make the choice to build your own platform for communication, establish a regular frequency for new material, and stick to that schedule. Blogs are a form of outreach that involves a long-haul investment, because audiences build slowly, and only with regular feeding.
- You don't need to build your own platform, as range of existing platforms are available to you, such as Facebook, Twitter, Medium, guest posts in established blogs, and op-ed pieces in newspapers.
- Don't be afraid to get it wrong; as long as you are open-minded and respond positively to critical feedback, then you will not become infamous on the internet.
- Play to your strengths and communicate in a medium and style that works best for you.
- Engage in communication with the community in a manner that anneals your professional goals.
- Evaluating your work by comparing your successes to the successes of others is only a recipe for disappointment. Establish benchmarks for yourself, and compare yourself to those benchmarks over time.

Acknowledgments

This manuscript was prepared under support of the National Science Foundation (OISE-1261015)

References Cited

- Arcidiacono, P., E. M. Aucejo, and V. J. Hotz. 2016. University differences in the graduation of minorities in STEM fields: Evidence from California. *Am. Econ. Rev.* 106: 525–562.
- Armstrong, M. J., A. R. Berkowitz, L. A. Dyer, and J. Taylor. 2007. Understanding why underrepresented students pursue ecology careers: A preliminary case study. *Front. Ecol. Environ.* 5: 415–420.
- Bradforth, S. E., E. R. Miller, W. R. Dichtel, A. K. Leibovich, A. L. Feig, D. Martin, K. S. Bjorkman, Z. D. Schultz, and T. L. Smith. 2015. Improve undergraduate science education: it is time to use evidence-based teaching practices at all levels by providing incentives and effective evaluations. *Nature* 523: 282–285.
- Byars-Winston, A. 2014. Toward a framework for multicultural stem-focused career interventions. *career. Dev. Q.* 62: 340–357.
- Chang, M. J., J. Sharkness, S. Hurtado, and C. B. Newman. 2014. What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups. *J. Res. Sci. Teach.* 51: 555–580.
- Chemers, M. M., E. L. Zurbruggen, M. Syed, B. K. Goza, and S. Bearman. 2011. The role of efficacy and identity in science career commitment among underrepresented minority students. *J. Soc. Issues* 67: 469–491.
- Cummins, J. 1986. Empowering minority students: A framework for intervention. *Harv. Educ. Rev.* 56: 18–37.

- Dika, S. L., M. M. D'Amico. 2016. Early experiences and integration in the persistence of first-generation college students in STEM and non-STEM majors. *J. Res. Sci. Teach.* 53: 368–383.
- ESA 2017. Diversity-and-inclusion-statement @ www.entsoc.org. Entomol. Soc. Am. (http://www.entsoc.org/about_esa/diversity-and-inclusion-statement)
- Fakayode, S. O., M. Yakubu, O. M. Adeyeye, D. A. Pollard, and A. K. Mohammed. 2014. Promoting undergraduate STEM education at a historically black college and university through research experience. *J. Chem. Educ.* 91: 662–665.
- Flores, S. M., and T. J. Park. 2013. Race, ethnicity, and college success. *Educ. Res.* 42: 115–128.
- Freeman, S., S. L. Eddy, M. McDonough, M. K. Smith, N. Okoroafor, H. Jordt, and M. P. Wenderoth. 2014. Active learning increases student performance in science, engineering, and mathematics. *Proc. Natl. Acad. Sci.* 111: 8410–8415.
- Graham, M. J., J. Frederick, A. Byars-Winston, A.-B. Hunter, and J. Handelsman. 2013. Increasing persistence of college students in STEM. *Science* 80: 1455–1456.
- Gross, D., E. Iverson, G. Willett, and C. Manduca. 2015. Broadening access to science with support for the whole student in a residential liberal arts college environment. *J. Coll. Sci. Teach.* 44: 99–107.
- Haak, D. C., J. HilleRisLambers, E. Pitre, and S. Freeman. 2011. Increased structure and active learning reduce the achievement gap in introductory biology. *Science* 80: 1213–1216.
- Hall, J. D., A. B. O'Connell, and J. G. Cook. 2017. Predictors of student productivity in biomedical graduate school applications. *PLoS ONE* 12: 14.
- Hancock, S., and E. Walsh. 2016. Beyond knowledge and skills: Rethinking the development of professional identity during the STEM doctorate. *Stud. High. Educ.* 41: 37–50.
- Hurtado, S., N. L. Cabrera, M. H. Lin, L. Arellano, and L. L. Espinosa. 2009. Diversifying science: underrepresented student experiences in structured research programs. *Res. High. Educ.* 50: 189–214.
- Hurtado, S., M. K. Eagan, M. C. Tran, C. B. Newman, M. J. Chang, and P. Velasco. 2011. "We do science here": Underrepresented students' interactions with faculty in different college contexts. *J. Soc. Issues* 67: 553–579.
- James, S. M., and S. R. Singer. 2016. From the NSF: The national science foundation's investments in broadening participation in science, technology, engineering, and mathematics education through research and capacity building. *CBE-Life Sci. Educ.* 15:
- Jarreau, P. B. 2015. Science bloggers' self-perceived communication roles. *Public Commun. Sci. Technol.*
- Jarreau, P. B., and L. Porter. 2017. Science in the Social Media Age. *Journal. Mass Commun. Q.* in press. doi: 10.1177/1077699016685558.
- Jones, M. T., A.E.L. Barlow, and M. Villarejo. 2010. Importance of undergraduate research for minority persistence and achievement in biology. *J. Higher Educ.* 81: 82–115.
- Kruse, T., S. S. Starobin, Y. Chen, T. Baul, and F. S. Laanan. 2015. Impacts of intersection between social capital and finances on community college students' pursuit of STEM degrees. *Commu. Coll. J. Res. Pract.* 39: 324–343.
- Kuncel, N. R., S. Wee, L. Serafin, and S. A. Hezlett. 2010. The validity of the graduate record examination for master's and doctoral programs: A meta-analytic investigation. *Educ. Psychol. Meas.* 70: 340–352.
- McGlynn, T. 2013a. Broader impacts ≠ reaching underrepresented groups. *Small Pond Sci.* (<https://smallpondscience.com/2013/07/17/broader-impacts-≠-reaching-underrepresented-groups/>)
- McGlynn, T. 2013b. Disadvantaged students come from disadvantaged universities. *Small Pond Sci.* (<https://smallpondscience.com/2013/12/11/disadvantaged-students-come-from-disadvantaged-universities/>)
- McGlynn, T. 2015. NSF Graduate Fellowships are a part of the problem. *Small Pond Sci.* (<https://smallpondscience.com/2015/04/01/nsf-graduate-fellowships-are-a-part-of-the-problem/>)
- McGlynn, T. 2016. Recruiting underrepresented minority students. *Small Pond Sci.* (<https://smallpondscience.com/2016/09/05/recruiting-underrepresented-minority-students/>)
- Meyer, X., and B. A. Crawford. 2011. Teaching science as a cultural way of knowing: Merging authentic inquiry, nature of science, and multicultural strategies. *Cult. Stud. Sci. Educ.* 6: 525–547.
- Nadelson, L. S., S. P. McGuire, K. A. Davis, A. Farid, K. K. Hardy, Y.-C. Hsu, U. Kaiser, R. Nagarajan, and S. Wang. 2015. Am I a STEM professional? Documenting STEM student professional identity development. *Stud. High. Educ.* 0: 1–20.
- Neeley, L. 2016. Toot your own horn: Self-promotion in social media, pp. 181–191. *In* C. Wilcox, B. Brookshire, and J.G. Goldman (eds.), *Sci. blogging essent. guid.* Yale University Press, New Haven.
- Nelson Laird, T. F., B. K. Bridges, C. L. Morelon-Quainoo, J. M. Williams, and M. S. Holmes. 2007. African American and Hispanic student engagement at minority serving and predominantly white institutions. *J. Coll. Stud. Dev.* 48: 39–56.
- Paluck, E. L., and D. P. Green. 2009. Prejudice reduction: What works? A review and assessment of research and practice. *Annu. Rev. Psychol.* 60: 339–367.
- Passow, A. H., and M. M. Frasier. 1996. Toward improving identification of talent potential among minority and disadvantaged students. *Roeper Rev.* 18: 198–202.
- Pearson, G. A. 1992. Gender, race, nationality, and the graduate student entomology experience. *Am. Entomol.* 38: 103.
- Perna, L. W., M. Gasman, S. Gary, V. Lundy-Wagner, and N. D. Drezner. 2010. Identifying strategies for increasing degree attainment in STEM: Lessons from minority-serving institutions. *New Dir. Inst. Res.* 2010: 41–51.
- Quitadamo, I. J., C. L. Faiola, J. E. Johnson, and M. J. Kurtz. 2008. Community-based inquiry improves critical thinking in general education biology. *CBE Life Sci. Educ.* 7: 327–337.
- Reveles, J. M., and B. A. Brown. 2008. Contextual shifting: Teachers emphasizing students' academic identity to promote scientific literacy. *Sci. Educ.* 92: 1015–1041.
- Richmond, J. A., and S. P. Whitney. 1990. Bringing human diversity into the mainstream of entomology. *Am. Entomol.* 36: 189.
- Schwartz, S.E.O., S. S. Kanchewa, J. E. Rhodes, E. Cutler, and J. L. Cunningham. 2016. "I didn't know you could just ask:" Empowering underrepresented college-bound students to recruit academic and career mentors. *Child. Youth Serv. Rev.* 64: 51–59.
- Shanahan, M. 2009. Identity in science learning: exploring the attention given to agency and structure in studies of identity. *Stud. Sci. Educ.* 45: 43–64.
- Shipman, M. 2016. Metrics: Measuring the success of your blog, pp. 172–180. *In* C. Wilcox, B. Brookshire, and J.G. Goldman (eds.), *Sci. Blogging Essent. Guid.* Yale University Press, New Haven.
- Stewart, P. 1964. *Jacobellis v ohio.* US Rep. 378: 184.
- Thao, M., F. Lawrence, M. Brakke, J. Sherman, and M. Matute. 2016. Insights into implementing research collaborations between research-intensive universities and minority-serving institutions. *Nat. Sci. Educ.* 45:
- Toven-Lindsey, B., M. Levis-Fitzgerald, P. H. Barber, and T. Hasson. 2015. Increasing persistence in undergraduate science majors: a model for institutional support of underrepresented students. *CBE-Life Sci. Educ.* 14:
- Tsui, L. 2007. Effective strategies to increase diversity in stem fields: a review of the research literature. *J. Negro Educ.* 76: 555–581.
- Weiner, O. D. 2014. How should we be selecting our graduate students? *Mol. Biol. Cell.* 25: 429–430.
- Wilson, Z. S., L. Holmes, K. deGravelles, M. R. Sylvain, L. Batiste, M. Johnson, S. Y. McGuire, S. S. Pang, and I. M. Warner. 2012. Hierarchical mentoring: a transformative strategy for improving diversity and retention in undergraduate STEM disciplines. *J. Sci. Educ. Technol.* 21: 148–156.
- Zax, D. 2014. Wanted: smart students from poor families. *Yale Alumni Mag.* (yalealumnimagazine.com/articles/3801-wanted-smart-students-from-poor-families)