Cultivating inclusive instructional and research environments in ecology and evolutionary science

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Abstract

As science and student populations continue to diversify, it is important for ecologists, evolutionary scientists, and educators to foster inclusive environments in their research and teaching. Academics are often poorly trained in diversity, equity, and inclusion best practices and may not know where to start to make scientific environments more welcoming and inclusive. We propose that by approaching research and teaching with empathy, flexibility, and a growth mindset, scientists can be more supportive and inclusive of their colleagues and students. This paper provides guidance, explores strategies, and directs scientists to resources to better cultivate an inclusive environment in three common settings: the classroom, the research lab, and the field. As ecologists and evolutionary scientists, we have an opportunity to adapt our teaching and research practices in order to foster an inclusive educational ecosystem for students and colleagues alike.

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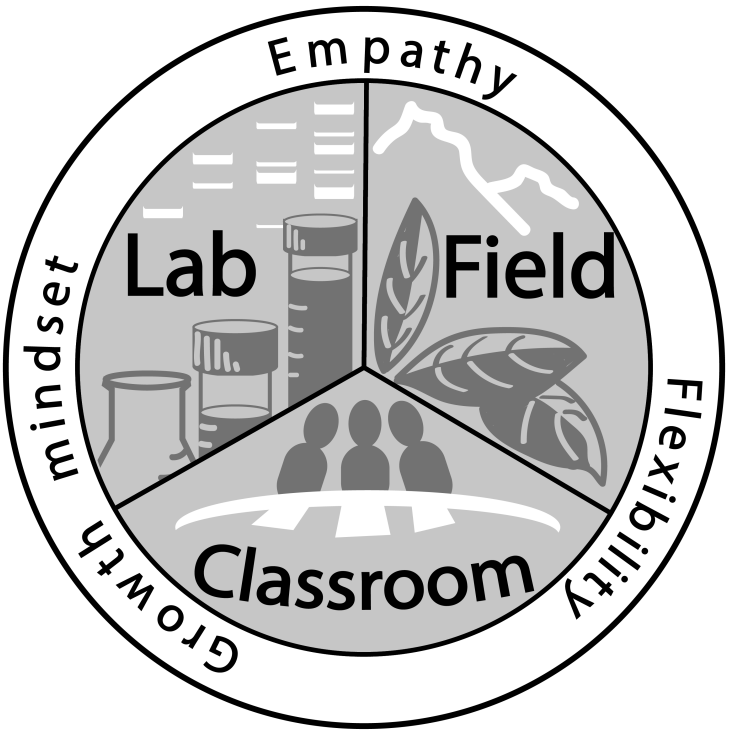
Empathy
Flexibility
Growth mindset
Lab
Field
Classroom

Title

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Abstract

As science and student populations continue to diversify, it is important for ecologists, evolutionary scientists, and educators to foster inclusive environments in their research and teaching. Academics are often poorly trained in diversity, equity, and inclusion best practices and may not know where to start to make scientific environments more welcoming and inclusive. We propose that by approaching research and teaching with empathy, flexibility, and a growth mindset, scientists can be more supportive and inclusive of their colleagues and students. This paper provides guidance, explores strategies, and directs scientists to resources to better cultivate an inclusive environment in three common settings: the classroom, the research lab, and the field. As ecologists and evolutionary scientists, we have an opportunity to

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Keywords:
Inclusivity, equity, diversity, teaching, research

Introduction

Inclusivity is critical for a scientifically-informed future that reflects the diverse world that benefits from ecological and evolutionary inquiry. Inclusivity overlaps with diversity and equity in that to truly include a broad diversity of people in science, there need to be equitable opportunities in research and the classroom, providing a truly welcoming and inclusive environment for various ideas and perspectives to flourish. While higher education pushes for greater diversity, equity, and inclusion (Smith 2015), ecology and evolution as disciplines have not always been welcoming for all people. Ecology and environmental organizations have not been open to diversity and inclusion in the past (Lawrence et al. 1993, Melosi 1995, Dorceta 2007), but some progress has been made (Ortega et al. 2006, Beck et al. 2014). Evolutionary science has been tied to eugenics (Bashford and Levine 2010) and race science (Jackson and Weidman 2006), that unfortunately continues to this day (Daar 2017). Scientists and educators have the power to shift ecology and evolution in a positive direction and build a more inclusive environment for future generations. The following article is meant to provide guidance to ecologists and evolutionary scientists by providing an overview of some practical next steps and suggestions to implement in everyday research and teaching practices.

We draw from the education and social science literature, our personal experiences as scientists and educators, and conversations with colleagues, students, and organizations interested in making science and science education more inclusive. While two of the authors self-identify as members of some underserved groups (i.e., women, the queer community,

blind), we are aware that we (a) do not speak for all members of the communities to which we belong and (b) do not represent all axes of diversity. We acknowledge our privilege and power as white, educated individuals in the academy. We recognize that we cannot fully understand the experiences of all scientists; we do, however, strive to be allies to and with marginalized or underserved groups in science through meaningful action to promote inclusivity (for more on allyship, see Appendix 1A). As such, we seek to contribute to ongoing dialogue among scientists and educators and encourage self-reflection and collaboration.

Through our mutual interest in inclusive education, we were brought together as part of the inaugural Open Education Community Fellows program, a joint effort of the Environmental Data Science Inclusion Network (EDSIN) and Quantitative Undergraduate Biology Education and Synthesis (QUBES) Center. Recognizing the need for a central community geared towards inclusive scientific (specifically biological and environmental) education, the EDSIN-QUBES Open Education Community Fellows developed Biological, Universal, and Inclusive Learning in Data Science (BuiLDS), a site for collecting and sharing inclusive educational resources and creating a community of practice for inclusive education (see BuiLDS and additional useful resources in Appendix 1B). As the group name acknowledges, there is substantial overlap between inclusive practices and Universal Design for Learning (UDL). UDL is an instructional perspective that guides development of equitable learning experiences for the broadest possible diversity of students, minimizing the need for individual accommodations. However, an in-depth discussion of UDL practice in the context of ecology and evolution teaching and research is beyond the scope of this article. We encourage readers to explore UDL and its role in fostering inclusivity using the resources provided in Appendix 1C.

The authors fully acknowledge that truly inclusive scientific and instructional environments require structural changes to the pre-existing academic and research system (Hurtado et al.,

1999; Danowitz & Tuitt, 2011; Hurtado et al., 2012; Winkle-Wagner & Locks, 2014; Vera et al., 2016; Puritty et al., 2017). While some scientists and educators are positioned to enact such changes—and we strongly encourage them to do so—we also believe that widespread changes to research and teaching, enacted by scientists across disciplines, can have a positive impact. This article is meant as a starting point for ecological and evolutionary scientists and educators, as many of us are in a unique position to affect change through our roles as mentors, teachers, and principle investigators (Killpack & Melón, 2016; Macdonald et al., 2019).

<<Insert Box of Terms here>>

Framing Your Research and Teaching Mindset

In our ecological and evolutionary research, we often encounter variation and adapt our approaches to better our science. Similarly, we suggest developing a mindset in your teaching and research that is adaptable to a diverse population. This includes empathy, flexibility, and a growth mindset. Keeping these three principles at the center of your research and teaching will help you engage in practices that cultivate an inclusive environment in the classroom, in the lab, and in the field.

Empathy

While empathy is well established to have positive benefits in medical practice (Derksen et al., 2013), it is also important for interacting with students, mentees, and colleagues who are different from you (Stephan & Finlay, 1999; Bernier et al., 2005; Cole, 2008). Reflecting on our own privilege and empathizing with others' challenges and obstacles is one of many first steps to building a truly inclusive scientific environment. For example, first-generation college students may be less familiar with institutional structures, policies, and culture than someone whose parents attended college (McCarron & Inkelas, 2006), and thus first-generation students may

feel less comfortable engaging faculty and classmates (Soria & Stebleton, 2012). By empathizing with students' hardships and reaching out to help, you, as a mentor, can help guide first-generation students to be successful in academia. One helpful exercise for any scientist is to be aware of our own implicit bias; you can do so by participating in self-guided exercises (e.g., Harvard implicit bias test) or implicit bias training (e.g., Kirwan Institute implicit bias training).

Flexibility

Just as we are flexible in our approaches to scientific investigations, maintaining flexibility with your peers and students is also important. Students—graduate and undergraduate—experience numerous difficulties and obstacles that may be unknown or unfamiliar to colleagues and mentors. Non-traditional students, for example, have obligations and responsibilities that may be obscure to faculty and mentors (MacDonald, 2018). To address some of these complexities, mentors can, for instance, be flexible in scheduling meetings with students who may not be able to adhere to a rigid weekly schedule. Taking a flexible approach and communicating with peers and students will improve research and teaching goals while fostering an inclusive environment (Barnett, 2014).

Growth mindset

As opposed to a fixed mindset where one believes that intelligence/ability is static, a growth mindset is demonstrated when someone believes that intelligence/ability can be developed over time. Dr. Carol Dweck and colleagues have conducted considerable research demonstrating the importance of approaching instruction and mentoring with a growth mindset (Dweck, 1999). This approach can have tremendous positive impacts on students and mentees, such as reducing systemic achievement gaps in underrepresented minority students (Canning et al., 2019). A fixed mindset can lead to unfair judgement of student performance and unhelpful teaching

practices (Rattan et al., 2012). We advocate approaching teaching and research with a growth mindset, with regard to both students and yourself as an educator and scientist.

<<Insert Figure 1 here>>

Building Inclusivity in Teaching and Research Environments:

Here we constrain our discussion to three environments commonly encountered by ecologists and evolutionary scientists: the classroom, the laboratory, and the field. These environments present both shared and unique opportunities and challenges for fostering inclusivity. As you read about these environments, remember that axes of diversity are numerous and not always immediately apparent; it is important to be aware of your own biases and naiveté when working with others.

1. **Environment: Teaching in the Classroom**

Ask yourself*: What barriers to entry am I unknowingly perpetuating in my classroom and through my current teaching practices?*

The classroom is a common environment for many scientists, especially those in academia. Along with all of the logistical and skills/content-based goals and concerns that come with teaching a course, instructor-student interactions can have a tremendous impact on student success, self-efficacy (confidence), and science identity (Trujillo & Tanner, 2014).

A constructive strategy to guide all of your students to feel and think like scientists is to cultivate an inclusive atmosphere inside and outside of the classroom (Dewsbury & Brame, 2019; Dewsbury, 2020). Some simple practices that you can build into a course from the beginning include facilitating balanced groups, learning names, and using pronouns. When it comes to

course materials, some simple practices that may help include supportive messaging in your syllabus and increasing representation and relevance in your teaching materials. Materials should also be designed with accessibility in mind. An inclusive message is lost if it cannot be perceived.

1.1 *Balanced groups*

Group work is a fundamental aspect of working in the sciences, and having students work in groups is known to have numerous benefits for their development and education (Thorley & Gregory, 1994; Kempa & Ayob, 1995; Seethamraju & Borman, 2009). Collaborative learning is an opportunity to increase participation and student-student interactions. In traditional randomly assigned group work, students can feel marginalized or experience increased anxiety (Rosser, 1998; Strauss et al., 2011; Henning et al., 2019; Juvonen et al., 2019). As the instructor, you have the ability to structure groups to be more inclusive and inviting for all students. Engineering groups to balance gender, ethnicity, personality and other relevant categories without isolating members of marginalized groups is recommended (Katzenbach & Smith, 1993; Slavin, 1995; Huxham & Land, 2000; Seethamraju & Borman, 2009). While each instructor will have their preference for structuring and assessing groups, there are some strategies available in the literature such as grouping students with similar out-of-class schedules, emphasizing flexibility in managing group dynamics (i.e., rotating leaders), and using peer assessment (Hubscher, 2010; Layton et al., 2010; Clarke & Blissenden, 2013; Scott, 2017).

1.2 Learning names & using pronouns

Learning student names can help build student-instructor relationships (Tanner, 2011) and create a more positive classroom environment (Tanner, 2013). By simply having name “tents” in the classroom at each student’s desk/table and learning to pronounce students’ names correctly, instructors can cultivate a more comfortable environment and build community in the

195 classroom (Kohli & Solórzano, 2012; Cooper et al., 2017). In addition to having names available
196 for reference, including the option for sharing pronouns can also increase transparency and
197 encourage self-identification (Spade, 2011). We suggest providing opportunities for students to
198 self-identify their pronouns to the instructor discreetly (e.g., through filling out quick surveys on
199 the first day of class), or, if the student is comfortable, with the whole class (Pryor, 2015).
200 Modeling this behavior for your students by stating your own pronouns when you introduce
201 yourself to the class sets an example for students and indicates that you take inclusivity
202 seriously. We also acknowledge that learning names and pronouns by traditional methods like
203 name “tents” and photo/name galleries can present barriers to instructors who are blind or low
204 vision, those with print disabilities, and others. Other strategies like asking students to provide
205 short audio recordings or written bios and establishing the norm of saying one’s name before
206 speaking can make useful substitutes.
207
208 ***1.3 Inclusive syllabus and establishing norms***
209 In many situations, a syllabus might be the first exposure students have to an instructor and a
210 course. Developing a learner-focused syllabus (Palmer et al., 2014, Heim et al., 2019) with
211 welcoming language sets the tone for an inclusive learning environment (Passman & Green,
212 2009; Harnish & Bridges, 2011). This consists of many elements, including a positive and
213 respectful tone, language consistent with a growth mindset, encouraging students to explore
214 and ask questions, and recommendations for how students can meet course expectations.
215 Additionally, it is helpful to establish standards for discourse at the beginning of a course, as
216 non-inclusive social norms may guide discourse otherwise (Neill et al., 2019). For example, by
217 simply establishing rules around answering questions, raising hands, and debating among
218 students, instructors can reduce male dominance in participation and marginalization of some
219 students (Caspi et al., 2008; Wayne et al., 2010). For more detailed guidance on syllabus
220 construction we recommend the work by Palmer et al. (2014).

1.4 Increasing representation and relevance

Education research shows that social integration, a sense of belonging (Chang et al., 2010; Walton & Cohen, 2011; Johnson, 2012; Rainey et al., 2018; Strayhorn, 2018), and developing a science identity (Hughes & Hurtado, 2013; Trujillo & Tanner, 2014) are important for success and retention of underrepresented groups in STEM. One way to foster a sense of community among students is by increasing the diversity of representation of scientists in the classroom (Egalite et al., 2015; Le & Matias, 2019). By diversifying the scientists that students are exposed to, you can help students identify as scientists and feel like part of the community. Example strategies include highlighting diverse scientists in course topics/material (Schinske et al., 2017; Zemenick & Weber 2020) and web conferencing with scientists of diverse backgrounds to facilitate interactions between students and professionals. Cultural and community-relevant materials can also enhance the learning experiences of a diverse student population (Warren et al., 2001). One way to empathize with your students' unique life experiences is by providing space for them to incorporate their experiences into course activities. For example, having open-ended assessments whereby students have some choice in the direction of their assignment can allow for personalization and the opportunity for students to explore how science affects their daily lives.

2. Environment: Developing an Inclusive Research Lab

Ask yourself: *How does the way I manage my research lab actively promote diversity and inclusion?*

In ecology and evolutionary research, research groups are often organized into labs, whether a designated physical space or a grouping of students and researchers under a specific adviser or principle investigator. For undergraduate students, research labs may be their first experience

conducting scientific inquiry. Therefore, it is incredibly important to cultivate a welcoming atmosphere and culture in the lab space. Fostering an inclusive research lab environment requires attention to three broad areas: lab member recruitment and selection, interpersonal dynamics, and cultural norms in academic research.

2.1 Recruitment and selection

Student self-efficacy and science identity directly affect student interest in research (Chemers et al., 2011; Riccitelli, 2015). Bringing students with diverse identities into the research lab requires welcoming practices that reflect a diverse scientific community. Recruitment and selection should go beyond traditional passive strategies like waiting for email requests or asking lab members to suggest candidates.

Active recruitment requires good advertising. The more widely a student research position is advertised, the more chance it has of being noticed by members of groups traditionally under-represented in ecology and evolutionary research. Depicting diversity on as many axes as possible in job advertisements and on lab websites shows the pool of potential applicants that they are included in the target audience (Avery et al., 2004). Some labs may have little visible diversity to depict. Even then, explicit statements encouraging students from all backgrounds, and, where possible, all experience levels, to apply helps lower the barrier of perceived exclusion.

Advertisements should also explicitly address possible misconceptions about work flexibility in research labs (Ahmad et al., 2019). Students with outside work or family roles may assume that working hours are not flexible or that remote work is not welcome in research (Fairchild, 2003). Those receiving accommodations for a disability in their courses may believe similar accommodations are not available in research positions. There may also be assumptions about

academic requirements, grade cutoffs, and test scores. Explicit statements outlining points of flexibility, availability of workplace accommodations, academic requirements or lack thereof, etc., lower recruitment barriers caused by misconceptions and apprehension about who can and cannot do research.

Inclusive recruitment efforts can go beyond formal advertising. Encouraging lab members to discuss their research experience and its relevance to their life and goals at campus activities and social events raises awareness about student research and its value and relevance in groups that may not always broadly intersect with ecology or evolutionary research communities (Ahmad et al., 2019).

Inclusive candidate selection requires avoiding implicit biases (Bertrand & Mullainathan, 2004; Eaton et al., 2020). Everyone has them, regardless of intent or identity. Objective evaluation of candidates limits the influence of implicit bias. This means identifying a specific set of skills required to do the job, criteria for determining whether a candidate possesses each skill, and the relative importance of each skill or trait before a candidate review begins. Identifying traits that are key to research success, like motivation and curiosity, is also important (Emery et al., 2019). Criteria, and evaluation methods can be qualitative while still being objective. The most inclusive evaluation avoids relying solely on criteria that can be biased and are not directly related to the position (e.g., standardized test scores (Ployhart et al., 2003; Berry et al., 2011) and arbitrary grade cutoffs). Instead, evaluation should focus on evidence from multiple sources that relate to the applicant's ability to succeed in the position.

2.2 Interpersonal interactions

Modeling inclusive behavior as a normal part of social interaction in the lab demonstrates empathy and fosters an inclusive atmosphere (Meeussen et al., 2014). Modeling and promoting

inclusive behaviors can take many forms such as providing quality mentorship to postdocs, students, and technicians (Hund et al., 2018). Mentors who openly acknowledge and celebrate diversity rather than taking a diversity-blind approach to research mentorship will have more inclusive and productive labs (Page, 2008; Campbell et al., 2013; Morales et al., 2017). Actively engaging in and creating space for discussion of issues related to diversity and inclusion (e.g., at group meetings) can increase lab members' comfort in openly discussing such topics (Sabat et al., 2017). Choosing to participate in campus efforts aimed at increasing diversity and inclusion and attending diversity-related trainings and events shows lab members that these are appropriate and valuable uses of their time.

The inherent power imbalances between PIs, graduate students, postdocs, staff scientists, and undergraduate researchers make establishing social norms in the lab critical. All lab members should know what constitutes acceptable and unacceptable behavior. They also need to know what to do and who to contact if they feel those expectations are being violated. An effective code of conduct addresses these needs (Nitsch et al., 2005; see lab group code of conduct examples in Appendix 1D). Ideally, one of the individuals listed as a contact person or ombudsperson should not be reliant on the lab's PI for employment or future career success to reduce the potential impact of power dynamics when resolving conflicts. An explicit description of social norms to which all lab members agree promotes a safe, inclusive environment for all members, regardless of position.

2.3 Research and academic cultural norms

Every research lab has its own "ways of doing things," and research approaches in ecology and evolution each have their own best practices. Some of these structures, like specific protocols, may be explicit, while others, like use of common spaces, are implicit. Similarly, some criteria for

undergraduate research success as measured by graduate programs and scholarship/fellowship applications are explicit while others are implicit.

Having a centralized virtual or physical location for lab procedures and protocols along with a standardized onboarding process for all new lab members is one way to make lab procedures explicit. Members can be given a written, recorded, or, ideally, real-world walkthrough of common lab practices relevant to their position. It could include things like waste disposal, cleaning equipment, replacing stock solutions, data storage and access, shared server resources, and miscellaneous practices every lab member is just "expected to know." Providing this information at the onset creates an atmosphere where no one has a monopoly on key information. An onboarding process also provides an ideal opportunity to introduce the code of conduct discussed above.

Mentors who demonstrate a growth mindset by providing guidance on nuanced expectations for professional materials such as applications, personal statements, cover letters, etc., put all members, especially those from historically marginalized groups, in a more competitive position for career advancement (McKay & Davis, 2008; Sedlacek, 2017; Mathur et al., 2019). Working with individuals to establish research goals and paths to achievement recognizes lab members' unique backgrounds and reduces barriers for those who are less familiar with research and academic norms. Tools like Individual Development Plans (Tsai et al., 2018) and student contracts (Emery et al., 2019) can help with this process.

3. Environment: Making the Field Welcoming to All

Ask yourself: *How might implicit biases, systems of oppression, and power dynamics affect my interactions with scientists and students while in the field?*

As ecologists and evolutionary biologists, the questions we pursue often involve conducting field work at some point in our careers. Working in the field can present unique challenges to ensuring that students and employees have access to field experiences (if desired) and feel safe and supported during those experiences. Strategies for making field experience inclusive and welcoming for everyone requires advanced preparation on multiple fronts, including hiring practices, discussing facilities and responsibilities in the field, addressing accessibility in the field, and creating a field-specific code of conduct to establish and maintain behavioral norms.

3.1 Advanced preparation

Facilitating safe and supportive field work for everyone starts well before entering the field. First, as mentioned in the previous section on building an inclusive lab environment, implicit biases can often influence the hiring process (Bertrand & Mullainathan, 2004; Eaton et al., 2020). To make field work accessible to all, the same strategies for recruitment, selection, and retention of lab members also apply when engaging with students and technicians who will be conducting field work.

Field work comes in many forms, and having open and clear conversations about field conditions and expectations is key to successful and safe working conditions. In more formal educational contexts where classes have field work components, you will likely be interacting with students who have varying levels of experience with field work; some students may be regaling friends and classmates with stories from “last summer at field camp,” while others might feel uncertain about what the term “field work” entails (Núñez et al., 2019; Giles et al., 2020). There might be similar discrepancies in experiences when hiring technicians or graduate students (Fournier & Bond, 2015). Regardless of the amount of previous field experience, field work can introduce unique challenges, including: reduced independence in terms of access to transportation, food, facilities, medical resources, etc.; unfamiliar cultural practices or norms;

distance from support networks; long days with physically strenuous activity; and greater exposure to potentially unfamiliar environmental hazards (John & Khan, 2018). Additionally, scientists of color—especially Black scientists—are likely acutely aware that they may face unwarranted discrimination or violence in outdoor spaces (West, 1989; Blahna & Black, 1992; Goodrid, 2018). Any or all of these aspects may generate discomfort or concern; such feelings should be met with empathy and active discussion about how best to mitigate these concerns rather than ignored, brushed aside, or ridiculed. Talking about the field beforehand gives everyone a chance to mentally acclimate to the new situation, ask clarifying questions about concerns, and have time to prepare appropriately, as needed (John & Khan, 2018; Starkweather et al., 2018).

3.2 Field-specific codes of conduct

As previously mentioned, establishing a lab code of conduct is important for creating a safe and secure social environment in a research group. Field work adds the additional complexity of taking place in novel and/or remote locations, where a perceived (and often real) lack of accountability and enforcement can increase the probability of hazing, physical or verbal intimidation, and sexual harassment (Clancy et al., 2014; Nelson et al., 2017). Therefore, if you manage a research group that conducts field work, we encourage the creation of a field-specific code of conduct that reduces any ambiguity about behavioral norms. This can (and likely will) be similar to your research group's code of conduct or even a subsection of the lab code of conduct; something similar can be put into effect for classes which have field work components. For examples of field work codes of conduct, see Appendix 1D. Be clear that the same rules of safety and respect that students or lab members agree to abide by within the lab also apply when in the field. Additionally, clear reporting guidelines should be put into place (Nitsch et al., 2005); while these may mirror those of the lab, different guidelines may be required based on who will be in the field and which methods of communication will be available.

3.3 Accessibility

When designing a class with a field trip or field work, a flexible design to embrace the broadest diversity of students is the best strategy. In higher education, legal responsibility for requesting specific accommodations on the basis of disability is placed on students (Hadley, 2011). As such, many instructors find out about needed accommodations on the first day of class or, in some cases, may never be made aware (Feig et al., 2019). Students may not disclose their disability for a number of reasons, including not being aware of their own disability, social stigma, or delays in approval from the institutions (Cole & Cawthon, 2015; De Cesarei, 2015). Trying to make last minute changes to a trip for accommodations can be challenging and frustrating for all involved and often leads to students with disabilities being unable to participate (Feig et al., 2019). For field trips or field work, we recommend not making assumptions about a person's comfort level or abilities. Preemptively designing activities with the flexibility to transition between modes of instruction and meet the needs of the broadest diversity of abilities and backgrounds increases inclusivity; it not only reduces the likelihood that students with disabilities will be excluded but also benefits other students, with or without disabilities (Feig et al., 2019).

All reasonable efforts should be made to allow interested participants to be involved, though we acknowledge that it is sometimes impossible to make every aspect of field activity accessible to everyone. For example, if your research *requires* off-trail, backcountry hiking to remote locations, you may not be able to make that aspect of the project accessible to someone who has severely limited mobility. Nevertheless, difficulty or inability to make field work accessible to everyone should not be an excuse to ignore accessibility issues and simply delegate other tasks to a person for whom participation is achievable (Carabajal et al., 2017). If—after brainstorming, discussion, and genuine attempts at making appropriate accommodations—all parties are in

agreement that sufficient accommodations cannot be made, then a student or employee can work on another part of a project if they are still interested in participating (Carabajal et al., 2017).

The cost of gear is also a potential barrier to field work, and is often overlooked (Núñez et al., 2019). Unlike working in an office or laboratory setting, experiences that include field work often require participants—students and employees alike—to provide at least some of their own gear; this can be in the form of attire (e.g., hiking boots, field pants), general supplies (e.g., water bottles, backpacks), or more extensive gear (e.g., tents, sleeping bags, etc.) (Ham & Flood, 2009; Giles et al., 2020). Sometimes grades are even determined by whether students are wearing the correct gear for a field trip. This can have a disproportionately negative effect on students who are financially insecure (Walpole, 2003; Ham & Flood, 2009; Giles et al., 2020). Approach these issues with empathy and flexibility by making conscientious decisions about what gear is in fact “required.” For example, if tennis shoes or closed-toed shoes will suffice in place of hiking boots, there is no need to make hiking boots a requirement. Additionally, if at all possible, have extras of necessary supplies on hand for students who cannot afford them or help facilitate a gear swap or other borrowing system (Giles et al., 2020).

While we recommend making field work as accessible as possible to those who wish to participate, we also want to be clear that conducting field work is not a requisite for success in ecological or evolutionary science. There are many paths to being an ecologist, evolutionary biologist, etc., and not all of them include field experience, especially given the growing trend towards big data and computational work (Peters et al., 2014; Giles et al., 2020). Field work should not be subject to ability gatekeeping (Feig et al., 2019), nor should field work be used as a gatekeeper to becoming an ecologist or evolutionary biologist (Giles et al., 2020).

Conclusion

As researchers and instructors in ecology and evolutionary science, we often need to adapt and change our approaches to scientific inquiry. We advocate that scientists leverage these skills to take an inclusive approach in their research and teaching, providing a welcome scientific and learning environment for everyone. By exercising empathy towards others, maintaining a sense of flexibility, and practicing a growth mindset, scientists can build a more inclusive environment in any setting. Whether it's a classroom, the research lab, or the field, ecologists and evolutionary scientists can make educated choices about how they structure these environments and conduct themselves to better include people of all identities and backgrounds.

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NE organized, wrote, and edited the manuscript. EB wrote and edited the manuscript. AH wrote and edited the manuscript.

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Figure Legend:

Figure 1. The three principles of empathy, flexibility, and a growth mindset will help ecologists and evolutionary scientists promote inclusivity in the classroom, the lab, and during fieldwork. Artwork by Dr. Sara Weinstein.

Box of terms: These definitions would be best formatted as a box inserted in line 99

Inclusivity - “The practice of including people across differences. Inclusivity implies an intentional practice of recognizing and working to mitigate biases that lead to marginalization or exclusion of some people.” (Dewsbury & Brame, 2019)

Diversity - In higher education there is structural diversity, the numerical representation of diverse groups (Hurtado et al., 1999), informal interactional diversity, or “the frequency and the quality of intergroup interaction as keys to meaningful diversity experiences during college”, and classroom diversity, where students are “learning about diverse people [content knowledge] and gaining experience with diverse peers in the classroom” (Gurin et al., 2002)

Equity - “Equality of opportunity...it is necessary to go beyond formal equality of rights and take account of differences in the opportunity structure.” (Clancy & Goastellec, 2007)

Privilege - “automatic unearned benefits bestowed upon perceived members of dominant groups based on social identity” (Case, 2013)

Power - “the ability to influence others to believe, behave, or to value as those in power desire them to” (French & Raven, 1959 *in* Mandelli, 2004)