Accessibility and innovation

To the Editor — Many leading geoscience organizations, such as the American Geosciences Institute, have called for a more inclusive approach to geoscience education, for example, opportunities for students with disabilities[1]. However, consensus regarding how to achieve access for disabled students in geoscience education has been slow to develop. At the same time, it is becoming increasingly clear that the modern geoscience workforce will need far more skills than traditionally covered in a curriculum that culminates in a field course. Thus, as the geoscience community takes steps forward toward creating a more inclusive educational environment, it behooves us to recognize that much-needed innovation in the teaching of undergraduates will act to naturally increase the inclusivity of geoscience degree programmes.

An important goal of field camp courses is to provide students with an opportunity to synthesize their knowledge and recognize themselves as practitioners of geoscience. Certainly, the cognitive and metacognitive gains associated with field-based learning experiences are well-documented[2], but many of the desirable learning outcomes attributed to field-based education are not unique to immersion in remote inaccessible locations. Affective and cognitive gains may also result from social bonding through extended time with peers and mentors, creative synthesis of knowledge and project-based learning.

Many students' choice to pursue geoscience careers may derive from an initial interest in maths, physics, chemistry and other core sciences that are based on laboratory experimentation, data analysis and/or numerical simulation. These students may be better served by capstone experiences that align more closely with their interests. Alternative capstone courses could take the form of a retreat, where students are challenged to collaboratively apply and synthesize their knowledge, engage in original laboratory-based research, analyse remotely sensed Earth observation data, or develop and validate numerical models to address one of the grand challenges of modern geoscience.

At the same time, the geoscience workforce needs an increasing range of skills, including computational vocabulary, analysis, visualization tools, programming styles and programming languages. In addition, tools for collaborative software development are an integral part of the modern geoscience repertoire, but we are not systematically teaching them to our undergraduate students. Petabytes of remote sensing data await users with the skills to analyse them. Even skills such as the professional use of social media will be key for the twenty-first century geoscientist. Thus, offering a broader array of course options increases the range of available educational experiences and enriches learning opportunities for all students, with or without disabilities.

At present, disabled students are commonly offered accommodations or substitutions on an individual basis, for instance through the provision of a personal aide or an alternative activity. This approach derives from the perspective that disability lies within the individual, who must therefore be assisted in order to perform in accordance with normative practices. Despite the well-meaning intentions of the accommodations/substitutions model, operating in accordance with such a perspective calls attention to what a student can't do, rather than focusing on what they can do, which is likely to be discouraging. In addition, often disabled students are not automatically granted accommodations. Instead, they must formally request them, possibly requiring the students to schedule appointments with a university-authorized access consultant, their instructors, or both. These policies burden disabled students relative to their peers.

Important progress toward making the geosciences more inclusive has been achieved through the creation of accessible, short duration (1–3 days), introductory-level field experiences[3]. Currently, however, an extended duration (4–6 weeks), upper division field camp is a required course for graduation in many geoscience programmes, and it would be difficult, if not impossible, to create a field-based learning experience equivalent to a traditional field camp that would be accessible for all students. As long as such traditional field courses remain a requirement for graduation for all geoscience students, it seems likely that disabled students will remain one of the least represented groups among those under-represented in the geosciences[4]. In fact, disabled individuals are disproportionately more under-represented in the geosciences when compared with all other science, technology, engineering and mathematics fields[4].

Barriers to learning inadvertently result from a failure of educators to account for the needs of all their learners and from a narrow definition of valuable learning outcomes. Movements towards increasing the number of accessible courses and degrees provide an unprecedented opportunity to create a more broadly trained and skilled workforce for the twenty-first century, while also making the geosciences more appealing to a broader set of students. ❐

References

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