

Designing Successful Student Field Experiences: Resources and Strategies

¹Mitchell Awalt, ²Dave Mogk, and ¹John McDaris

¹Science Education Resource Center, Carleton College; ²Montana State University–Bozeman

Educators teaching in the field are expected to address challenges of logistics, safety, accessibility, inclusion, and ethics in addition to pedagogy when designing these experiences. It is important that they have access to robust materials and guidance to provide students with safe, accessible, positive, and impactful field learning opportunities. To assist educators in finding materials and developing successful field experiences, SERC has collected and organized high-quality sources for field education strategies, guidance, and resources.

The collection - **Design Successful Student Field Experiences** - acts as a springboard to information addressing important topics in field education, including logistics and safety in off-campus environments, accessibility and inclusion, ethical field conduct, and field-based pedagogy. The collection is designed to be an asset for educators in the geosciences and related disciplines teaching outside of the classroom.

Design Successful Student Field Experiences

Field experiences provide impactful learning and growth opportunities for students in the geosciences and allied fields. There are many benefits ascribed to instruction in the field, including opportunities for learning in the cognitive, affective, and psychomotor domains; exploration at varied spatio-temporal scales; development of scientific thinking skills and habits of mind; and recruitment and retention of students. Despite these perceived benefits, field experiences can also present barriers for students that can impede their participation in the geosciences. In order to produce graduates who are diverse, capable, and professional, it is important that students have opportunities to participate in safe, accessible, positive, and impactful field experiences.

The collection of resources showcased here provide strategies and insights for building strong field experiences from NAGT sponsored programs as well as other projects and partners in the discipline. Designing field experiences can involve consideration of many overlapping and dynamic factors, and there are multiple possible approaches to achieving success. These resources reflect this diversity of approaches and can be adapted, modified, and combined to help faculty and departments create robust field programming for their students and specific contexts.

Interested or active in geoscience education research? These resources are for you!

- [Teaching](#)
- [Accessibility](#)
- [Equity](#)
- [Professionalism](#)

Click for more info

Enhance Student Learning and Engagement
When field instruction is combined with strong pedagogy, development of scientific habits of mind, and opportunities to build practical skills, it can serve as a cornerstone for undergraduate geoscience education.

Support All Students in the Field
There are a number of strategies faculty and departments can take to support the success and inclusion of all students in field settings.

Design for Safety and Minimize Risk
By taking steps to design safe field experiences and prepare students for the field, faculty and departments can provide positive learning and growth opportunities for all students.

What is this?
These pages are a synthesis of advice on teaching geoscience in the field, made possible by work from faculty members and administrators involved in many programs sponsored by NAGT as well as partners in the discipline. Projects with resources featured in these pages include: ADVANCEGeo Partnership, Bringing Research on Learning to the Geosciences, GET Spatial Learning, GExodus Tools for Societal Issues (GETSI), InfoGrate STEP Center Project, Integrating Research and Education, On the Cutting Edge, Teaching GeoEthics Across the Geoscience Curriculum, Supporting and Advancing Geoscience Education in Two-year Colleges (SAGE 2YC), and Starting Point: Teaching Introductory Geoscience. External projects and partners with resources in this collection include the Geological Society of America, the International Association for Geoscience Diversity (IAGD), NAGT Far Western Section, National Park Service, Flyover Country, Stereonet Mobile, and Strabotop. Resources from beyond the geosciences have been included from [Pedagogy in Action](#).

Enhance Student Learning and Engagement



Enhance Student Learning and Engagement

Opportunities to learn in the field are commonly cornerstone experiences for students in the geosciences. Instruction in the field presents unique and exciting ways to engage students with geoscience content. When field instruction is combined with robust pedagogical approaches, development of scientific habits of mind, and opportunities to build practical and professional skills, it can serve as a foundation for undergraduate geoscience education.

Use Strong Pedagogical Practices and Techniques
Learning in the field is inherently active and engaging. However, much like in the classroom, effective teaching activities are built on achievable learning goals, aligned assessment, and evidence-based instruction. Field settings provide enhanced opportunities to engage students with geoscience content, skills, and ways of thinking.

- Scaffold field exercises to address uncertainty and novel experiences: Geoscience in the Field, SAGE 2YC, Starting Point, Undergraduate Research
- Teach with instructional strategies that support spatial thinking: Spatial Thinking Workbook, Research on Learning, Spatial Thinking in the Geosciences

Develop Scientific Habits of Mind and Practical Skills
Field settings provide opportunities for students to "think like a geologist," requiring them to deal with large, dynamic, and complex systems, make decisions, self-monitor and self-regulate, iterate and integrate scientific approaches to inquiry, and perform other tasks not necessarily encountered in the classroom.

- Build student scientific habits of mind: Geoscience in the Field, InfoGrate, Starting Point
- Consider student motivations, attitudes, emotions, perceptions, and values: Affective Domain, Geoscience in the Field
- Incorporate strategies for building practical skills: InfoGrate
- Integrating research practice into field experiences: Undergraduate Research
- Familiarize yourself with impactful teaching practices in the field: NAGT Geoscience Education Research, Research on Learning

Incorporate Technology and Instrumentation
The increasing use of digital technologies has benefited field work in the geosciences. The incorporation of these technologies into field instruction can allow for deeper exploration, increased inclusivity, and preparation for the workforce when combined with strong pedagogy, learning goals, and assessment.

- Provide students with tablets or other technologies to use in the field: Teaching with GeoPads, Geoscience in the Field, GET Spatial Learning in the Trenches, Undergraduate Research
- Use apps designed with geoscience in mind: Flyover Country, Stereonet Mobile, Strabotop
- Integrate GIS and remote sensing into field instruction: GIS and Remote Sensing, Teaching with GIS in the Geosciences
- Teach with Google Earth: Structural Geology, Teaching Methods
- Train students to take effective photographic: Geophotography

Teach Safety, Ethics, and Professionalism
Field settings come with a host of safety, ethics, and professionalism situations that are not necessarily encountered or addressed in the classroom. Training and preparation in these areas is needed in order to produce graduates that are well-prepared for research and the workforce.

- Establish appropriate and professional conduct in the field: ADVANCEGeo, GeoEthics, Geoscience in the Field, in the Trenches, NAGT Field
- Teach about scientific and professional ethics: GeoEthics
- Familiarize your students with geohazards sites and the ethics of collection: GeoEthics, Geological Society of America, Geoscience in the Field, Montana Geohazards Project, National Park Service
- Model professional behavior: ADVANCEGeo, SAGE 2YC, Undergraduate Research

Explore Existing Field Activities, Courses, and Guides
Educators taking students into the field are expected to consider logistics, safety, inclusion, and ethics in addition to pedagogy; an extensive list that can be challenging to address. Faculty have contributed their ideas and resources for taking students into the field so that other educators can benefit from existing ideas and opportunities.

- Search for field-based teaching activities: Teach the Earth
- See examples of field-based courses: Geoscience in the Field
- Make use of existing field trip guides: Montana Geohazards Project - Sites, Road Logs, Trail Guides, NAGT Teaching in the Field, NAGT Far Western Section
- Use on-campus field experiences: Starting Point
- Consider incorporating societal relevance: GETSI, InfoGrate
- See departmental resources for teaching in the field: Building Strong Geoscience Departments
- Learn more about accessible field trips: International Association for Geoscience Diversity

When field instruction is combined with strong pedagogy, development of scientific habits of mind, and opportunities to build practical skills, it can serve as a cornerstone for undergraduate geoscience education.

- Using strong pedagogical practices and techniques
- Developing scientific habits of mind and practical skills
- Incorporating technology and instrumentation
- Teaching safety, ethics, and professionalism
- Exploring existing field activities, courses and guides

Design for Safety and Minimize Risk



Design for Safety and Minimize Risk

Opportunities to work and learn in the field environments can be defining experiences for students. Field environments also pose hazards and risks not typically encountered in the classroom. Negative situations in the field created by environmental factors, lack of preparation, participant behavior, or other sources can have profoundly negative impacts on student learning and the safety of all participants. By taking steps to design safe field experiences and prepare students for the field, instructors can provide positive learning and growth opportunities for all students.

Prepare for Emergencies
Uncontrolled environments such as the field, require situations that can be entirely prevented. Planning and preparing for emergencies in the field can, however, help to avert some and mitigate others. Field trip leaders can increase the likelihood of safe and successful experiences for students and instructors by taking certain steps before the trip even begins.

- Collect medical and contact information for all participants: Geoscience in the Field, NAGT Field
- Ensure faculty and assistants have first aid or first responder training: Geoscience in the Field, NAGT Field, Starting Point
- Communicate emergency plans to all participants: Geoscience in the Field, NAGT Field, SAGE 2YC
- Bring appropriate medical supplies and communications equipment: NAGT Field, SAGE 2YC, Starting Point
- Consider departmental and personal liability: Geoscience in the Field, NAGT Field

Minimize Risk in the Field
Working in the field involves risk. It is important that instructors and students in field experiences understand the risks and are provided with strategies and information to manage and minimize them.

- Choose appropriate field sites: Geoscience in the Field, SAGE 2YC, Starting Point
- Familiarize yourself with recommendations regarding vehicular safety: Geoscience in the Field, NAGT Field, SAGE 2YC, Starting Point
- Communicate logistics to students and reduce "novelty gaps": SAGE 2YC, Starting Point, Undergraduate Research
- Make sure that instructors and assistants are prepared: Geoscience in the Field, SAGE 2YC, Undergraduate Research

Establish Appropriate Behavior
The behavior of those participating in field experiences can have a dramatic impact on the safety of others and preservation of the field environment. Appropriate field conduct is important from the standpoint of reducing risk as well as a matter of ethics and professionalism. Discouraging, enforcing, and modeling appropriate behavior in the field help to ensure these opportunities are safe and positive experiences for all.

- Create policies and codes for conduct in the field: ADVANCEGeo, GeoEthics, Geoscience in the Field, in the Trenches, NAGT Field
- Communicate expectations to students: ADVANCEGeo, GeoEthics, SAGE 2YC, Undergraduate Research
- Model professional behavior: ADVANCEGeo, SAGE 2YC, Undergraduate Research

By taking steps to design safe field experiences and prepare students for the field, faculty and departments can provide positive learning and growth opportunities for all students.

- Preparing for emergencies
- Minimizing risk in the field
- Establishing appropriate behavior

Support All Students in the Field



Support All Students in the Field

Field experiences are often perceived as a cornerstone of the geoscience and are frequently used as a way to attract students to the field. However, field settings can also present barriers to access and inclusion. There are a number of strategies faculty and departments can take to support the success and inclusion of all students in the field.

Provide Accessible Field Opportunities
Field trips and experiences can present many barriers to students with disabilities (PWD). Physical barriers are particularly apparent in field experiences, but non-physical barriers can also prevent PWD from participating and learning effectively. Creating accessible experiences, making modifications, and providing accommodations can help to reduce barriers to inclusion.

- Discuss potential barriers and solutions with students: ADVANCEGeo, SAGE 2YC
- Analyze the accessibility of your field locations: Geoscience in the Field
- Adapt and modify existing field trips to be more accessible: International Association for Geoscience Diversity (IAGD), SAGE 2YC, Starting Point
- Learn more about accessible field trips: IAGD
- Know your legal obligations: SAGE 2YC

Ensure Experiences are Ethical and Inclusive
Recent work has documented systemic issues of harassment and discrimination in field settings. These, in addition to institutional and logistical barriers, can create negative or even harmful experiences for women, underrepresented minority students, students with disabilities, non-traditional students, and others. Eliminating these barriers makes field experiences more inclusive of all students.

- Establish professional conduct through communication and setting expectations: ADVANCEGeo, GeoEthics, in the Trenches
- Be aware of how groups with different identities are perceived by others, especially in field settings: ADVANCEGeo
- Create opportunities that are inclusive of non-traditional students: Undergraduate Research
- Provide local or urban field experiences: Starting Point, Urban Geology

Make Use of Technology and Virtual Environments
Technology and virtual field environments can be great tools for increasing accessibility. When combined with strong pedagogy, technology can support the success of all students in field settings.

- Learn more about promoting accessibility using technology: SAGE 2YC
- Provide digital technologies for students to use in the field: Teaching with GeoPads, GET Spatial Learning, GIS and Remote Sensing, in the Trenches
- Use apps designed with geoscience in mind: Flyover Country, Stereonet Mobile, Strabotop
- Teach with Google Earth: Structural Geology, Teaching Methods

There are a number of strategies faculty and departments can take to support the success and inclusion of all students in field settings.

- Providing accessible field opportunities
- Ensuring experiences are ethical and inclusive
- Making use of technology and virtual environments

