Why Physical Science Should Stay Physical: The Importance of the Field Trip

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It’s no secret that the content of our day-to-day lives has been migrating out of our surroundings and into our personal devices. The advent of the smartphone prompted one of the most monumental social transitions in recorded history: human society’s shift from physical to digital. Our work, entertainment, and social lives are all heavily influenced—if not totally dominated—by the Internet and mobile apps. We have access to more information about ourselves and each other than we know what to do with. This is great news for the scientific community, which reaps the benefits of instantaneous collaboration and data sharing. Digitized research is accessible to billions, sparking discussion about the processes that govern our Earth’s natural systems. As a result, the cycle of scientific inquiry and discovery has accelerated dramatically.

The increasing accessibility of science technologies in classroom environments can often lead to a departure from potentially costly and logistically complex outdoor activities. Field trips are always the first thing to get cut from a curriculum. Students are shown pictures instead of samples and are asked to imagine textures and scents instead of experiencing them firsthand. Sure, it’s more convenient than piling a class of thirty onto a bus, but at what cost of learning? Only one of our senses is engaged by looking at a photo, when all five should have the opportunity to engage with the world around us. Our lack of interaction with the physical environment in classroom settings is not only to our own detriment as students of geoscience, but also a detriment to our successors.
For many, it was an especially pivotal field trip, hike, or camping experience that inspired them to pursue a career in the geosciences. I was lucky to grow up in Littleton, Colorado, right in between the Rockies and the Red Rocks. Though I didn’t understand the science of it when I was young, I was fascinated and frankly in awe of the sheer majesty of the rock. I think that counts for something. I would argue that the emotional, empathic quality gained from interacting with nature is the most important element of a physical scientist’s career: inspiration. It’s what encourages new generations of researchers to continue the work of their predecessors. To be a scientist is to have an inquiring mind—to ask questions and pursue answers. At their core, a scientist, no matter their discipline, is curious. That curiosity is driven by inspiration.

In-person exposure to the physical sciences cannot be supplanted with slide decks and diagrams. They are necessary and useful teaching mechanisms, but should not be considered equal in educational and emotional value. The importance of field learning should be emphasized in the profession of any physical scientist, particularly one just beginning their career. That being said, field experience can be a costly, logistically impractical, or even—in the wake of COVID-19—a non-CDC-compliant proposal. How do you get a classroom of students out into the field in an affordable, manageable, health-conscious manner?

Shinneman et al. (2020) describe the use of the free NSF-funded Flyover Country mobile app to create self-guided field trips for an introductory geosciences course. Using the app, students identified geological features of interest in regional parks and urban areas. Flyover Country combines a variety of open-source data, including landscape features, fossil locations, and interactive geologic maps. These data are visualized on a base map, which is marked with locations of interest for users. The app includes previously published field trips, as well as a custom option for instructors to create their own using photos, figures, and text.

The American Geophysical Union has developed a similar resource: Streetcar 2 Subduction is a collection of virtually-assisted field trips that guide users through a geological tour of the San Francisco Bay Area. Originally created in 1979 by Clyde Wahrhaftig, AGU has since digitalized and updated the tour’s content using Google Earth and Google Maps to create
mobile device-accessible versions of the “streetcar” trips. Embedded in the trips are notes, pictures, and even little videos with field experts explaining some of the outcrops.

Based on student surveys and lab grades, Shinneman et al. found evidence that students on the self-guided field trips observed similar geology and reported similar affective outcomes as those students who attended the instructor-led trip. Though the study couldn’t quantify factors like emotional fulfillment from being outside and seeing the outcrops in person, apps like Flyover Country and Streetcar 2 Subduction (which are but two of many similar resources available) are clearly viable methods of teaching geologic principles in the field.

These self-guided trips are an excellent way for students of all ages to interact with the physical environment in a time where such field experiences have been hampered by the social distancing restrictions implemented as a result of COVID-19. Even under normal circumstances, field trips are subject to many unfortunate financial and logistical limitations. The self-guided nature of the app-based trip establishes field experience as an accessible, affordable curriculum component. We are presented with an opportunity to integrate outdoor and classroom learning more than ever before, potentially exceeding pre-COVID participation levels and introducing a new standard of educational involvement.

We owe it to future geoscientists to include field learning as a central element of their education. Ensuring that prospective students are at least offered the opportunity to physically engage with the Earth and the ambient environment should be a primary goal of educators in the sciences. All scientists, no matter their discipline, are curious—we must continue to foster that curiosity by inspiring the next generation.
Author's hand at Dinosaur Ridge, next to 100-million-year-old hadrosaur and ornithomimid tracks atop the trampled sediment of what was once a muddy beach (Credit: S. Siomades)

Reference: