A Hands-on Approach: Making Geology Labs Accessible to the Visual Impaired

Sarah Fischer
*Indiana University - Purdue University Fort Wayne*

Dawn Stager
*Indiana University - Purdue University Fort Wayne*

Tessa Matthews
*Indiana University - Purdue University Fort Wayne*

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Introduction

Geology labs rely heavily on visual aids. Teaching visually impaired students in a geology lab requires special attention and tactics. Exercises must be modified from the general visual methods to physical ones. Many activities involve examining images, diagrams, charts, models, and maps. These resources must be translated to a corporeal form to allow the visually impaired student to participate in such activities. This can be done in a number of ways, but mainly relies on models and textured surfaces that the student can physically observe and examine.

Methods

Dura-lar

Dura-lar is a transparent polyester film. It has a high durability and has proved an excellent resource. It can be used to recreate virtually any image in a raised fashion that allows visually impaired students to "see" the image with their hands.

The Dura-lar allows for the recreation of images and graphs allowing the visually impaired students to examine, observe, and even plot points on their own graphs. Dura-lar can also be used to add braille labels to other resources as well.

Abstract

Geology is a detail-oriented science that relies on observation. For this reason, introductory geology courses universally utilize visual aids including maps, diagrams, and a variety of graphs to illustrate Earth features and processes. However, such illustrations are not accessible to visually impaired students. Overcoming this accessibility problem is a serious challenge, but also presents pedagogical opportunities with solutions that benefit all students. The review of past practices in the classroom highlights areas that require appropriate modification.

Personal attention during class and additional tutoring has proven essential in assisting visually impaired students. When teaching mineral identification a personal tutor with some previous experience can not only describe standard visual observations, but can help emphasize mineral properties such as density, thermal conductivity, and acoustical properties. Alternative observations and activities are also frequently necessary. An example of this is landforms, such as volcanoes. They are so large that they are normally observed visually and are discussed using visual aids such as photographs and maps. The visually impaired student can "see" a volcano through raised topographic maps, either pre-existing, or printed from widely-available digital data on a 3D printer.

Other tools include tactile drawings made with a ball point pen on plastic sheets and 3D prints of crystal shapes, rare or microscopic fossils, microscopic features of rock, and the alien surfaces of planets. Common tools, like rulers, protractors, and lab equipment can also be used, with attention to features like raised markings. Determining which resources are most valuable to the visually impaired students is a learning process that involves trial and error. Effectiveness of the new methodologies is measured directly by the visually impaired students' feedback as techniques are introduced during tutoring sessions. With effort, earth science labs can provide all students with first-hand experience in the process of scientific investigations.

Methods

Physical/Textured Models

Maps

Maps allow the visually impaired student to examine and locate geological features such as river and glacial valleys, mountains, and lakes. Many tables and charts in the book are unreadable or not usable to visually impaired students and making a physical model can prove useful to students.

Three-dimensional printed models prove useful for explaining shapes, symmetries, and topography. Silty putty and play dough may be used to model concepts (such as elasticity and deformation) and diagrams as well.

Other Tips and Strategies

Rock and Mineral Identification

Physical/Textured Models

Maps

Three dimensional printed models prove useful for explaining shapes, symmetries, and topography. Silty putty and play dough may be used to model concepts (such as elasticity and deformation) and diagrams as well.

Conclusion

Teaching visually impaired students is a very rewarding process for both the visually impaired students and those assisting them. It requires creative methods of thinking and often much trial and error. Tutors and instructors also learn from each other and the students they work with. Each individual is a part of the learning process and each individual brings different perspectives and new ways to teach both the visually impaired students and the class as a whole.

Teaching visually impaired students in a geology lab is a rewarding and enriching process that requires use of resources and expansion of methods. It is a progression that requires time and devotion, but is of great value and opens opportunities to make learning accessible to a greater diversity of people.

Acknowledgements:

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