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Resources for Making Astronomy More Accessible for Blind and Visually Impaired Students

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Abstract

Recently, a variety of printed and Web-based resources for teaching astronomy to the visually impaired have become available. A listing of these resources is presented.

Introduction

In general, many students have difficulty visualizing concepts in astronomy, such as the differences in the size and scale of the Solar System, the galaxy, and the universe. The graphics that accompany textbooks may not adequately explain concepts for all learning styles, and accessibility becomes an issue if the available information is geared primarily toward visual learners.

Get creative!

Presenting material to students in a multimodal approach makes learning more accessible to a variety of students. For example, a PowerPoint presentation should, at a minimum, contain labels and a verbal description of the image. Discussing meteorites? Why not pass around a small meteorite for everyone to touch?

How do you teach the scale of the Solar System? As many authors have pointed out, asking the students to read a list in the text is not likely to be as effective as asking them to make a simple scaled Solar System using game and sport balls, from a small marble to a basketball, to represent the planets. With a list of actual planet diameters, the students can create a scaled conversion factor and identify which planet is which. The activity is now accessible to blind students and helpful to sighted students who learn best kinesthetically.

According to the American Foundation for the Blind, there are about 10 million blind or visually impaired people in the United States. In recent years, a number of groups and projects have put some thought into resources to help them appreciate and learn astronomy. Below I cite a number of publications and Web sites that you can use to make your class more accessible.

Resource List

Beck-Winchatz, B., 2003. "Can Blind People be Astronomers?" Beck-Winchatz examines the misconception that astronomy is only a visual science. He explores how technology and remote observing make astronomy accessible.
http://analyzer.depaul.edu/SEE_Project/fr03co23.htm

Beck-Winchatz, B., and N. Grice, 2003–2006. Space Exploration Experience (SEE) Project for the Blind and Visually Impaired. The goal of this program is to develop and test Braille/tactile inquiry-based hands-on space science activities and observing programs that actively engage blind and visually impaired students, from elementary grades through introductory college level. Downloadable resources include asteroid diagrams, tactile star wheels, exploring the Moon's phases, investigating variable stars, and tracking sunspots.
http://analyzer.depaul.edu/SEE_Project

Beck-Winchatz, B., and S. Ostro, 2003. "Using Asteroid Scale Models in Space Science Education for Blind and Visually Impaired Students," *Astronomy Education Review*, 2, 118. This article describes a set of three-dimensional asteroid models, developed by Steve Ostro, and how blind students used them.
http://aer.noao.edu/cgi-bin/article.pl?id=66

Grice, N., 2004. "Astronomy for Blind and Visually Impaired People," *Organizations and Strategies in Astronomy* (Vol. 5), ed. A. Heck (Kluwer Academic Publishers), 217. This chapter provides an overview of resources developed for teaching astronomy students who are blind or visually impaired.

Grice, N., 1988. "Astronomy for Special People," *The Planetarian* (Vol. 17, No. 3), International Planetarium Society. Grice examines strategies for making astronomy topics accessible to people who have visual, hearing, or physical impairments.

Grice, N., 1996. *How to Make Planetariums More Accommodating and Accessible to Visitors with Disabilities*, Great Lakes Planetarium Association. This 258-page book contains suggestions for making planetarium programs more accessible to people who have special needs.
This booklet may be ordered from the Great Lakes Planetarium Association:
http://www.glpaweb.org/tips.htm.

Grice, N., 2002, "Solar System Sports!" *Odyssey Magazine*, 11(7). This article for kids shows how to create a scaled diameter model of the Solar System using sports balls. It works well for sighted and blind students.

Grice, N., 2005. *The Little Moon Phase Book*, Ozone Publishing. This easy- to-use book contains the names of the Moon phases in print and Braille. Each phase is shown both as a touchable version and a touchable glow-in-the-dark version, making it accessible and useful for both sighted and blind students.

Grice, N., 2002. *Touch the Stars,* National Braille Press. This 103-page text has pages printed in both Braille and large print and contains plastic thermoform raised line drawings. General astronomy topics covered in the text include constellations, the Moon, our Solar System, stellar evolution, the universe, and historical astronomers. A print book containing print versions of the tactile images is included.

Grice, N., 2005. *Touch the Sun*, Joseph Henry Press. The 67-page text is printed in both Braille and large print and contains 16 embossed color images. The dynamic Sun comes alive with stimulating textures and silk-screened color images taken by the SOHO and TRACE spacecraft, and the Stanford Solar Center.

Grice, N., 2002. *Touch the Universe: A NASA Braille Book of Astronomy,* Joseph Henry Press. This 59-page text is printed in both Braille and large print and contains 14 tactile color embossed pictures. Readers are taken on a voyage of discovery through the eyes of the Hubble Space Telescope, starting at Earth orbit and reaching the Hubble Northern Deep Field of Galaxies.

Grice, N. You Can Do Astronomy LLC. Look under New Projects for a description of some new technologies being applied to materials about the Sun and the Earth.
http://www.youcandoastronomy.com.

Hurd, D., and J. Matelock, 2002. *Our Place in Space,* Edinboro University of Pennsylvania. This book features text in Braille and large print, and thermoform plastic drawings of objects in the Solar System.

Hurd, D., and R. Hurd, 2005. *I Can See the Moon: Book and Activity Set.*
This set of materials includes a spiral book about the Moon and related classroom activities designed to foster language development and literacy skills while learning science. Also included is a PowerPoint version of the book on CD for students who need alternative access to books (this can be ordered from the Web site).
http://www.aaccoreconcepts.com/gpage.html

National Federation of the Blind, Astronomy Resources Web Portal. This Web portal contains a comprehensive list of available resources in several scientific disciplines, including astronomy. You will want to bookmark this site and refer to it often.
http://www.blindscience.org—Click on Resources and Astronomy.

The Relief Globe Company, Relief Globes. Although these globes are not specifically designed for the blind and therefore do not have Braille labels, they offer a high degree of relief. The company currently offers a number of different globes of the Earth and a Mars globe. You may also order custom globes of the Earth, Moon, Mars, Venus, and Saturn.
http://www.reliefglobe.com

Southeast Regional Clearinghouse (SERCH) is a program funded by NASA's Science Mission Directorate (SMD), whose purpose is to promote space science awareness and enhance interest in science, math, and technology through the use of NASA's SMD mission data, information, and educational products. SERCH has been working with special needs educators to develop techniques and materials to make NASA materials accessible for a variety of learners.
http://serch.cofc.edu

Weferling, B. 2006. "Astronomy for the Blind and Visually Impaired: An Introductory Lesson," *Astronomy Education Review*, 5. This article describes the use of easily available materials (balls, string, and sand) to convey the sizes of planets, the scale of the Solar System, and the number of stars in the galaxy.
http://aer.noao.edu/cgi-bin/article.pl?id=199

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