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Good Reading from Other Sources on Astronomy Education and Outreach (Published in 2005)

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Abstract

We introduce what we hope will be an annual feature in the AER that our readers will find useful: an annotated listing of readings about astronomy education and outreach that appeared during the previous calendar year. To keep things manageable, we only cover readings directly related to astronomy. Suggestions for additions to the list are most welcome.

Papers and Articles on Astronomy Education

Bailey, Janelle, & Slater, Timothy. "Resource Letter on Astronomy Education Research" in *American Journal of Physics*, vol. 73, no. 8, pp. 677-685. An informative, detailed, annotated guide to articles and books in astronomy education research through 2004. 134 entries.

Black, Alice. "Spatial Ability and Earth Science Conceptual Understanding" in *Journal of Geoscience Education*, vol. 53, no. 4, pp. 345-354 (Sept. 2005). An analysis of how such skills as mental rotation, spatial perception, and spatial visualization affect college students' ability to understand earth science concepts, including several from astronomy.

Bogina, Andrew M., & Roberts, Brandi. "The Use of Haiku and Portfolio Entry to Teach the Change of Seasons" in *Journal of Geoscience Education*, vol. 53, no. 5, pp. 559-562 (Nov. 2005). Unusual techniques for teaching the seasons in middle school. (Despite the title, the authors used a hands-on model before they had the kids write haikus.)

Christensen, Thomas. "Changing the Learning Environment in Large General Education Astronomy Classes" in *Journal of College Science Teaching*, vol. 35, no. 3, pp. 34-38 (Nov./Dec. 2005). Lays out the gradual transformation of a lecture class into a somewhat more participatory one, using Just in Time

Teaching techniques, group activities, and the Web.

Dark, Marta. "Using Science Fiction Movies in Introductory Physics" in *The Physics Teacher*, vol. 43, no. 7, pp. 463-465 (Oct. 2005). Brief introduction to using films to illuminate scientific ideas, using the movie *Armageddon* as a prime example. Not an original technique, but the brief article could give new astronomy instructors some ideas.

Fraknoi, Andrew. "Cosmos in the Classroom 2004" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 34, no. 2, p. 11 (Mar./Apr. 2005). Quick overview of a national conference on teaching Astronomy 101, with a listing of issues facing the community.

Hahn, Deirdre, et al. "Exploring the Social, Moral, and Temporal Qualities of Pre-service Teachers' Narratives of Evolution" in *Journal of Geoscience Education*, vol. 53, no. 4, pp. 456-461 (Sept. 2005). Twenty-one education students were asked to come up with a scenario about evolution on another planet to see what their mental models of evolution were.

Ishikawa, Toru, & Kastens, Kim. "Why Some Students Have Trouble with Maps and Other Spatial Representations" in *Journal of Geoscience Education*, vol. 53, no. 2, pp. 184-197 (Mar. 2005). Discusses what cognitive science can tell educators about helping instructors read maps and other 2-D representations of 3-D phenomena; although only geology is discussed, the ideas have many applications to astronomy teaching.

Knipp, D., et al. "Simulating Realistic Satellite Orbits in the Undergraduate Classroom" in *The Physics Teacher*, vol. 43, no. 7, pp. 452-455 (Oct. 2005). Describes an exercise in which orbits are modeled with atmospheric drag included. Astronomers James Head and Esther Zirbel are coauthors.

Libarkin, Julie, & Anderson, Steven. "Assessment of Learning in Entry-level Geoscience Courses: Results from the Geoscience Concept Inventory" in *Journal of Geoscience Education*, vol. 53, no. 4, pp. 394-401 (Sept. 2005). Geoscience instructors are developing the kind of multiple-choice exam for their field that astronomers have in the Astronomy Diagnostic Test. Some of the concepts that they test have direct relevance to things we teach in astronomy, and this study of how instruction has changed (or mostly *not* changed) college student perceptions is something that astronomy instructors and researchers may want to look at carefully.

Lockwood, Jeff, et al. "Learning to Own the Sky" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 34, no. 2, pp. 26-32 (Mar./Apr. 2005). Overview of a program at NOAO to train K-12 teachers in doing astronomical research and to bring the experience back to their students.

Nobes, G., Martin, A. E., & Panagiotaki, G. "The Development of Scientific Knowledge of the Earth" in *British Journal of Developmental Psychology*, vol. 23, pp. 47-64. Elicited ideas about the shape of the Earth from children and adults and found little evidence of the naïve models (misconceptions) that earlier researchers reported.

Prather, Edward. "Students' Beliefs about the Role of Atoms in Radioactive Decay and Half-life" in *Journal of Geoscience Education*, vol. 53, no. 4, pp. 345-354 (Sept. 2005). Interviews and surveys reveal a number of preconceptions and misconceptions about radioactivity that may make it harder for college students to follow the discussions of radioactive dating in our courses.

Schatz, Dennis. "Making Model Comets: Has It Really Been Twenty Years?" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 34, no. 6, pp. 16-22 (Nov./Dec. 2005). A review and history of one of the most popular classroom demonstration activities in astronomy: making a comet out of dry ice, water, and other ingredients.

Stassun, Keivan. "Building Bridges to Diversity" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 34, no. 3, pp. 20-27 (May/June 2005). The chair of the American Astronomical Society's Committee on the Status of Minorities in Astronomy reviews the current situation for underrepresented groups in our science and makes suggestions for how to improve our outreach.

Trundle, Kathy, & Troland, Thomas. "The Moon in Children's Literature" in *Science and Children*, vol. 43, no. 2, pp. 40-43 (Oct. 2005). After examining 79 children's books, the authors select two (that offer misconceptions) and give examples of how to use them with classroom and observing activities.

Wieman, Carl, & Perkins, Katherine. "Transforming Physics Education" in *Physics Today*, vol. 58, no. 11, pp. 36-41. Describes the use of technology (clickers, interactive simulations) in improving physics instruction. Has relevance to astronomy.

Papers and Articles on Public Outreach in Astronomy

Bailey, Mark et al. "The Human Orrery: Putting the Solar System in Perspective" in *Sky & Telescope*, vol. 109, no. 5, pp. 107-111 (May 2005). On an interactive outdoor family exhibit at the Armagh Observatory that lets people simulate Solar System orbits.

Fraknoi, Andrew. "Steps and Missteps Toward an Emerging Profession" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 34, no. 5, pp. 19-25 (Sept./Oct. 2005). An overview and critique of the astronomy education and outreach (EPO) profession in the United States and ideas for how to improve the training and professionalism of its members.

Morrison, David. "Hyperbole in Media Reports on Asteroids and Impacts" in *Skeptical Inquirer*, vol. 29, no. 2, p. 29-33 (Mar./Apr. 2005). An examination of gullible or exaggerated news coverage in one area of astronomy.

Morrison, David. "Only a Theory? Framing the Evolution/Creation Issue" in *Skeptical Inquirer*, vol. 29, no. 6, pp. 37-41 (Nov./Dec. 2005). Astronomer Morrison suggests that one important component of the public misunderstanding of evolution has to do with the use of the word theory and suggests that scientists can help change the terms of the discussion. This is part of a thought-provoking special issue on the challenge of intelligent design.

Wyatt, Ryan. "Planetarium Paradigm Shift" in *The Planetarian*, vol. 34, no. 3, pp. 15-19 (Sept. 2005). Part of a special issue of the journal for planetarium educators on immersive full-dome video planetarium shows, their promise and their demands.

Book

Pasachoff, Jay, & Percy, John, eds. *Teaching and Learning of Astronomy: Effective Strategies for Educators Worldwide*. 2005, Cambridge University Press. A book elaborated from the proceedings of a special session on astronomy education held at the 2002 International Astronomical Union's 25th General Assembly in Sydney, Australia.

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