

Astronomy Education Review

2009, AER, 8, 010601-1, 10.3847/AER2009008

The Astronomy Education Research Charter

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Received: 01/3/09, Revised: 02/16/09, Published: 03/10/09

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Abstract

The Astronomy Education Research Charter is a statement from members of the astronomy education research community. It was originally discussed at the 2007 Astronomy Education Research Symposium. A report of the symposium and a call for public participation in its creation was published in this journal (Price *et al.* 2008, *Astronomy Education Review*, 6, 130). Participants of the symposium and members of the general public edited this document via an anonymous wiki from January, 2008 to September, 2008. This published version of the document is authored by all contributors to the wiki, who are represented by the coordinator, Aaron Price, and the coordinating organizations: The American Association of Variable Star Observers and the Wright Center for Science Education at Tufts University. We consider this an ongoing process, and this is just the first version of this document, which is owned by the community. Further revisions are encouraged via the wiki at http://aavso.org/astroed/index.php/Main_Page. The community is welcome to build on this version through other channels as well. In those cases, the wiki may be a useful resource to publicize further work on the charter.

1. PREAMBLE

This charter seeks to promote excellence in astronomy education based on research-proven insights into how students learn best. To that end, we seek to guide ongoing astronomy education research and to spread the results of that research widely throughout the community of those who teach astronomy. (See [Price *et al.* 2008](#) for a report about the symposium where this charter was discussed.)

2. INTRODUCTION

As a gateway science, astronomy provides key entry points for increasing scientific awareness, understanding, and appreciation among the general public. Its multidisciplinary nature offers a unique opportunity for teaching concepts that cross traditional curriculum boundaries. Among educators, astronomy provides an appealing context for introducing scientific topics and methods of scientific inquiry. Within the field of astronomy, effective education ensures essential links between current and future practitioners of scientific research. Robust educational programs also help to justify public support of astronomical research.

The findings of astronomy education research have informed the teaching of fundamental concepts at elementary and secondary school levels. From Earth's shape and gravity, to the phases of the Moon and seasons of the year, astronomy education research has shown when and how to engage students in genuine inquiry that leads to verifiable results.

At the collegiate level, a significant fraction of the effort expended by astronomy departments, and a larger fraction of their financial support, is involved in introductory astronomy education. It behooves astronomers to approach this mission with thought because "Astro 101" may be a student's only exposure to science at this

level. As education research has shown, teaching by lecture is not the most effective nor efficient method by which to promote learning. We need to engage students in more meaningful ways and provide them with the best practices of the classroom.

Astronomy education research provides crucial perspectives on learning modalities and instructional methodologies in formal and informal settings. Astronomers cannot be expected to be both producers of scientific research and creators of best education practices. A new role is being defined in astronomy departments and public outreach outlets, such as planetariums and museums; this role is that of the astronomy education researcher. As students and the general public have increasing pressures put upon both their attention and their ways of acquiring information, progressive investment of time and resources in astronomy education research is needed.

3. RECOMMENDATIONS

3.1. For Astronomers

- Support funding for astronomy education research, and its implementation, within your organizations.
- Collaborate with astronomy education researchers and astronomy educators on research projects.
- Support the addition of astronomy education research as a component of the National Research Council Decadal Report.

3.2. For Astronomy Educators

- Keep up-to-date on the latest in astronomy education research, and apply it to your instruction.
- Share best practices with colleagues through astronomy education research publications and presentations.
- Collaborate with astronomy education researchers on research projects.
- Be a resource to your astronomy colleagues regarding new findings in astronomy education research.

3.3. For Astronomy Education Researchers

- Publish results in peer-reviewed journals and present them at both astronomical and educational venues.
- Submit paper citations to appropriate professional citation databases within the fields of both astronomy and education research.
- Use the research methodology (qualitative, quantitative, or both) that provides the right balance of depth and breadth of data to answer your research question ([Johnson 2004](#)).
- Use appropriate sample populations that are culturally and demographically representative of the target audience for the research ([Lee 2003](#)).
- Follow ethical and legal guidelines when working with human subjects (see [Brogt et al. 2008](#) for a summary).
- Be rigorous concerning validity and reliability—Anecdotal and self reported measures should be used only as starting points leading to more rigorous research methodology [see Volume 36, Issue 8 of *Educational Researcher* (2007) for an in-depth, contemporary discussion].
- Be strategic in your areas of research (e.g., more research is needed in the fields of informal education and professional development as well as learning studies on how best to teach high school students about the structure and evolution of stars, galaxies, and the universe).
- Be familiar with the research literature inside and outside the Astronomy Education Review (AER) that underpins your study and provide adequate citations to that literature—try not to reinvent the wheel.
- Increase the use of longitudinal studies.
- Report null results of well-designed studies.

3.4. For Museums and Public Outreach Organizations

- Ensure that programs and exhibits are subject to formative and summative assessment.
- Reward education and public outreach specialists for participation in education research venues, such as presentations at astronomy education meetings and publications in journals.

3.5. For Professional Societies and Funding Agencies

- Recognize research activity by astronomy education researchers as professional activity that has the same merit and contribution as astrophysics research.

- Encourage and/or provide resources for astronomy education research.
- Continue supporting publication of the AER.
- Incorporate keynote speakers on astronomy education research as part of departmental colloquium series, society conferences, and funding agency retreats.

References

Broggt, E., Foster, T., Dokter, E., Buxner, S., and Antonellis, J., 2008. "Regulations and Ethical Considerations for Astronomy Education Research III: A Suggested Code of Ethics," *Astron. Educ. Rev.*, 7, 57.

Johnson, R. B., 2004. "Mixed Methods Research: A Research Paradigm Whose Time Has Come," *Educ. Res.*, 33, 14.

Lee, O., 2003. "Equity for Culturally and Linguistically Diverse Students in Science Education: Recommendations for a Research Agenda," *Teach. Coll. Rec.*, 105, 465.

Price, A., Brecher, K., Bruning, D., Edwards, T., Foster, T., Gross, N., Henden, A., Kavanagh, C., Larsen, K., Lee, H.-S., Pasachoff, J., Percy, J., Plummer, J., Raddick, J., Sadler, P. M., Sneider, C., Waller, W., and Wolff, S., 2008. "Astronomy Education Research Charter and Symposium Report," *Astron. Educ. Rev.*, 6, 130.

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