

Tools to Support Scientists' Involvement in EPO and Science Education Research

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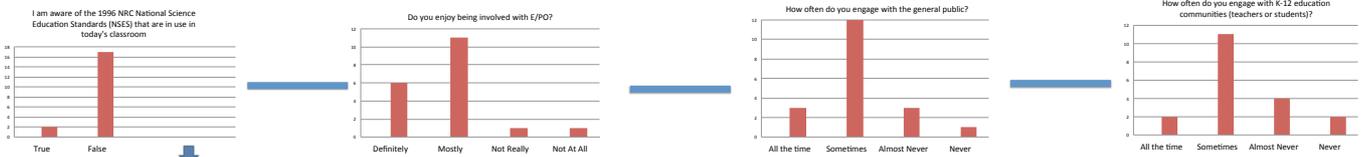
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Introduction:
Like all professionals, scientists spend years becoming an expert in their fields of research, but not necessarily at teaching or presenting their work to non-specialist audiences. However, they are often called on to give classroom talks, teach courses, and interact at public events. In addition, many grant funding agencies now require an education and public outreach component to bring the results of front-line science to the general public in a meaningful way. In addition, evidence of effectiveness as a teacher and thoughtful reflection on educational practice are standard requirements in promotion and tenure applications. In the highly competitive environment of academia, serious engagement with education can thus give a researcher a leg up in his or her research practice and career, beyond the obvious benefits to teaching, university and professional service such engagement may have. A particularly powerful way to create EPO and science education research is by close collaboration between scientists, educators and EPO specialists. Such a collaboration can lead to very high quality EPO and (educational) research outputs, reaching a broader and more diverse audience than they could have reached individually and can help inform practice across all settings, lead to stronger proposals, and strengthen education research studies.

Definitions:
 • EPO: The practice of getting science results to the general public, educate the public, contribute to science literacy, and show public how public funds are being spent.
 • Science education research: academic research to further knowledge on teaching and learning
Therefore: While science education research can be used to inform EPO practices and determine its efficacy, it is not the same.

Scientist Support Network at Johns Hopkins University Applied Physics Laboratory

At the May 2012 Radiation Belt Storm Probes (RBSP) Science Working Group Meeting, the RBSP EPO staff disseminated a short, multiple-choice survey. Understanding the scientists' previous experiences and feelings towards EPO helped us to better address their needs.



Scientists' Needs

• EPO training, familiarity with classroom standards, opportunities to engage with audiences, funding, time, rewards

Many scientists are enthusiastic to be involved, but are unsure or unaware of opportunities, best practices and techniques to effectively reach their intended audiences. Just as we assess how education activities are meeting the needs of our audiences, we must also assess our collaborations with scientists to make sure we are meeting their needs. This can be done by including surveys and assessments as part of a collaboration as we would with an education activity.

Informed by

Toolbox

Informed by

A partnership of equals who all bring expertise

Consists of different skills brought to the table by different people

Audience Needs

- Depends on audience, one size does not fit all
- Wow factor
- Interactive
- Information accessible at their scientific comfort level
- No Jargon!

General motivation and time management

- Improve grant applications for scientists (broader impacts)
- New places to publish
- Use scientists as resources in their area of expertise (don't make them do things they're not trained / prepared to do)

EPO Professionals/Resources

- Network of EPO professionals
- Access to EPO materials
- Access to specialist software
- Knowledge of best practices with different audiences
- Ability to evaluate efficacy of programs

Science Education Research Resources

- Knowledge of disciplinary education research methods and literature
- Disciplinary education research journals (e.g. Astronomy Education Review (<http://aer.aas.org>), American Journal of Physics (<http://ajp.aapt.org>))
- Curriculum resources (e.g. <http://www.compadre.org>, <http://serc.carleton.edu/index.html>)
- Ethics regulations of conducting research (Brogt et al., 2007, 2008ab)

Professional Development

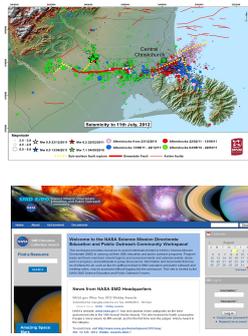
- General teaching / public speaking support
- Audience awareness (most common problem in teaching / public lectures)
- Support for action research (e.g. Center for Astronomy Education: <http://astronomy101.jpl.nasa.gov>)

Academic Development Group at the University of Canterbury

Academic developers work with faculty and graduate students in environmental geohazards. Efforts focus on preparing graduate students for their roles as hazard communicators.

- Training to translate science into English
- Training to communicate the same scientific message to different stakeholder audiences (general public, Civil Defence, government officials).
- General good teaching practices readily transfer into this realm

Take home message: A teaching center or support unit on campus may have a wealth of information that can readily be applied to EPO efforts



smdepo.org/

NASA Science Mission Directorate Education and Public Outreach Forums

Forums organize the efforts of SMD E/PO mission and granted programs into a coordinated effort to increase the overall coherence of SMD E/PO programs leading to more effective, sustainable, and efficient utilization of SMD science discoveries and learning experiences.

- Support of scientists in E/PO programs through
 - Development of scientist toolkits for content and engagement strategies
 - Engagement of scientists in thematic programming for the public (e.g. Year of the Solar System <http://solarsystem.nasa.gov/yss/>).
- EarthSpace – A national clearing house for sharing space and earth science teaching resources <http://www.lpi.usra.edu/earthspace/>

Resources for Engaging Scientists in EPO

Outreach Guide (American Physical Society) <http://www.aps.org/programs/outreach/guide>
 Education and Public Outreach: A Guide for Scientists (The Oceanography Society) http://www.tos.org/epo_guide/
 Resources for Involving Scientists in Education (National Academy of Sciences) <http://www.nas.edu/rise>
 Visiting Geoscientists (American Geological Institute and American Association of Petroleum Geologists) <http://www.agiweb.org/education/aapg/>
 Communicating Science: Tools for Scientists and Engineers (from the American Association for the Advancement of Science) <http://communicatingscience.aaas.org/>
 Space Science Institute Resources for Scientists in E/PO http://www.space-science.org/education/extra/resources_scientists_cd/

Resources compiled by Mangala Sharma – SMD Astrophysics E/PO Forum

References

- Brogt, E., Dokter, E. and Antonellis, J. (2007) Regulations and Ethical Considerations for Astronomy Education Research. *Astronomy Education Review* 6(1): 43-49.
 Brogt, E., Dokter, E., Antonellis, J. and Buxner, S. (2008a) Regulations and Ethical Considerations for Astronomy Education Research II: Resources and Worked Examples. *Astronomy Education Review* 6(2): 99-110.
 Brogt, 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. *Astronomy Education Review* 7(2): 57-65.