

Editorial

Education and Public Outreach: Why and How

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I've written a lot about education and public outreach (EPO), e.g. Percy (2002, 2012, 2014). These papers are freely available on the website of the *Journal of the Royal Astronomical Society of Canada*. Why write again? Because I get the sense that, in some countries, science is under threat. Science is essential to our well-being—not just our economy, but our health, environment, and culture. Among the hallmarks of science, it promotes rational thinking and critical thinking, and evidence-based decision-making—all of which are essential, but often in short supply.

I am also motivated by having recently served on a panel on “Science Culture in Canada” at the 2017 conference of the Canadian Association of Science Centres. This panel arose from a comprehensive report on this topic (Council of Canadian Academies 2014). This report is freely available on-line; see the References section for the URL. If you don't have time to read the whole report, at least read the twelve-page Executive Summary. Among other things, it notes that Canada ranks very highly, internationally, on science engagement, highly on science knowledge and attitude to science, but less highly on the production of university graduates with science-related degrees.

An interesting recent development, discussed at a pre-conference meeting, is the creation of STEM “ecosystems” (STEM is an acronym for science, technology, engineering, and mathematics). A STEM ecosystem is a local partnership of organizations which provide formal or informal learning opportunities, especially for young people. In the last two years, over forty such partnerships have been created in the U.S. Vancouver has applied to be the first such ecosystem outside the U.S. There is much to be gained from partnership in public outreach (Percy 2012). For more information, see STEMEcosystems.org. Check it out! It has lessons for science culture everywhere.

Here in Canada, we are cautiously optimistic about the future of science in our country. A major report, “the Naylor report,” was recently released by the federal government (Advisory Panel 2017); see References for the URL. David Naylor, who chaired the report panel, is an eminent medical scientist and former president of my university. Canada actually has a Minister of Science who is a scientist, and a Minister of Health who is a doctor (and a Minister of Transport who was an astronaut, and a Cabinet which is half women!).

Professional and amateur scientists can support and enhance science, and science culture, through EPO. Professional

scientists have an *obligation* to do so—to communicate the nature, importance, and excitement of their work to the public—because, for most of us, our salaries and research costs are paid by the taxpayer. For amateur scientists such as AAVSO observers, the motivation can be to support science, or simply to convey their passion to the public.

EPO comes in many forms: illustrated presentations, hands-on demonstrations, star parties, sidewalk astronomy, Boy Scout and Girl Scout badge workshops, school visits, observatory tours, and so forth.

If you have the opportunity to choose your EPO audience, don't just “preach to the converted.” Seek out new audiences, large audiences, and especially underserved audiences. I'm currently doing a lot of school visits, but presentations to teachers are even higher-impact. I give presentations to later-life learners, to residents of retirement homes and even nursing homes—a growing demographic of taxpayers/voters who are interested in and supportive of astronomy, and of science in general. I give presentations in public libraries, because that gets me and astronomy out into the many communities across Toronto. I give presentations to school and university science and astronomy clubs—the scientists of the future. At the same time, I and my colleagues are investigating and joining partnerships that will connect us to underserved populations, such as inner-city youth, immigrants, and Aboriginal communities.

How to do it? Details are in the three papers referred to above; they are all available on ADS or on my outreach webpage <http://www.astro.utoronto.ca/~percy/EPOindex.htm> I have also summarized them on one page which you can find at:

<http://www.astro.utoronto.ca/~percy/STEMoutreach.pdf>

In short: you must decide whether your objective is to educate, inform, entertain, engage, inspire, recruit, fundraise, or just “sell your subject.” Always consider the nature and needs of your audience. If your objective is to change the views of people with deep-seated misconceptions (such as the cause of the seasons), or deep-seated beliefs (such as young-Earth creationism), then special strategies are needed.

Then you have to decide what content, visuals, and demonstrations to include. Don't try to give a full course of astronomy in one hour. Just select highlights. Remember that you have to *engage* the audience, and leave a good impression of astronomy and astronomers.

Audience engagement will depend also on your delivery skills. Plan, organize, and rehearse. Be clear, concise, jargon-free, and enthusiastic. Be audible, and make your visuals visible. Leave lots of time for questions and answers.

Afterwards, reflect on your experience, and how it could be improved. In some outreach settings, a short, simple feedback questionnaire can be useful. If you have had success, make it known to your colleagues, and encourage them to do likewise.

JAAVSO welcomes papers on various aspects of EPO: examples which are unusually novel, efficient, or effective, especially if they are suited to new or underserved audiences. Papers which report on formal research on EPO are also welcome. For examples, go to the *JAAVSO* search site <https://www.aavso.org/apps/jaavso/search/> and choose the category “education and outreach” box to search. You will find 78 results!

References

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