

Outreach!

by John R. Percy

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The RASC excels in public outreach, at the national, local, and individual level. Our Society won the national *Michael Smith Award* in 2003 for excellence in bringing science to the public. I recently (Percy 2012) reflected on my own half-century of experience in astronomy outreach and, in an earlier article in this *Journal* (Percy 2002), I explained why we should do outreach, and how to succeed. This article is a short update, summary, and how-to guide. It supplements other excellent guides, such as the recent one by Paul Heath (2014).

Why do public outreach? The reasons may differ, depending on whether we are amateur or professional astronomers. We do it to increase public awareness, understanding, and appreciation of our science i.e. to increase public science literacy. We *professionals* should do it also to be accountable to the public, who fund our salaries and our research. We also want to present a positive image of science, and scientists, i.e. “public relations”. In universities, we want to attract young people to science, and to attract the best students to our university i.e. recruitment. Outreach sometimes leads to major donations: it was Clarence Augustus Chant’s outreach which ultimately led to the gift of the David Dunlap Observatory to the University of Toronto.

For our students, a growing trend is “community service learning”, in which they can learn by doing practical projects in the community – especially for worthy non-profit organizations. Students are engaged in outreach in other ways: in my department, public tours are run by graduate students. At York University, undergraduate students are very active in running their public outreach programs, including their campus observatory. RASC Centres may do outreach to attract more members. But in astronomy, we *all* do outreach because we love astronomy, and want to share it with others. We want to inform, entertain, and inspire. Astronomy is exciting. Outreach is deeply rewarding, and satisfying.

There are many forms of outreach. One is communication through print or electronic media – books, magazines, newsletters, websites. Another is lectures; almost every RASC Centre holds lectures for the public, as well as for its members. There are eyes-on experiences such as star parties in a variety of locations from street corners to city parks to dark-sky preserves. Some of these activities can be in schools, either in a formal class setting, or after school. See Heath (2014) for an even more comprehensive list.

All of these forms of outreach can be approached with a basic set of guiding principles, which have been expressed in many forms. The one below is based on work by noted science educator Derek Hodson.

Objectives What is your purpose and goal in doing this outreach activity? Is it to educate, inform, entertain, inspire, recruit, fundraise, or engage? I would hope that, whatever your objectives, one would be to leave the audience enthusiastic about astronomy and astronomers. It often helps to partner with other organizations which share our goals: libraries, science centres, colleges and universities. Figure 1 shows some of the 5000+ people who observed the 2012 transit of Venus in Varsity Stadium, at an event organized by several partners, including the RASC Toronto Centre.

And what are the nature, needs, motivation, and expectations of your audience? (If you don’t know, ask!) If the activity is for families or children, it must be fast-paced, hands-on or eyes-on (if possible), simple, and especially engaging. Adults can tolerate a one-hour lecture, if it is interesting. Older adults will appreciate a microphone, and larger print on handouts and slides.

There is a special need to attract young people, women, minorities, and the disadvantaged to astronomy. In North America, amateur astronomy is becoming the preserve of greying white males like me. Astronomy is part of *every* culture in Canada, including our First Nations. And people of all ages and cultures are interested in space exploration, black holes, cosmology, and the possibility of extraterrestrial life, as well as astronomy's connections with their own history and culture.

It helps to be aware of the many misconceptions that people have about astronomical topics, from the cause of the seasons, to pseudoscientific beliefs about astrology, space aliens, and creationism. Neil Comins (2001) has published a book about these, and maintains a list of over 1700 of them on his website¹.

Curriculum Having decided on your objectives, what should you include in your activity? One or two topics in depth, or a broad (and perhaps exhausting) array? A good look at the moon and Saturn, or a quick look at the whole Messier Catalogue? It's also tempting (especially in a classroom) to over-emphasize *content*. In fact, we also want to convey *skills* such as critical thinking, and how to *observe* (rather than just glance) through a telescope. It helps if we can talk *with* audience members, not just *at* them. Then we can cater to their personal interests and experiences, and also find out whether they understand what we have told them, or shown them.

We want them to know why the topic is relevant, useful, or interesting to them. I always like to inject some "Canadian content", especially as the taxpayers are paying for astronomical research. Too many Canadians think that all astronomical discoveries are made by NASA, with the Hubble Space Telescope, and are unaware that Canada is one of the world leaders in astronomy.

Most of all: we want to make sure that our audience comes away with a positive feeling about us, and about astronomy. The biggest buzzword in university education today is *engagement*. We want our audience to be engaged, and inspired.

Delivery Whatever the outreach activity, it should be delivered in the most effective way possible i.e. with "best practices". (As an aside: few if any university teachers have any training in effective teaching!) Knowing astronomy does not guarantee expertise in communicating it – though it does help. You should be aware of the audience's prior knowledge of astronomy and (as mentioned above) the fact that much of it may be wrong. Children, and many adults may not be capable of immediately grasping abstract concepts, or with graphs and equations, or appreciating the scale of the universe, or dealing with 3D and "frame of reference" concepts such as the cause of moon phases.

In formal education, *inquiry-based* is the gold standard. Are the students' minds engaged? Hands-on is always good, especially for children, and the RASC and many of its Centres have developed engaging handouts (such as the IYA planispheres), models, and other hands-on materials. To paraphrase astronomy educator Tim Slater: what the students/audience do is more important than what the instructor does. Get the audience to do, estimate, predict, think, and discuss.

Lectures are not very effective for teaching content but, if done well, can still be useful, if the lecturer is clear, concise, enthusiastic, and interested in the audience. The rules are simple: plan, organize, and rehearse; divide the material into short segments; be clear, concise, and *enthusiastic*; use simple language and analogies, and avoid jargon; be audible and make visuals visible; leave ample time for questions and discussion.

Evaluation and Feedback Every activity in life should be subject to *assessment*, which includes both evaluation and feedback. The assessment can be through formal research, through

¹<http://www.physics.umaine.edu/ncomins/>

a simpler version called “action research”², through a short but well-designed questionnaire, or simply through reflection. There is *formative assessment*, which is done during the activity, and therefore provides immediate feedback, and there is the usual *summative assessment*, which is done at the end. In either case, it is important to use the assessment for *feedback*, to ensure that the activity is done even better next time.

In conclusion: Keep up the good work in outreach, both nationally and locally! Since outreach is a large and important part of the Society’s work, give it a high profile in our publications and meetings. Many Centres offer lectures, workshops, and courses on general astronomy, on observing, on astro-imaging etc. Offer such programs on education and outreach as well. That will help to get more Centre members involved in and good at outreach. Share your successes and ideas through RASC publications and on-line forums. Honour RASC outreachers, both nationally and locally, with recognition; the recently-created Qilak Award is an excellent step forward.

References

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Figure Caption

The University of Toronto astronomy group, in partnership with the Alumni Association, the Institute for the History and Philosophy of Science and Technology, and the RASC Toronto Centre, organized a very successful viewing of the 2012 Transit of Venus, attracting over 5000 people to Varsity Stadium.

²http://en.wikipedia.org/wiki/Action_research