REFLECTIONS ON TEN YEARS OF RELEA: LATIN-AMERICAN JOURNAL OF ASTRONOMY EDUCATION

John R. Percy [1]

Professor Paulo Bretones has asked me to write an article, reflecting on the first ten years of RELEA (Latin-American Journal of Astronomy Education), and I am pleased and honoured to do so. For over 30 years, I was active in the International Astronomical Union's Commission 46 (Education and Development), and I served as President in 1994-1997. I was also active in many other international science and education organizations, and enjoyed traveling to meet my "kindred spirits" in other countries. Professor Bretones was one of them.

In 2007, I formally retired from my university, but I have continued many of my activities voluntarily there, though not many of my international ones. I still encourage young astronomers to learn about and support international astronomy education and development, and I am delighted that two of my young colleagues, Drs. Michael Reid and Linda Strubbe, have become active in Commission 46. My last major international trip was in 2009, to the conference "Mathematics and Astronomy: A Joint Long Journey" in Madrid. I gave an invited review paper on "Teaching and Learning Astronomy". Both the text of my paper (1) and a .pdf version of my powerpoint presentation (2) are available on my education website (3). These provide a comprehensive summary of my reflections on astronomy education and outreach, and I shall not repeat them here.

Astronomy Education

Education is an important but under-appreciated part of our science. For professional astronomers, astronomy education is important for attracting and training and retaining the next generation of astronomers, and for increasing public awareness, understanding, and appreciation of our science. Amateur astronomers also make important contributions to education and public outreach. In Canada, the primarily-amateur Royal Astronomical Society of Canada (4) won the *Michael Smith Award*, Canada's top national award for excellence in science outreach. They also partnered very effectively with professional astronomers during International Year of Astronomy (IYA) 2009 (Hesser et al. 2010).

It is also very important for astronomy to be part of the school science curriculum, for the many reasons that I have listed elsewhere (Percy, 2005). In my province of Ontario, Canada, astronomy is a compulsory part of the elementary and secondary school science curriculum. Unfortunately, very few schoolteachers have any training in astronomy, and astronomy teaching, so it is important for astronomers to support them by helping to create resources and workshops. The best way to do this is by partnering with science teachers' organizations such as the Science Teachers Association of Ontario (5), one of my favourite organizations for over 40 years.

[1] Department of Astronomy & Astrophysics. Ontario Institute for Studies in Education. University of Toronto, Toronto ON M5S 3H4.

Schoolteachers are trained in how to teach. In Ontario, they complete a one-year Bachelor of Education program, after their undergraduate degree. In future, they will have to complete a two-year Master of Education program. University instructors usually are *not* required to have any training in how to teach, even though, along with research, it is half their job! My university *does* offer extensive instruction in and support for teaching (6). But it is optional, not compulsory.

Astronomy Education Research

This brings me to the importance of doing and communicating astronomy education *research*. Astronomy education research provides empirical evidence for the best way to teach. It subjects our teaching and outreach to the same high standards that we use for our astronomical science research. Unfortunately very few professional astronomers, amateur astronomers, or schoolteachers are trained in science education research.

My colleagues and I recently completed a project to assess the value of giving tutorials in a small planetarium, as part of a 1350-student course in introductory astronomy for non-science students. As research assistants, we used two graduate students in astronomy, and two graduate students in science education, from the Centre for Science, Math, and Technology (SMT) Education (7) at the Ontario Institute for Studies in Education, a branch of the University of Toronto. I am a faculty member at SMT. The SMT graduate students had been well trained in both qualitative and quantitative research techniques, so this beneficial partnership was a learning experience for all of us. I recommend more contact between astronomers, and professionals in science education and science education research.

You will note that I have already mentioned partnership twice. It is always an excellent strategy: work with organizations that have expertise that you need but do not have -- organizations with which you share common interests. One of our most successful partnerships in IYA was with the Toronto Public Library, which is the busiest public library system in the world. Together, we organize dozens of public lectures each year. The library provides the room, the facilities, the publicity, and the audience. We provide the astronomer.

Astronomy Education Publication

Where can astronomy education, and astronomy education research papers be published? There are specialized journals whose papers are written and read by professionals in science education. They are not written for the average astronomy educator, and they tend to be accessable only by a very expensive subscription. Many astronomy education papers appear in these journals, and in a wide variety of other places. This would not be a problem if there was a single place where all such papers were abstracted, like the Astrophysics Data Service (8), which we research astronomers use because it lists almost all astronomical research papers. But there is no similar service for papers on astronomy education, and astronomy education research.

Until recently, an excellent option was *Astronomy Education Review*, a free on-line journal, but it is now "dormant" i.e. inactive. I hope that it will soon be published again. Fortunately, all of the volumes of AER have been archived, and are freely available on-line (9). I am the Editor of the *Journal of the American Association of Variable Star Observers*, a refereed journal which is freely available on-line (10). We occasionally publish papers on education, if they deal with stars or the sun -- our nearest star. I am also a Contributing Editor of the *Journal of the Royal Astronomical Society of Canada* (11). I write a column every two months, often about education, and there are occasionally other articles on education in the JRASC. The JRASC is freely available on-line, a year after publication. Until then, it is available to members and subscribers only.

Another new and potentially-useful publication is astroEDU (12), an open-access, *peer-reviewed* platform for astronomy activities, mostly at the school level. It is sponsored by IAU Commission 46. But it is for activities only, and its future is not guaranteed. Nevertheless, I recommend it to you, both to use, and to contribute activities.

Reflections on RELEA

RELEA is an extremely useful publication for Latin-American teachers of astronomy. Spanish and Portuguese are native languages for over half a billion people worldwide, second only to Mandarin. Millions of other people understand them as a second or third language. RELEA therefore has huge potential, if Latin-American and other Spanish- and Portuguese-speaking astronomy teachers read it. So it is very important to publicize and promote it.

On November 3, 2014, I attended my university's annual Teaching and Learning Symposium, where 200 of our best teachers gathered to share ideas. The keynote speaker was our president, Professor Meric Gertler (who had just returned from Brazil!). He proposed three strategies for advancing teaching at our university: (1) *Catalogue and communicate our teaching achievements.* That's what RELEA is meant to do, but it's important to make sure that it is widely read. (2) *Build on our strengths*. In our case, that meant building on the fact that the University of Toronto is one of the world's great research universities. In astronomy, our strength is that astronomy is exciting and inspiring because of its many connections with history and culture, and because of the beauty of the night sky and the wonder of the universe. Make sure that these are part of your curriculum. (3) E*mphasize the value of "being there"*. Nowadays, students and other people can learn from the Internet, or from "massive open on-line courses" or MOOCs. But that's not the same as being face-to-face with an inspiring teacher, or looking through a real telescope, or doing inquiry-based, hands-on activities, or being "engaged" in other ways. So enrich your teaching by connecting your students to the universe, and to enthusiastic teachers like yourself.

I wish you many more years of success with RELEA. And I congratulate and thank Professor Bretones and his co-editors and all those who write the articles, edit, format and publish them, and all those organizations and institutions which support them and support RELEA.

Web Links

(1) www.astro.utoronto.ca/~percy/madrid.pdf
(2) www.astro.utoronto.ca/~percy/madrid2009.pdf
(3) www.astro.utoronto.ca/~percy/EPOindex.htm
(4) www.rasc.ca
(5) stao.org
(6) www.teaching.utoronto.ca
(7) www.oise.utoronto.ca/smt
(8) ads.harvard.edu
(9) portico.org/stable?cs=ISSN_15391515
(10) www.aavso.org/journal-aavso
(11) www.rasc.ca/journal
(12) astroedu.iau.org

References

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