

Education and Public Outreach Committee Report – for the CASCA Board at CASCA 2011

Submitted by Dennis Crabtree (Chair).

CURRENT COMMITTEE MEMBERS

Chair:	Dennis Crabtree	(2005-13) NRC-HIA
Vice-Chair:	Joanne Rosvick	(2005-11) Thompson Rivers University
Members:	Julie Bolduc-Duval	(2010-13)
	Jan Cami	(2008-11) University of Western Ontario
	Eric Chisholm	(2010-13) NRC-HIA
	Yvan Dutil	(2008-11) T3E
	Louise Edwards	(2008-11) Caltech/IPAC
	Nathalie Martimbeau	(2001-12) Montréal Planetarium
	Peter Newbury	(2009 – 2012) University of British Columbia
	Gordon Sarty	(2008-11) University of Saskatchewan
	Ian Short	(2009-13) St. Mary's University
Board Representative:	Marcin Sawicki	St. Mary's University

COMMITTEE ACTIVITIES

CASCA EPO Reporting Form

The Committee implemented an on-line EPO reporting form to allow CASCA members to record their outreach activities. This data will allow CASCA to track the number of outreach activities reported (in several categories) as well as track the number of people reached by these activities. Thus far in 2011, 122 events have been submitted using the form reaching a total of over 14,000 Canadians. The breakdown is as follows:

Activity	Number
Astronomy course for non-science majors - (Enrollment number)	4415
Day-time observing	10
Night-time observing	5171
Other	283
Public Exhibition	260
Public talk	2769
School visit (4-8)	727
School visit (9-12)	55
School visit (K-3)	861
Grand Total	14551

PromoScience Grant - À la Découverte de l'Univers / Discover the Universe

Under the auspices of the PromoScience grant held jointly with the FAAQ and the RASC, an on-line pilot program to train outdoor interpreters (such as in the parks) was developed and delivered in June 2011. The program is modeled after a somewhat similar program run successfully by the Astronomical Society of the Pacific. The pilot program was very successful with very positive feedback from the participants.

The success of the *À la Découverte de l'Univers / Discover the Universe* pilot, led to the development of new PromoScience grant to run the program for three years (2012-2014). The PromoScience proposal is joint with the FAAQ and the RASC and we are cautiously optimistic that we will be successful as we received very strong letters of support. The PromoScience Proposal is appended to this report.

Qilak Award for Astronomy Outreach and Communication

The development of the Qilak award was completed with the design of a certificate that will be presented to the winner's selected by each of the three society's supporting this award (CASCA, FAAQ, RASC). The Chair of the Awards committee has agreed to handle the call for Nominations for this award. The Awards committee will pass nominations along to the EPO Committee who will submit a recommendation to the Awards committee who are responsible for selection of the winner.

Discover the Universe/ À la découverte de l'univers

An interactive, on-line astronomy training program for educators

in remote and underserved communities

Executive Summary:

Astronomy is a powerful tool for attracting young people to science. However, both schoolteachers and informal educators (youth group leaders, park interpreters, First Nations elders) often find astronomy intimidating to teach. This is especially true in poor or geographically remote communities that lack connections to universities or amateur astronomy clubs. To overcome this challenge, we will develop and offer a program of Web-delivered interactive astronomy training workshops and follow-up materials. Building on our successful 2011 pilot project, this interactive training will: (a) be easily accessible, in English and French, to educators who lack the resources to participate in traditional training programs, (b) provide educators with ready-made astronomy activities for their youth, and (c) let them build connections with professional and advanced amateur astronomers. Our program will give these educators the knowledge, tools, and confidence they need to teach astronomy. We estimate that we will reach over 16,000 young Canadians.

1. The Program

Astronomy's visual appeal, long cultural heritage, and the fascinating questions it asks ("what is our place in the universe?", "is there life on other planets?", etc.) is a powerful way to attract young people to science and technology. However, this power often remains untapped because educators (both schoolteachers and youth program leaders) feel intimidated by astronomy's wide scope and their own lack of astronomy training and knowledge. Most educators lack familiarity with even basic astronomy concepts, lack resources they need to teach even those concepts that they are familiar with, and often feel intimidated in the face of those occasional kids who appear to be more knowledgeable than they are.

In urban centres educators can receive training in how to teach astronomy from amateur astronomy clubs or universities. Indeed, in such areas, members of our three organizations (FAAQ, RASC, and CASCA¹) already successfully engage in helping educators

¹ Fédération des Astronomes Amateurs du Québec (FAAQ) represents over 1800 amateur astronomers throughout Quebec. Royal Astronomical Society of Canada (RASC) has over 4000 amateur astronomers throughout Canada. The Canadian

through classroom visits, teacher workshops and summer institutes. However, such astronomy training is usually unavailable in poor or geographically remote locations, such as Canada's rural areas, the North, aboriginal communities, or in some of Canada's "inner city" schools. Educators in these communities have no help with building their astronomy skills or confidence and, consequently, their youth will continue to miss out on one of the best ways to be introduced to science. Our proposed program will give educators in such underserved communities the training, resources, and confidence they need to successfully teach astronomy to their youth.

1.1. Program Objectives

We will train educators to teach astronomy by providing interactive astronomy training workshops delivered live over the internet. These workshops will (in separate implementations) target school teachers and informal educators (e.g., youth group leaders, First Nations elders, or Parks staff), and will be delivered both in English and French. The workshops will:

- familiarize educators with important concepts in both astronomy and astronomy education so that they have **the knowledge and confidence to present astronomy topics to their youth**;
- be delivered on-line and therefore **accessible even in remote areas** since the vast majority of Canadian communities now have internet access either at schools, community centres, libraries, or directly to homes;
- be delivered via (existing) Web conferencing systems and therefore be **highly interactive** (see Figure 1).
- **give educators ready-made lesson plans or activity guides**, making it easy for the educators to implement astronomy training in their classes/youth groups;
- be developed and led by **our experienced bilingual astronomy education expert** and will also involve interactions between program participants and professional and advanced amateur astronomers drawn from our three organizations;
- provide program participants with a ready-made **long-term support network** of fellow educators and amateur and professional astronomers to draw on into the future.



Figure 1. Screenshot of our pilot project’s interactive astronomy training session for French language Park interpreters. Our EPO specialist, Dr. Julie Bolduc-Duval, is seen demonstrating a piece of astronomy software to a group of remote participants.

1.2. Program Content and Structure

We will develop four sets of multi-week workshops, tailored to four different types of participants: workshops for schoolteachers in (a) English and (b) French, and workshops for informal educators in (c) English, and (d) French.

The workshops will be developed and led by our experienced bilingual astronomy EPO specialist Dr. Julie Bolduc-Duval (please see attached CV XXX), who will be assisted by a resource committee consisting of a number of experienced science educators (see attached list of resource members in Appendix XXX). For special topics we will draw on experts from our parent organizations (FAAQ, RASC, and CASCA) or from other groups (such as First Nations elders for sky-lore topics), who will be invited to participate in the online sessions. The workshops will be offered free of charge with priority given to applicants from remote and disadvantaged areas.

We will deliver a total of 10 multi-week workshops in 2012, 15 in 2013, and 20 in 2014 (see Budget section). To accommodate the four different participant groups, workshops will be tailored in length, content, and language of delivery, as described further below. All workshops will share the following key features:

- Weekly, ~1.5-hour-long live videoconference group web sessions. These live group sessions will be devoted to covering material (facts and concepts, astronomy teaching methods, student activities, etc.) and will also serve as a forum for the

participants to ask questions and discuss ideas. Teachers' workshops will each consist of 6 such sessions, while informal educators' workshops will consist of 4 sessions each.

- Segments of the online group sessions will involve videoconference interaction with a professional or advanced amateur astronomer drawn from among CASCA, FAAQ, and RASC members or with outside specialists such as First Nations elders. These sessions involve discussions of special topics (e.g., upcoming lunar eclipse, a recent "hot" astronomical discovery in the news, or traditional sky-lore) and also provide program participants with invaluable networking opportunities.
- Weekly take-home assignments designed to reinforce content covered in the Web conference call give the participants opportunities to reflect on the material and help them prepare for the next interactive session.
- Continuing access to on-line resources on our website (see pilot example in Appendix XXX) will be available to our alumni, giving them access to activity guides, program outlines, and other resources.
- Continuing on-line support network for our program alumni through an online forum where they can continue to interact with a network of like-minded educators into the future.

While both formal and informal educators have a need for training in astronomy, each group has different needs that consequently require different workshop content and accompanying supplemental material. For example, schoolteachers need information and lesson plans that are suited to daytime classes and address their provincial or territorial curriculum requirements. On the other hand, informal educators, such as Scout leaders, Park interpreters, or First Nations elders, need activities that are more active and suitable for evening, dark-sky hours.

Table 1 presents a workshop plan for English-language school teachers. This example is tailored to BC and Yukon teachers and covers prescribed learning outcomes in their grade-3 curriculum. We are aware that curricula vary between grades and – to a lesser degree – between jurisdictions, and will address this by varying certain topics between workshops.

In addition to interactive online discussions and take-home activities that cover astronomy concepts, participants will be provided with lesson plans and activity guides they can use directly in their classes or youth group meetings. Additional materials will be available to the program participants and alumni on our website.

To reduce cost and effort, we will leverage workshop development and delivery in several ways. Content of English workshops for youth group leaders will be readily adaptable for French youth group leaders (and vice-versa). The same applies to content for teacher workshops, and while school curricula vary between jurisdictions, there are certain commonalities that can be retained between them. Finally, all technical support (website, videoconferencing service) and program administration will be shared.

Based on the successful pilot program we ran in spring 2011 (see Figure 1, Appendix XXX, and <http://www.decouvertedelunivers.ca/>), development for this new program will

Table 1: Proposed plan for a six-week workshop for English-language schoolteachers.

Week	Theme	Presentation	Homework Activity
1	What we see in the sky	Using Star Finders/cherche-étoiles and planetarium software	Guided observation (with real sky and planetarium software)
2	Motions of the Earth	Explaining day–night and the seasons	Model of the seasons and how the view changes over the year
3	Sky lore	Bright stars, constellations, sky lore focusing on Canadian Aboriginal stories	Research one star or constellation of your choice to present it to your class
4	Moons and planets	Moon, planets, the solar system	Construct a model of the solar system
5	From Earth to infinity	Scale of the universe, distances and sizes	Scavenger hunt on the Web
6	Astronomy in the news	Interactive session with professional or amateur astronomer: astronomy in the news	Prepare by reading news Web sites or newspaper articles and background reading of Wikipedia article

involve researching provincial and territorial curricular requirements, adapting existing and creating new materials and resources in two languages, crafting applicable and appropriate content into a coherent series of audience-specific lesson plans and activities, and building the administrative and delivery structure required for a successful educational program. Our experienced EPO specialist, assisted by the resource team of education experts across Canada, have the knowledge, skills, and contacts to carry out this task.

1.3. Originality and Creativity of the Program

Our proposed bilingual program will enhance science education in remote and underserved communities by addressing the needs of First Nations educators, park interpreters, youth group leaders, and schoolteachers. It will be implemented via a Web-based interactive teleconference model that will connect educators to professional scientists and experienced amateurs. The successes and lessons learned from implementing our astronomy training program will serve as models for similar programs in other disciplines of science in the future, both in Canada and abroad.

2. Impact and Reach

By targeting educators we will take advantage of the multiplicative effect of “teaching the teachers” and reach many more youth than would be possible by targeting them individually. We estimate that our program will impact at least 16,000 youth, as follows: we anticipate an average participation of 20 educators per workshop (with a cap of 25 participants). With 45 workshops over three years we will thus train 900 educators. Assuming that 75% of these educators follow through and apply their new learning, and that each one of them works once with 25 youth upon completing our program, this gives 16,875 youth. Additionally, many of the educators can be expected to teach more than 25 youth each (e.g., schoolteachers teaching classes year after year, park interpreters teaching over multiple weekends...), so the number of youth that our program will reach can be expected to be several times the nominal 16,785 young Canadians in communities that are traditionally underserved. The effectiveness of the program is thus ~\$6 per young person exposed to the wonders of science through astronomy.

We have established a realistic set of targets to reach in our three-year workshop schedule and program evaluation will be achieved by tracking progress of these numbers. We

have also begun developing participant feedback forms so we can evaluate our success as we go, and adjust program content as we progress, according to the feedback we receive.

3. Excellence of the Organization and Our Ability to Deliver

Beyond the International Year of Astronomy (IYA) is a collaboration of the of Canada's three major astronomical organizations and builds on the success of the PromoScience-supported Canadian International Year of Astronomy (IYA 2009) public outreach program.

The three partner organizations are: **FAAQ**, founded in 1975, represents over 1800 amateur astronomers in 42 clubs in all regions of Québec. **RASC**, founded in 1868, has over 4000 enthusiastic amateur astronomer members in 29 branches across Canada. **CASCA**, founded in 1971, represents 550 Canadian professional university and government astronomers. In sum, over the years, our organizations have received a Micheal Smith Award and several PromoScience grants. Each organization has a well-maintained and active website, email distribution list, and informal and formal communication networks that span the country.

Each year, our three organizations deliver hundreds of public lectures, star parties, school visits, observing sessions, and other public events, reaching hundreds of thousands of Canadians. During IYA 2009, we cooperated to deliver close to two million personal moments of astronomical discovery for Canadians. See *IYA Final Report* in the Appendix XXX for details.

As part of the PromoScience-funded IYA 2009 activities, we developed and delivered a pilot Web-based interactive training project that anticipates the program we propose here (See Figure 1 and Appendix XXX). This pilot project received very positive feedback from its participants:

I had long been hoping for the sort of training offered by your online class À la découverte de l'univers! I found the online format to be comfortable and accommodating. My colleagues would welcome access to this type of training."

--- Jennifer, schoolteacher

J'ai pu pratiquer les connaissances acquises lors de la formation À la découverte de l'Univers tout au long de l'été. Lors d'expériences de camping j'ai pu exposer des citoyens au ciel nocturne en leur montrant comment repérer les constellations et en pouvant leur en décrire les faits saillants. Au retour des classes j'irai rencontrer les enseignants de l'école primaire du voisinage pour leur offrir des activités scientifiques comme à chaque année, mais cette année je rajouterai au menu les activités d'astronomie de la formation À la découverte de l'Univers et quelques autres que j'ai imaginées au cours de l'été. J'espère aussi planifier une soirée d'observation pour notre communauté.

--- Isabel Deslauriers, National Coordinator, Let's Talk Science Outreach

Our proposed program will be (as was our pilot project) developed and delivered by our experienced astronomy EPO specialist, Dr. Julie Bolduc-Duval, who will be assisted by a team of experienced astronomy educator “resource members” (see Appendix XXX). The program we propose here will build on the successes of our pilot project, extending it to a much larger set of audiences, including First Nations educators, schoolteachers, and informal educators.

Report on Current PromoScience Grant

The current collaboration was awarded a three-year PromoScience grant titled “Inspiring Youth Through Astronomy: International Year of Astronomy 2009 Canada (IYAC) “. This grant covered the International Year of Astronomy (2009) as well as the two following years.

IYA2009 was extremely successful (Appendix XXX) with PromoScience funding contributing to this success. As part of IYA2009, the successful partnership forged between the Canadian Astronomical Society (CASCA), the *Fédération des Astronomes Amateurs du Québec* (FAAQ) and the Royal Astronomical Society of Canada (RASC) delivered close to two million personal moments of astronomical discovery (“Galileo Moments”) for Canadians. See *IYA Final Report* in the Appendix XXX of this application for details.

In addition to personal experiences with science, another success of IYA2009 is the declaration of numerous Dark Sky Preserves (DSPs) including Kejimikujik National Park DSP in 2010, Jasper National Park DSP in 2011, and Canada’s first Urban Star Park, Irving Nature Park in Saint John, NB. Our IYA2009 efforts also resulted in ongoing astronomy programs with First Nations Elders in Alberta (Blackfoot), Manitoba (Cree) and Nova Scotia (Mi’kmaq).

Part-time paid EPO coordinator Julie Bolduc-Duval was hired using the PromoScience funds. Otherwise, all of the activities related to this program are carried out by hundreds of volunteers from the three organizations. Some examples of activities and results include:

- A key IYA resource was a bilingual Star Finder/Cherche-étoiles distributed free in schools, at star parties, etc. and was very popular with youth; 300,000 of these have printed
- The approximately 100 astronomy clubs, university departments, etc. are encouraged through regular newsletters to focus some of their EPO on our target audience
- We developed resources and events on cultural astronomy, including a one-day "Multicultural Astronomy Festival" in Toronto on 16 October, 2010
- We continued to provide presentations and hands-on activities e.g. in rural Ontario libraries
- Talks in partnership with the Vancouver Public library reached approximately 6,000 people in 5 events. Given the strong multicultural nature of Greater Vancouver, these events reached people of various ethnicities but especially Indo- and Chinese Canadians. In fact the event in Richmond, BC was given in Cantonese.
- Summer tours through BC parks, funded by the PromoScience grant, reached a total of 1600 people in 15 stops in 2010 and 1100 people in 16 stops this year. The lower attendance in 2011 is probably due to the wet and cold weather this year in BC.

Much of our effort in the past year has been focused on developing and delivering a French-language pilot for the program in our application, “Discover the Universe/À la découverte de l'univers”. The interactive sessions were made freely available for wide viewing on the internet, with enthusiastic comments received (see Appendix XXX).

One of the goals stated for our previous PromoScience award was to “solidify partnerships and processes that secure the legacy” of IYA2009. The present application continues that process.