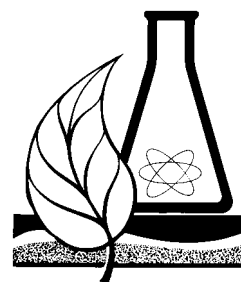


THE ALBERTA SCIENCE TEACHER

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From the Editor



I remember the day I told my instructor at university that I wanted to teach at a rural school. The look on her face was nothing less than shock. I did not understand her reaction then. I do not understand it today. I grew up on a grain farm. I have lived in two large cities in Alberta, but I never felt comfortable there. My wife and I have hobbies and interests that make rural life a better match for us.

I have contemplated doing a special issue of *The Alberta Science Teacher* since I became its editor. The topic of teaching in a rural area came to me when I realized that the Science Council (SC) has had difficulty in helping science teachers far from the cities. Professional development is hard

to organize. Sharing resources is difficult. And merely reaching rural teachers takes considerable effort. The main problem, of course, is distance from the cities. This distance leads to many of the issues rural teachers face: distance from experts and colleagues, and fewer students (which means less funding).

This issue is full of ideas, special projects and viewpoints surrounding the topic of teaching in rural areas. I must thank everyone who responded so enthusiastically to the idea of a special issue. I was afraid it would not be well received. I am planning other special issues for the future.

This issue also contains information for all science teachers, rural and urban, such as resources and announcements about contests and grants. I apologize for not including regular features such as Astronomy Notes and News Snippets. There just wasn't room.

I hope you will enjoy this issue.

Derek Collins

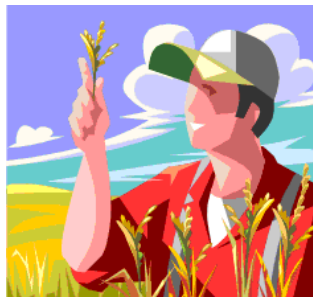


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President's Message

Teachers today are working at a time when there are perceived paradigm shifts in both how we look at student learning and how we look at student assessment. These factors—combined with limited professional development funding, curricular changes and implementation of technology—have made our profession more and more challenging. This is why having a strong Science Council is important. Any specialist council is important for one prime reason: connection. We need to meet with colleagues and talk not only about our pedagogy but also about ourselves. We need to develop and nurture personal relationships and foster feelings of comfort and empathy.

In the next two years, our council will undertake a professional development initiative. This initiative will take the form of promoting ad hoc workshops, hosting our annual conference and providing resource-sharing technology in the secure area of our website (www.atasc.ab.ca). The Science Council will conduct not only an internal assessment of its own operations but also a professional development needs assessment.

This year's conference will be held November 11–13 at the Fantasyland Hotel in Edmonton and will celebrate Alberta's 100th birthday! The conference will be host to eight keynote speakers. I hope to see all of you there.

Have a great year!

Dennis Oppelt

Conference 2005

**"Science—A Centennial
Celebration"**

November 11–13, 2005

Fantasyland Hotel, Edmonton

While we celebrate Alberta's centennial in 2005, we will also celebrate Alberta science with Conference 2005: "Science—A Centennial Celebration."

The conference will be held November 11–13 at the Fantasyland Hotel in Edmonton. Because the conference opens on Remembrance Day, we will begin with a short Remembrance Day commemoration before the keynote address.

We have already booked eight keynote speakers, six of whom are top-class Alberta scientists, and the topics range from dinosaurs to ants, from the Herschel telescope to the Galapagos Islands, from Albert Einstein (whose centennial is also in 2005) to Merlin and *The Matrix*. A motivational presentation will encourage us all to "dare to dream."

We plan to offer the best in workshops and sessions for all grade levels. If you are interested in presenting, submit your application online as early as possible. We would love to hear from you!

To celebrate Alberta's centennial, the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) has agreed to put on the Science Olympics for delegates. This not only will be fun but also will give you ideas to take back to your classroom. We hope as many of you as possible will participate. You will be able to register for this event on site.

A centennial banquet will be held on Friday evening. For \$10 per person, you will enjoy an excellent meal and be entertained by Johnny "Bagpipes" Johnston, who returns to Edmonton with a new show.

A wine and cheese reception will be held on Saturday evening, with entertainment from singer-songwriter Phoebe Legere, one of North America's best accordionists. The cost of registration for this event is \$5 per person.

If you want to attend either or both events, please indicate this when you register for the conference. Your tickets will then be included in your registration package. Seating for both events is limited, and we cannot guarantee that any tickets will be available on site.

Both the Fantasyland Hotel and the West Edmonton Inn are providing accommodations for delegates. The rates are very reasonable, but you must book your room on or before **October 8, 2005**.

A special early-bird registration discount of \$90, along with a chance to win some great prizes, is being offered to all delegates who pay and register before **February 28, 2005**. The conference registrar must receive your payment by this date. A \$65 discount will be available until the end of September.

We hope to offer you the best in conference speakers, sessions, activities and so on, but our success depends on you! Please participate as either a delegate or a presenter. We look forward to seeing you in November 2005. For more information and online registration forms, visit the conference website at www.atasc.ab.ca/conference/.

**Gillian Vas
Conference Codirector**

Teaching Science in Rural Alberta—Advantages and Disadvantages

As a person who experienced his entire public education and university life in Edmonton, as well as his first three years of teaching at composite high schools, I have found it interesting to have spent the last 10 of my 13 years of teaching science in rural Alberta. In a sense, I have experienced both worlds, which led to my interest in contributing an article to this special issue of *The Alberta Science Teacher*. My intention is to relate some of what I see as the advantages and the disadvantages of being a rural science teacher in Alberta. So, here it goes.

Advantages

One thing I like about being a teacher in a rural school is that, for the most part, I am my own boss. I do not have a department head or any other administrators watching my every move. My principal gives me a budget, and I decide how I will spend the money. I decide my priorities, and the principal, by and large, rubber stamps my requests. As long as I am within my budget, no one is looking over my shoulder to see whether or not I need more microscopes.

Another nice perk is small class sizes. Fortunately, in our school, junior and senior high classes of more than 30 students are not that common. The higher the grade level, the smaller the class sizes tend to be. For example, my Chemistry 30 class this year has 12 students. Much more

time is available for one-on-one assistance, which leads to the success of more students. The marking is less onerous, and I can take more time to get to know my students personally, which helps me determine the best way to deliver the program of studies to them. This one-on-one interaction also allows me to encourage students to take the course who might not otherwise attempt it, because I can assure them that they will receive the help they need to make it through the course.

Many small schools have only one trained science teacher. Therefore, that teacher is responsible for teaching most, if not all, of the school's science courses. Before I became the vice-principal of our school, I taught all the sciences from Grade 9 through Grade 12. I enjoyed the variety, because I did not teach the same courses in Semester 2 that I had taught in Semester 1. This kept my teaching interesting and challenging, and I have never been bored teaching at my school. I sometimes wonder how boring it must be to teach the same subject day in and day out, semester after semester. Teaching all the sciences is more work, because I have to know all three subject areas, but variety is the spice of life.

Another advantage of rural teaching is the parents. Rural parents are very supportive of all aspects of the operation of the school. The school is an integral part of the community, and the parents have a vested interest in its success. They are willing to help in any way and are common visitors to our school. Parent-teacher nights are very busy, and parental turnout at events like sports games and drama presentations is outstanding.

Disadvantages

Although teaching in a rural school has its perks, it also has some downsides. A major disadvantage is that the science teacher often has no one with whom to collaborate on science topics in the school. He or she can collaborate on pedagogy with teachers of other subjects, but it is difficult to find a fellow science teacher to talk to. After all, other science teachers are not just down the hall but, rather, 50 kilometres or more away. Collaboration does happen, but usually it is done at PD days, teachers' conventions and so on.

A related problem is professional development. It is harder for rural teachers to participate in professional development activities because of the larger distances they must travel and the limited funds available in a smaller school to attend conferences in expensive locations such as Banff and Jasper.

Another disadvantage is that I don't have a lab tech to help me set up labs and clean up when they are done. Setting up lab activities eats up a lot of my preparation time.

Curriculum change is also an issue in smaller schools. For example, when biology, chemistry and physics curriculum changes occur in 2007 and 2008, there will be little collaboration with other science teachers to lessen the burden. In a large high school with several biology teachers, the teachers can distribute the tasks of creating new lesson plans, exams and so on. In my school, I am it. I will have to make new curricula not only for biology but also for chemistry and physics. Thanks to Alberta Learning, I will have to do this for two years straight. I am not looking forward to that onerous task.

One of the biggest disadvantages to rural teaching is split classes. This is a problem not only for science teachers but for all teachers in rural schools. Declining enrolments, though leading to smaller class sizes, may also lead to combined classes so that the program can be offered. For example, for many years I taught Physics 20 and 30 in the same classroom at the same time. That meant that I had to do very careful planning, and I was often exhausted by the end of the period because I tried to meet the needs of both groups of students. With the low enrolment in our physics courses, we could not justify having separate classes for each.

Although I enjoy the variety of subjects I teach, it can be difficult sometimes. Switching from class to class can be like juggling and involves an intellectual leap. I may go, for example, from teaching Science 8 to Physics 20/30 to Biology 20 to Science 10 all in one day. That's quite a shift in subjects and ability levels.

Well, I hope you enjoyed my stroll through some of the advantages and disadvantages of teaching science in rural Alberta. I have truly enjoyed my 10 years of teaching in a rural school and cannot imagine teaching anywhere else. For those new and veteran teachers out there who are considering teaching in a rural school, go for it! You will not be disappointed. The advantages outweigh the disadvantages by a long shot.

**Brett Huculak
Science Teacher and
Vice-Principal
Viking School, Viking**

Junior High Science Box Program: An AISI Project for Multigrade Classrooms

Retiring from the classroom in June 2003 has given me both the time and the opportunity to begin work on an innovative Alberta Initiative for School Improvement (AISI) project that aims to improve the quality of junior high science in Hutterite, Mennonite (German-speaking) and other multigrade classrooms in my school division. Horizon School Division No. 67 stretches from Lomond in the north to Coutts in the south and comprises predominantly rural schools.

The AISI offers a golden opportunity to improve student learning by introducing innovative and creative initiatives based on local needs and circumstances. The Junior High Science Box Program is one such initiative.

During my years in a multigrade rural classroom, I developed strategies and prepared worksheets to enhance the teaching of science in that situation so that students could learn to work independently and become excited about science through their own learning. From this experience, the idea of a science-box project was born. With the new junior high curriculum in place, I obtained permission from Pearson Education to use its textbook *Science in Action* as a resource book for my worksheets.

The Grade 7 science program has been completed. It allows students to work independently using worksheets based on *Science in Action* and a box of lab materials prepared specifically for each unit of the curriculum. The

Grade 7 program is being implemented during the 2004/05 school year.

The boxes are circulated among the schools, with teachers keeping a science box for two months. Three science boxes have been prepared for each unit to accommodate the 15 schools involved in the project. The students will have covered five units by the end of the school year.

The worksheets have been designed for both textbook and lab work. Students are expected to carry out a certain amount of written work based on the textbook, but the emphasis is on hands-on projects, which can be difficult to implement in a multigrade classroom. However, the availability of science boxes containing the necessary materials, along with the worksheets, should make implementing the hands-on program much easier.

The format and reading level of the Pearson textbook met the criteria I had determined in selecting a resource on which to base my worksheets. I have simplified the hands-on instructions so that students will find them easier to follow and carry out independently. When necessary, the teacher will act as a facilitator.

Now that the Grade 7 program has been completed, it will be followed over the next two years by Grades 8 and 9. The Grade 7 program is currently being implemented in 15 Hutterite schools and three other multigrade classrooms in the Horizon School Division.

The worksheets have been printed in coil-bound reusable student booklets, with copies for each student included in the science box. The entire program is also available on CD-ROM. Additional funding for this part of the project has been made possible through the generous sponsorship of the Alberta Ingenuity Fund. A large portion of the AISI funding is being used to fill the

science boxes (large plastic tubs) with lab equipment not always available in smaller schools. Microscopes, balances and hot plates are just a few examples. The only materials teachers will be required to supply are consumable items such as Styrofoam cups, plastic wrap and paper towels. Enough equipment has been provided to allow up to 10 students to work in groups of two or three. Funding has also been channelled into professional development and worksheet preparation.

A professional development day was held in May 2004 for Hutterite and Mennonite teachers and for other teachers with multi-grade science classes. The objective was to prepare teachers for the successful implementation of the program in September. Teachers were able to try out some of the labs, using the worksheets and the equipment in the science boxes, and to prepare some specific hands-on materials for the next school year. Another focus of the day was to discuss any problems teachers might encounter when implementing the program in a multigrade classroom. Experience has taught me that brilliant ideas developed in the peace and quiet of one's home do not necessarily translate to success in a busy classroom.

An important criterion of the project has been to ensure that teachers (many of whom have a nonscientific background) have the support they need to be both willing and able to buy into the program. As they complete each unit, they will have the opportunity to provide feedback in the form of a simple questionnaire. This will allow us to make changes to the program if required and to iron out any unforeseen problems. There will be successes and failures, but I believe that once teachers have set up an implementation plan, they will find that

the students enjoy the responsibility of an independent-study program. A participation mark will be weighted into the student assessment and, as an added incentive, students will be awarded a certificate of achievement on the successful completion of each unit.

We intend to showcase the Grade 7 program at the next AISI conference, which will be held in Calgary in February 2005. We anticipate that, with review and revision, the program will grow in strength from year to year. Its final outcome will not simply be a measure of academic achievement in science but will also reflect how this independent-study program has encouraged students to work cooperatively and to become responsible and self-motivated.

The worksheets can, of course, be used without the science boxes and are available on CD-ROM, along with lists of the materials required for each unit and a teacher edition with answer keys. Two other school divisions in southern Alberta have shown interest in this program. If you would like more information, please e-mail me at gillvas@telus.net.

Gillian Vas

Grant MacEwan Announcement

I am pleased to announce that Grant MacEwan College is opening college classrooms to high school science teachers—current and retired—free of charge! Interested teachers can take one science course per term for free. Please inform high school principals and teachers in Edmonton and surrounding areas of this opportunity. Interested teachers should contact Roy Jensen at JensenRH@MacEwan.ca or Lucio Gelmini at GelminiL@MacEwan.ca.

Initiative Objectives

- To provide high school instructors with lifelong learning opportunities
- To provide networking opportunities for high school and college instructors
- To bridge the gap between high school and postsecondary education systems

The objectives of this initiative fit within the broader goals of the Centre of Excellence in Science Education (CESE) initiative in development at Grant MacEwan College.

Roy Jensen

Statement of Beliefs of the ATA Science Council

We believe that

- a high-quality, public system of education open to all is imperative for a society to flourish;
- science education is an essential component of education for all students and affects the well-being of society;
- science education is a shared responsibility of the entire community;
- students benefit from seeing the interconnectedness of science to other subjects;
- active membership in professional organizations enhances teacher professionalism and facilitates teacher expertise;
- science education can benefit from cooperation and the formation of strategic alliances among groups that deal with science and the teaching of science; and
- high-performance organizations purposefully provide for self-renewal.

New Habitat Demonstration Site for Conservation Education

The Calgary chapter of Pheasants Forever and the Partners in Habitat Development (PHD) program have just completed construction of the new 12-acre Langdon Habitat Demonstration Site, opening to school groups and the public in spring 2005.

The focus of the Langdon Habitat Demonstration Site is to provide an interactive interpretive experience for youth and adult visitors to learn about the critical components of a successful habitat area, as well as identify what wildlife need in order to live safely and comfortably throughout the four seasons. The site is a hands-on representation of habitat efforts implemented by the PHD program, a conservation initiative designed to restore and enhance wildlife habitat in the irrigated farming regions of southern Alberta.

Food, shelter, protective cover, nesting cover and water are the core components of wildlife habitat. The demonstration site showcases examples of the following:

- Shrub cover and grassy corridors for wildlife travel lanes and protective cover
- Tall grass for ground-nesting birds
- Shelter belts for travel lanes and to protect animals from cold weather and predation
- Fencing to promote growth of vegetation and protect against livestock access
- Cattail marshes for winter thermal cover
- Winter food sources

The site is located near the hamlet of Langdon, east of Calgary on Glenmore Trail (south side) and one kilometre east of secondary Highway 791. This

convenient location offers rural and Calgary schools the ability to take their classes into the field to explore and learn more about habitat stewardship, biology and environmental issues relevant to the southern Alberta landscape.

“The demonstration site will be an excellent awareness and resource tool for schools and teachers to give their students one-on-one time with Mother Nature,” said Bob Haysom, executive director of Pheasants Forever Calgary. “The most effective method for increasing long-term wildlife conservation efforts is education. Today’s youth are tomorrow’s landowners and resource users. What they learn today will influence how they view their natural surroundings as adults.”

The site, with land being donated by the Western Irrigation District in Strathmore, was completely landscaped with a “total habitat area” in mind. A half-acre pond was dug to represent a wetland with emergent vegetation. The site has been completely fenced

off from neighbouring cropland, and native trees, shrubs and grasses have been strategically planted to create a bountiful habitat for a variety of wildlife species, such as the ring-necked pheasant, Hungarian partridge, sharp-tailed grouse, waterfowl, songbird, white-tailed deer and rabbit.

The Langdon site was built over three years. Although it is completely surrounded by farmland, by fall 2004 the grasses were so tall that small coveys of partridge were already calling it home. Once the site matures, it will offer even more opportunities for wildlife.

A large sign in the area shows a legend of the site, the habitat components and how each component benefits wildlife. Visitors will be able to walk around and view each component up close.

For more information, interested teachers should contact Pheasants Forever Calgary at (403) 802-3777 or marketing@pheasantsforevercalgary.com, or visit their website at www.pheasantsforevercalgary.com.

Partners in
Habitat Development



Book Review

*Coming of Age:
100 Years of Educating
Alberta Girls and Women*
edited by E. Lisbeth Donaldson
Calgary: Detselig, 2004
\$27.95/174 pages



“Good news,” proclaims Frances Wright in her chapter in *Coming of Age*. “We all have dreams.” Wright goes on to relate her own dreams and challenges as the founding president of the Famous 5 Foundation, and the dreams and challenges of the five Alberta women who successfully lobbied for the vote for women in Canada and their official recognition as persons. Wright’s story is just one patch in a new-fashioned rainbow quilt, stitched together by editor E. Lisbeth (Betty) Donaldson.

Looking ahead to Alberta’s centenary, Donaldson, a professor of education at the University of Calgary, put together *Coming of*

Age because “the timing was right to honour Alberta women.” “I wanted to get those stories before they were lost,” Donaldson said. To this end, she called on friends and colleagues to tell the “her-stories” of Alberta teachers and students, in their personal, professional, political and public lives.

The result, *Coming of Age*, includes the familiar voices—but less-known personal stories—of Calgary author Aritha van Herk and “First Lady of Reform” Deborah Grey. Other contributors, such as Olympian and the first Canadian woman bobsled driver, Christina Smith, offer further inspiration that teachers will want to share with teenaged students.

Some voices are missing from the book, as Donaldson admits in her introduction, but those present help paint an otherwise fading picture of Alberta, past and present. Students might be surprised, for example, to learn that their schools were named after real people with a habit of defying convention!

One author discusses her life as a lesbian mom in suburbia. Another, a male elementary school teacher, writes about being “a thorn surrounded by roses.” A teacher compares her experience of primary education in India and Canada. In each case, Donaldson lets the author speak in his or her own, unfiltered voice.

Some chapters discuss studies of women in education—history, trends, progress. These segments include the theoretical and meaty. Writing about the public domain, for example, Terri MacDonald, a Ph.D. candidate at the University of British Columbia, recounts her follow-up study to track the impact of the Operation Minerva program to attract and retain girls in science. Operation Minerva—an Alberta success story, as it turns out—is a Calgary-born and Alberta-wide program

that has connected Grade 8 and 9 girls to female science and engineering mentors. The encouraging results suggest that young women are enthusiastic but cautious about pursuing science careers.

Coming of Age includes a few stories that are difficult to hear, such as a family’s experience of the “silent horror of female adolescent bullying.” In another chapter, Nora Abou-Abisi describes the tears of children targeted by anti-Arab racism in the wake of September 11.

All together, the fragments that make up *Coming of Age* showcase a diversity of home-grown experience, with universal significance sure to speak to men and women far beyond Alberta’s borders.

For more information or to purchase *Coming of Age*, visit www.temerondetselig.com. Proceeds from the book will go to the Famous 5 Foundation Scholarship for Girls.

Alex Venter

Alex Venter is a science writer and author of many of the Alberta Women’s Science Network Mentors of the Millennium biographies (www.awsn.com/mentors/millementors/motml.html).

Mission Statement

The Science Council of The Alberta Teachers’ Association is a dedicated group of professional science teachers. It provides leadership and promotes excellence in science education through professional development and by influencing the direction of science education policy.

A Classroom Demonstration of Evaporative Cooling

Intuitively, heating is easy, while cooling seems to be impossible without high-technology devices. Everyone can light a match, rub two sticks together or get hot while doing exercise. Are there equally simple cooling methods?

Biology gives us a hint. Take a shower on a hot day and then stand in the wind to dry off. You will feel a chill. For that matter, sweating is nature's way to get rid of excess energy and to keep the body from heating up too much.

Does sweating actually decrease body temperature, or does it just provide stability? While drying in the wind, do you actually cool, or do you just feel cool? Might it be a placebo effect?

We have constructed a small tabletop device that quantitatively shows the evaporative-cooling effect. It is, of course, a variant on the wet and dry thermometers of traditional meteorology (see www.connel.com/freeware/psychart.shtml). The five important components are a thermometer, an electric fan, a water-filled container with at least one wall of copper or

aluminum, a wick with one end in the water and the other end stuck to the outside of the can, and an insulated enclosure to reduce undesirable heat gain or loss. Figure 1 shows the arrangement.

For a classroom demonstration, begin with the water in the container as close as possible to room temperature and the wick completely immersed in the water. Turn on the fan and, hopefully, show that the temperature of the water does not change significantly. Next, draw the wick partway out of the water and stick this free end to the metal side of the container facing the fan. The other end of the wick should remain in the water to supply a steady supply of evaporant. Turn on the fan again. The temperature of the water will start dropping within minutes. We have measured a temperature drop of 9°C at steady state.

As is the case with any demonstration device, there are enough unanswered questions for students and teachers to pursue if desired. We list only a few:

- How low can the temperature go?
- What is the role of humidity in the room?
- Does the temperature drop depend on the volume of the water?
- How does the partial pressure of water at the site of the wick change as it cools?
- What liquids other than water will work?

Some tips and precautions: Place mesh around the fan to prevent injuries to wandering fingers. Use waterproof glues. An empty tin can will work, but a rectangular can, with the wide side facing the fan and narrow at the sides, reduces the volume of liquid and the need for stirring. The most useful wick material we have found is a strip of J-cloth.

A highly simplistic mathematical condition for the temperature equilibrium for the above demonstration is as follows.

A mass of air m_{air} with a specific heat c_{air} transfers heat to the water container according to $m_{\text{air}} c_{\text{air}} (T_{\text{air}} - T_{\text{final}})$. That same air removes water from the wick and, for each gram of water removed, will deplete the reservoir by the heat of vaporization of water L at the temperature of the wick. To be able to factor in humidity and inefficiency of fully saturating the airflow after contact with the wick, let us just say that for each m_{air} incident at the wick, a mass of water m_{water} is absorbed by the air in evaporation and transported away. The amount of water removed in this way will be a small fraction f of the mass of air flowing past. We can write $m_{\text{water}} = f m_{\text{air}}$. The heat energy removed from the remaining water is then $f m_{\text{air}} L$.

The equilibrium condition becomes $m_{\text{air}} c_{\text{air}} (T_{\text{air}} - T_{\text{final}}) = f m_{\text{air}} L$, which simplifies to $c_{\text{air}} (T_{\text{air}} - T_{\text{final}}) = f L$ and $T_{\text{final}} = T_{\text{air}} - f L / c_{\text{air}}$.

Let us make a rough estimate. At ambient temperature, L is about 600 cal/g. The specific heat of air, c_{air} , is about 5 cal/mole K, and therefore 0.16 cal/g K. At 20°C the vapour pressure of water is 17 mm Hg, which means, as per ideal gas law, that air can hold 17/760 moles of water per mole of air, or 0.41 g/mole. With air at 29 g/mole, the fraction f is at best $0.41/29 = 1.4 \times 10^{-2}$. Ideally then $T_{\text{final}} = 20 - (1.4 \times 10^{-2})(600)/(0.16) = -32^\circ\text{C}$. Since the equipment can give a final water temperature of 12°C, it is obvious that the fraction f has been greatly overestimated. For example, the calculation assumes that the humidity in the room is 0 and that the air leaving the wick is fully saturated.

Frank Weichman
Department of Physics,
University of Alberta

Figure 1
Demonstration Device for Evaporative Cooling



PSAC Grant Program for Elementary and Junior High Schools in Small Communities

Five School Grants of \$1,000 Each Being Awarded in 2005!

For the third year in row, the Petroleum Services Association of Canada (PSAC) is awarding \$5,000 in grants to enhance educational opportunities in rural schools. The goal of the PSAC Grant Program for Schools in Small Communities is to introduce elementary and junior high students living in rural communities in western Canada to the petroleum services sector and its many exciting career opportunities.

Here are the eligibility requirements:

- Schools must be located in British Columbia, Alberta, Saskatchewan, Manitoba or First Nations communities with a population of 15,000 or less.



- Applications must clearly address a specific educational requirement relating to math, sciences, or the oil and gas industry (for example, computer hardware, software, field trips, science equipment, calculators and so on).
- Applicants must provide a description of the project's cost, why it is needed, and who will benefit from it and how.
- Projects valued at more than \$5,000 will not be accepted.
- Funds awarded must be used in the 2005/06 school year.
- Schools that submitted applications in previous years are eligible to reapply, even if they have received a PSAC grant in the past.

The 2004 PSAC grant recipients were as follows:

- Gladmar Regional School (Gladmar, Saskatchewan)—purchased science kits to study energy and machines
- Gordon F. Kells High School (Carlyle, Saskatchewan)—purchased microscopes, magnifying glasses and soil-testing kits
- Kateri School (Trout Lake, Alberta)—purchased a microscope with a flexible camera
- New Myrnam School (Myrnam, Alberta)—purchased a microscope with a flexible camera
- St. Michael's School (Bow Island, Alberta)—purchased hands-on kits that integrate math and science

All 2005 applications must be in the PSAC office by 5:00 p.m. on **Friday, April 29, 2005**. Detailed rules, application forms and promotional posters can be downloaded from the PSAC website at www.pfac.ca/initiatives/scholarship_grants.html or requested by calling PSAC at (403) 264-4195 or 1-800-818-7722 (toll free).

Resources from Inside Education

Inside Education is the new face of FEESA, An Environmental Education Society. It is the same great nonprofit society, working to bring you even more educational resources and services.

Inside Education offers services that may be of interest to teachers.

Our classroom presentations cover a wide variety of curriculum-connected topics in the areas of forests and energy. Delivered by an experienced educator, this service is offered free of charge to Alberta schools within a one-hour commute from Edmonton or Calgary. However, we encourage *all* interested schools to contact us, because we may be able to make arrangements for schools that fall outside this range.

Also, fun, interactive and curriculum-connected field trips dedicated to studying a variety of forest issues are available at our field sites in the Kananaskis and Rocky Mountain House areas.

For more information on these and our other education programs, visit www.insideeducation.ca.

2005 Alberta Emerald Awards

The Alberta Emerald Foundation for Environmental Excellence wants to recognize youths and educators who have demonstrated excellence in preserving, protecting, enhancing and sustaining the environment. Nominations are now being accepted for the 2005 awards. More information is available at www.emeraldawards.com.

Catalyst for the Future

Would you like a remote control that slows time? Think of what you would do with extra time—get organized, connect with friends and family, explore new professional development opportunities.

The Science Alberta Foundation can't offer you a remote control that slows time, but it does have a new program that will help you do two things at once.

Catalyst for the Future is a professional-learning program developed for teachers to use in the classroom. It gives teachers a chance to learn and teach at the same time—without leaving the classroom.

"We are committed to lifelong learning and have created a one-of-a-kind PD program for teachers," says Hyacinth Schaeffer, director of learning, Science Alberta Foundation. "We already offer exceptional learning opportunities for students through Wonderville.ca and Science-in-a-Crate, so why not create something special for teachers as well?"

Catalyst is the newest addition to the Science-in-a-Crate program. It has two components. The first component is a print package, containing a journal that highlights instructional strategies for teachers to use while hosting a crate. The journal has templates and masters for teachers and students, assessment rubrics and planning opportunities. It encourages teachers to implement, modify and assess the strategies to meet their instructional goals and the diverse needs of their students.

The second component is a video that introduces teachers to colleagues who have used Catalyst and showcases instructional strategies in real classrooms.

Catalyst will be delivered to your school as part of a crate from the Science-in-a-Crate program. Science-in-a-Crate is a unique resource that will bring science to life in the classroom. The hands-on activities in the crate engage many different learning styles and encourage students to work collaboratively to achieve a shared understanding of science, math and technology concepts.

There are two ways to approach the Catalyst program: independently or with a group of school colleagues. Both approaches have benefits. Independent participation allows for a lot of time flexibility and great personalization. Group study allows for implementation of teaching strategies across grades—and even schools—resulting in a more consistent learning experience for students. Group discussion and reflection generate additional thought and learning.

Find the Strategy That Works for You

Catalyst gives teachers a chance to explore and refine their instructional strategies. From three strategies, teachers choose those that best suit their teaching style and diverse student needs.

Explains Schaeffer, "No matter what strategy or strategies teachers choose, the central outcome is professional learning that will support students in becoming more actively involved and challenged in their science experience—a benefit that can extend to all subjects."

The three strategies are effective group work and learning, activating prior knowledge and linking science to other subjects.

Effective Group Work and Learning

Teamwork and communication are important life skills that are used well beyond the classroom. Wonderville.ca and

Science-in-a-Crate provide ideal group-work and cooperative-learning opportunities, helping students gain valuable skills in working together, solving problems and meeting outcomes.

"In my classroom, I've found that having students work in groups greatly improves their science learning," says Susan MacMillan, an elementary teacher with the Calgary Board of Education. "It allows them to discuss and expand ideas. When using the crate materials, I have the students take on specific roles within the groups. The students really enjoy the responsibility of these roles, and it helps to teach them how to communicate and work together effectively."

Activating Prior Knowledge

Students don't come to school as empty vessels. They bring their own knowledge and perceptions with them. Teachers must gauge their students' skills and adapt accordingly.

"Activating prior knowledge really involves two things—questioning and predicting," says Schaeffer. "With this approach, teachers engage students in activities that bring to light what they know about a topic before they begin to study it. Both during the study and when it is complete, the teacher and students look at the questions again to see what kids have learned and what misunderstandings have been addressed. Science crates model best practice for this approach, challenging current thinking with testing, observation and new evidence."

Linking Science to Other Subjects

Science-in-a-Crate meets outcomes for science curriculum but also overlaps with other subjects. For example, there is a natural fit between science and language arts. The activities involve communication—writing, listening,

speaking, reading, viewing and representing. This model can be applied to other subjects, such as math, social studies and health.

Schaeffer adds, "By implementing the crate approach with other courses, teachers are able to achieve better integration across the curriculum, and kids understand how learning moves beyond one subject."

Catalyst for the Future is included with all Science-in-a-Crate topics for the nominal crate-booking fee of \$25. Teachers have three weeks to complete the four-hour program.

To find out more, visit www.sciencealberta.org or call (403) 220-0077.

2005 Science and Technology Week Essay and Video Challenge

The essay and video challenge is a great a way for rural schools to participate in a province-wide contest. Plan to incorporate this challenge in your classroom next year—students and classes can win great prizes!

Teachers, can you think of a great essay question to ask science students in Grades 7–9? Please e-mail your ideas to Mary Anne Moser at moser@netera.ca by **January 30, 2005**.

Look for the contest details in the Science and Technology Week package, which will be sent to every school in Alberta in late August.

In the meantime, mark the following date on your calendar:

Deadline for essay and video submissions—**October 26, 2005**

Rural Struggles of Operation Minerva

Operation Minerva is a province-wide program designed to get girls involved in science. All corners of Alberta have seen the conference, from Fort McMurray to Medicine Hat. Unfortunately, over the years, the numbers and locations of the conferences have dwindled. Currently, Calgary, Medicine Hat and Red Deer are the only centres with a program running. As the coordinator in Medicine Hat, I can definitely understand the difficulties a rural community may face when trying to organize and sustain the conference.

Operation Minerva Medicine Hat is currently organizing the 13th annual conference. On January 28, approximately 50 girls from southeastern Alberta and Saskatchewan will gather at Medicine Hat High School for the one-day conference. In late November, approximately 20 schools from all over southeastern Alberta and Saskatchewan were invited to participate. It is up to the principals and science teachers to choose good candidates to send to the conference. Students from rural towns many have not even heard of attend yearly.

Because of the location, many of the girls find travelling to the conference an obstacle. The conference starts at 8:30 a.m. For girls travelling from out of town, the drive can be two or three hours, which means that they must leave when most of us are still sleeping. These girls deserve credit, because they never complain about being tired. Every year, I hear students say that it was definitely worth the trip.

One struggle we face is locating and recruiting mentors from a wide variety of science-, math- and technology-related careers. Every year, girls express interest in careers not held by anyone in

our database of volunteers. It would be wonderful to have many more professionals to choose from but, because of our location, this is just not possible. We appreciate the volunteer mentors we do have. Many of them have been with the program since the beginning, and we definitely could not continue without their support.

The parents and teachers who bring the girls to the conference every year must also be commended for their commitment. Many of them give up a day off work to drive into Medicine Hat and wait all day for the students to finish. It is wonderful that these adults are so willing to help the girls participate.

An important reason Operation Minerva continues in Medicine Hat is to allow rural students the opportunity to work in labs and participate in hands-on activities. Many rural schools do not have the facilities or resources to do hands-on science activities. I have heard many Grade 9 girls say that they do not know what a graduated cylinder is or that they do not know the proper way to measure liquids. Many of the skills those with a science background would take for granted are lacking in this population of students. This surprises many of the workshop leaders and mentors, because most would argue that these are skills all students need and should have the opportunity to learn. Unfortunately, with recent school closures, cutbacks and so forth, these opportunities are just not there for many rural students.

The importance of the Operation Minerva conference can especially be seen in the rural communities. It gives them the chance to engage in and learn about science. If we can foster and encourage just one girl's interest in math, science or technology, it is definitely worth all the effort!

Patty Rooks
Coordinator, Operation Minerva
Medicine Hat

Tyrrell Art Contest

The Prehistoric Poster Contest, hosted annually by the Royal Tyrrell Museum, got its start at about the time the dinosaurs went extinct—or so it seems. But the museum’s team of educators keeps finding new ways to make the contest appealing to both young artists and their teachers.

In fact, this time around there is not one but three new reasons to get your students involved. This year, the Tyrrell will reward not only quality—and the most outstanding works of student art—but also quantity. The school that sends in the most entries will receive a collection of books valued at \$1,500. This new prize was made possible by a partnership with KSPS Public Television, which will donate the books to your school library. So it’s a good idea to copy this article and place it in strategic spots in your staff room so that all the teachers get involved! The museum has also doubled the value of the grand prize, making the poster judged Best Overall worth \$500! Another addition this year is a dinosaur doodle pad, which will be sent to every student who participates.



The Tyrrell’s Prehistoric Poster Contest was developed by museum educators for students in Kindergarten to Grade 12 to spark imaginations, link to curricula and encourage learning. Each year there are different paleontology themes for different grade levels, with this year’s topics ranging from geometric dinosaurs (for Kindergarten students) to drawing the newest raptor, identified by Tyrrell scientist Philip Currie (for students in Grades 4–6).

Entries will be judged by a panel of artists and educators. Each winning entry will be awarded a cash prize, provided by the Royal Tyrrell Museum Cooperating Society. KSPS Public Television will donate dozens of new books to the school with the most participants. In total, more than \$3,400 in cash and prizes will be distributed to students. The winning posters will be framed and exhibited to the museum’s hundreds of thousands of visitors and will also be posted on the museum’s website (www.tyrrellmuseum.com).

Complete details on the Prehistoric Poster Contest are available at www.tyrrellmuseum.com/pc2005final.pdf or by dialing 310-0000 then (403) 823-7707 (toll free). The contest closes **January 28, 2005.**

Operated by Alberta Community Development, the Royal Tyrrell Museum integrates the science of paleontology into a wide variety of educational programs. Located six kilometres northwest of Drumheller, the museum is open year-round and is the only Canadian institution devoted exclusively to paleontology. Its winter hours are 10:00 a.m. to 5:00 p.m., Tuesday through Sunday.



Snapshot of Rural Science Education in the United States

Across the United States, rural communities are delving into science in ways that tackle content, invite culture and fully engage students in the local environment. In 2001, the Education Development Center (EDC) embarked on a two-year exploratory study of the Rural Systemic Initiative (RSI) and discovered how educators in these regions use their creative talents to design culturally appropriate science curricula and activities that meet the pressing needs and demands of their most-valued entity—the younger generation. By actively engaging community stakeholders and infusing science curricula with local issues and concerns, these educators have made rural science education relevant and distinct.

In Alaska, for example, reservations have spent much time and energy developing guidelines for preparing culturally responsive teachers, respecting cultural knowledge and strengthening indigenous languages. The guidelines assist teachers in dealing with such issues as how to work with the elders in the community and how to nurture a healthy youth population through the community and schools. Specific science activities involve engaging the whole region in the science-reform effort. For instance, elders, scientists, teachers, students and other community members take part in science fairs and camps that draw on traditional values. Students study the environment and learn science principles on site in a traditional setting, with the tribal elders sitting side by side with the scientists, who sit side by side with the teachers, and so on. Together, they develop

science projects for local, regional and, ultimately, state science fairs. Students' projects are judged on their scientific merit and the extent to which they reflect the cultural traditions and values of the region. Learning is taking place in all community members, with science embedded in the conversations and projects.

This emphasis on using the local culture and environment to teach science is echoed in other rural communities across the country. In the UCAN (Utah–Colorado–Arizona–New Mexico) region, students develop the science skills they need to understand the implications of human practices for the environment through activities that involve learning how to calculate running water or how to recognize different types of wood, for instance. In Fort Belknap, Montana, science is connected to students' daily lives through activities such as raising and hatching fish eggs. Teachers in Standing Rock Sioux Reservation in North and South Dakota are developing lessons that include elements of native culture and ways of doing science, such as making traditional hand drums to discover the elements that make sound. In rural Texas, parents actively take part in school leadership teams and plan events for families around science inquiry. Having students, parents, teachers and administrators take part in the scientific-inquiry process builds expectations around science for the whole community.

Science instructional practices in these rural communities have been making headlines. The time spent teaching science is increasing, students are getting more active and involved in hands-on aspects of science, and parents and communities are recognizing the value science education can add to their children's lives. By tying local culture and local issues to the science classroom,

students, teachers and community members are making science a bedrock of their communities.

This article is based on the work of the RSI and is supported by the National Science Foundation (NSF) and the EDC under Grant No. REC-0003325. To view the full report of the project, *Science Education Reform in Rural America: A Snapshot*, visit the Center for Science Education website at <http://cse.edc.org/work/research/ruralsger/default.asp>.

It's Snow Time!

Wouldn't it be nice to take the classroom outdoors . . . in the winter? Discover how animals survive and how we can have fun in the winter. Go on a snowshoe hike, look for animal tracks and do track casting. Build snow shelters and investigate snow. Learn how to dress for the winter and how farmers can conserve soil, water and wildlife. Discover the wonders of our longest season—winter!

The Parkland Conservation Farm offers you and your students the opportunity to do all these things. I can deliver the program at your school. Or ask about our free busing to the farm site, which is located 45 minutes east of Edmonton on Highway 16.

If I come to the school, the cost is \$5 per student. If the students are brought to the farm, the cost is \$3 per student for one program and \$5 per student for two programs.

For program details, contact me at (780) 764-3927 or pcfreach@telus.net. To learn more about the Parkland Conservation Farm, visit www.parklandconservationfarm.com.

Pamela Gottselig
Outreach Instructor,
Parkland Conservation Farm

Science Networks

Urban teachers have easy access to a multitude of resources that can supplement the classroom learning environment. From libraries to science centres to head offices with a ready supply of people who can help in the classroom, augmented curriculum support is often not far away.

But for those in rural settings, the choice is not nearly as broad. The past few years have brought many hardships to rural communities. Drought and the BSE crisis have left smaller communities with fewer resources to sustain their schools and with cutbacks, closures and combined classrooms—all of which present teachers with a huge challenge when it comes to teaching the science curriculum.

The Alberta Science Literacy Association (ASLA) operates science networks across the province. These networks are uniquely placed to offer support to teachers at any stage of the science curriculum. Through a combination of volunteers and resource kits, the networks work to accommodate individual teachers, their classroom needs and the basics of the science curriculum. All the services and resources are free or very low cost and are designed to meet Alberta Education's science curriculum outcomes in the classroom setting.

Praxis, the Science and Technology Hotline, is centred in Medicine Hat but covers more than 29,000 square kilometres in southeastern Alberta. Praxis works closely with schools throughout the Prairie Rose Regional Division, the Medicine Hat Catholic Separate Regional Division and the Medicine Hat School District. It offers a variety of services, including classroom speakers, field-trip support,

science-fair judges, industrial tours, workshops, curriculum support and career counselling. Praxis also offers a number of resource kits—if you live in an area where finding a classroom speaker is a challenge, there may be a kit to help you teach a science unit. The kits include all the resources required to develop a hands-on learning experience for the class, including creative ideas and experiments to make the concepts come alive. Visit www.telusplanet.net/public/mhpraxis/ for a partial listing of the kits. You can book kits through the director (see the contact information at the end of the article).

Covering over 259,000 square kilometres, from the Northwest Territories to Grande Cache and from the B.C. border to Whitecourt, the Peace Country Science Network has had to be creative in providing outreach to the teachers and schools in the region. As well as putting scientists in the classroom, the network works to bring other learning opportunities into schools. For example, it actively promotes an annual Envirothon, bringing together teams of high school biology students for a competition and learning exercise incorporating many of the science units taught in Grades 10–12. The network also promotes science as a career choice through coordinating career days at local high schools and a health-care careers workshop offered in conjunction with the regional hospital.

The Central Alberta Science Network (CASN) has an active Visiting Scientist Program. Although the presentations are generally restricted to schools within a 50 kilometre radius of Red Deer, the network's director has developed a number of resources that can be used with local volunteers. For example, the Grade 5 chemistry unit covers basic chemical concepts that

are critical to developing a more complex understanding of future chemistry units. Local pharmacists can deliver the workshop to students, using an outline that lists the experiments and materials. Students begin to not only understand the principles of the chemistry unit but also develop some ideas about scientists in the real world. The CASN is also a coordinating body for the Central Alberta Science Festival, which runs annually in the last week of May and had more than 7,000 people in attendance in 2004.

The ASLA also operates networks based in Calgary and Edmonton. These networks serve the outlying areas of the two cities and are very helpful in securing volunteers and suggesting resources to teachers who need help. Both networks also provide professional development workshops on science topics integral to Alberta Education's science curriculum, as well as general sessions that combine other curriculum elements (such as social studies and language arts) with science topics.

All five science networks sponsor local science events in their communities through partnerships with other science organizations, libraries and community groups. They are fabulous resources for finding people and ideas to help make science exciting and real to students and the general public.

Contacts

Central Alberta Science Network

www.sciencenet.ab.ca
 Director: Kimberly Forster
 (403) 345-3767
kforster@rdpsd.ab.ca

Peace Country Science Network

Director: Susanne Dow-Kuechle
 (780) 539-9847
susanne5@telusplanet.net

Praxis—The Science and Technology Hotline (Medicine Hat)

www.telusplanet.net/public/mhpraxis/

Director: Patty Rooks

(403) 527-5365

mhpraxis@telusplanet.net

Calgary Science Network

www.calgarysciencenetwork.ca

Coordinator: Julia Millen

(403) 263-6226

scihot@calgarysciencenetwork.ca

Edmonton Science Outreach Network

www.sciencehotline.ca

Director: Michael T. Caley

(780) 448-0055

esons@telus.net

The ASLA is committed to promoting science and technology literacy by improving public awareness and understanding of scientific and technological processes, skills and knowledge. It does this through developing databases and resources and creating communication links between the public and the scientific, engineering and technological sectors. To reach the ASLA, contact executive director Janet Hutchinson at (403) 245-8942 or info@asla.ca. For more information, visit www.asla.ca.

Free Video Features Alberta Leaders in Science and Technology

Alberta may be best known for its strong economy and beautiful scenery, but it is also known for its brilliant innovators.

These innovators are Alberta's modern pioneers. They are researchers navigating us into the future, helping us fight colds and flu effectively, saving lives with nanotechnology, strengthening our buildings, inspiring future generations, lighting up the developing world and helping Albertans get a good night's sleep.

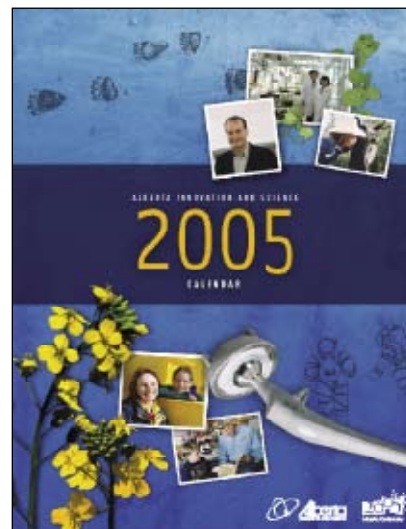
These are the stories featured in a new documentary called *Alberta Innovation 2004*, which is now available free to teachers across Alberta. The video takes viewers on a journey behind the scenes and into the laboratories where breakthroughs are being discovered and Albertans are improving our quality of life.

The video is available to teachers through Alberta Innovation and Science—the same people who bring you Science and Technology Week every year. Developed in cooperation with Global Television and Western Economic Diversification Canada, *Alberta Innovation 2004* is the fourth annual documentary on innovation in Alberta's science and technology sector. The series has been positively received by Albertans, leading Global to rebroadcast the program on New Year's Day.

To receive your free copy of the video, complete the order form included with this issue. If you did not receive the order form, fax your name, address and phone number to (780) 415-9824. Please share this information with fellow teachers.

If you missed the first three documentaries, don't worry! You can still view them online at www.innovation.gov.ab.ca. If you'd like to share your comments on any of the documentaries, e-mail them to is.inq@gov.ab.ca.

Oops! Our Mistake!



As the Scottish poet Robbie Burns noted, "The best laid schemes of mice and men often go astray."

Much to our chagrin, a few errors have popped up in the 2005 calendar featuring innovative Albertans that was recently sent out with *The Alberta Science Teacher*. Alberta Innovation and Science apologizes for any inconvenience these errors may have caused.

Specifically, the dates for some of the statutory holidays are incorrect. Please use the enclosed stickers to correct the following inaccuracies:

- St. Patrick's Day is on March 17, not March 16.
- Good Friday is on March 25, not April 8.
- Easter Sunday is on March 27, not April 10.
- Victoria Day is on May 23, not May 30.

If you're new to the Science Council and didn't receive a copy of the calendar, please contact us at is.inq@gov.ab.ca and let us know. We'd be happy to send you a corrected version. If you have any questions or comments, or if you would like additional correction stickers, let us know.

APEGGA: Bringing Science to You

The Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) supports the efforts of teachers to spark interest in science, math and technology through a number of outreach activities. With over 41,000 members, APEGGA recognizes and values the impact of science and math teachers in nurturing interest in science-related career fields.

A sponsor and exhibitor at Science Council conferences, APEGGA was pleased to be at the successful Conference 2004 in Banff. We enjoyed the opportunity to meet delegates and talk with them about science education. We thank all who added their e-mail addresses to our information-distribution list.

Please review the following summary of outreach activities and programs offered by APEGGA. We encourage your participation in these programs.

Science Olympics— January to March

Science Olympics is an interactive science competition held in communities across the province as part of National Engineering and Geoscience Week. Teams of students compete in take-home and mystery-event challenges.



Science Olympics will take place in the following locations:

- Calgary Science Olympics, February 26, Grades 1–12
- Grande Prairie Science Olympics, February 26, Grades 7–12
- Edmonton Science Olympics, March 5, Grades 1–12

For more details, visit www.apegga.org/NEGW/olympics.html.

Provincial School Challenge— January to March

Alberta students in Grades 1–12 are invited to compete in the Provincial School Challenge. This year, Grades 1–6 students will build paper chairs and Grades 7–12 students will compete in a mouse-trap car challenge. Information packages will be mailed to Alberta schools January 10 and will also be available at www.apegga.org/NEGW/challenge.html.

Outreach Program— September to June

Supported by more than 500 members around the province, APEGGA's outreach activities include the following:

- Curriculum-related science presentations that bridge the gap between real-world and classroom theory
- Career presentations and booths
- Interviews
- Job shadowing
- Science-event judging
- Presentations at professional development days

APEGGA also distributes career publications and information on university-entrance scholarships. Through APEGGA's outreach activities, we raise awareness of the science professions and promote interest in science, math and technology to students in Grades 1–12.

For more information, visit www.apegga.org/education/outreach_program.html.

Teacher Awards— January to March

APEGGA recognizes teachers who inspire learning in science and math. Awards are presented annually to 14 Alberta teachers, and their schools each receive \$1,000 to further science or math education. Students, parents, other teachers and school administrators may nominate teachers. Information will be mailed to Alberta schools on January 10 and will also be available at www.apegga.org/Science/teacher_awards.htm.

Education Scholarships for Teachers and Science Graduates— Deadline July 15

Every year, APEGGA awards six scholarships to practising teachers in Alberta who want to pursue a degree in science or to people with a math or science degree who want to pursue a degree in education. In other words, the scholarships are awarded to people who, within two years of study, will hold both a B.Ed. and a B.Sc. More information and the application form are available at www.apegga.org/education/scholarships/education.htm.

For more information about any of APEGGA's outreach programs, visit www.apegga.org or call us at (403) 262-7714 (in Calgary), (780) 426-3990 (in Edmonton) or 1-800-661-7020 (toll free).



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