

Improving Scientific Literacy

Let's Talk Science

Bonnie Schmidt

Many definitions exist for scientific literacy, but most include a basic understanding of scientific principles and processes and a recognition that scientific inquiry is an activity that is subject to human biases. Incorporating all of these aspects into teaching can be a challenge. All too often, students perceive science to be difficult, dangerous, and elitist. Possibly, this is because we tend to focus on memorizing content as the most important aspect of science for young people. I would argue that, although content is important, understanding the processes of science and scientific inquiry may be even more important.

By shifting the focus to understanding the processes of science, we can also foster the development of basic life skills in students—skills that have become as important as the ability to read and write, and essential in a rapidly changing, global environment.

According to the Conference Board of Canada's Employability Skills 2000+ Profile, several fundamental skills, personal management skills, and teamwork skills are essential for success. Using science as a foundation for learning we can help students to develop many of these skills which include but are not limited to the following:

- read and understand information presented in a variety of forms
- share information using a range of information and communications technologies
- use relevant scientific, technological and mathematical knowledge and skills to explain or clarify ideas
- manage information
- use numbers
- think and solve problems
- assess, weigh and manage risk
- work safely

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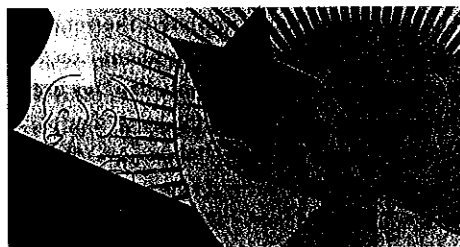
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- work with others
- participate in projects and tasks

The challenge remains of how to integrate these many aspects of science into curriculum. Consider using community resources to enhance your science program. Parents, personnel from science centres, and scientists from local universities, colleges and industry can all play a role in ensuring that students receive the best science education possible. Then there's Let's Talk Science—a national charitable organization that is dedicated to improving scientific literacy in Canada through the development and delivery of innovative educational programs for youth and their educators, and through research and advocacy.

Let's Talk Science Programs

Let's Talk Science use small-group, hands-on experiences in science to foster the development of teamwork, communication, problem

solving, critical thinking and leadership skills in young people.

The ultimate goal of Let's Talk Science is to ensure that all Canadian children experience a high-quality science education in order for them to appreciate and evaluate the impact of science on their lives. We believe that educators, particularly elementary school teachers, play a pivotal role in the development of a science culture, and must be equipped (i.e., have the resources, knowledge, skills, and attitudes) to teach science effectively.

We believe in the old adage, "hands on means minds on," so all Let's Talk Science programs incorporate an extensive component of hands-on activities. With three different program portfolios, we share the excitement of science with youth ages 3–18, elementary and middle school teachers, and the general community.

Matching Science Graduate Students and Teachers

The Let's Talk Science Partnership Program was launched in 1991. This national award-winning outreach program matches graduate student volunteers (i.e., Masters and Doctoral candidates), who are studying in scientific fields, with elementary and high school teachers in one-to-one relationships. It is up to the teacher and his/her volunteer partner to design science experiences that will benefit the class. These partnerships often last two or more years as the volunteer is completing graduate studies. The benefits of this program to students are many. They learn about the importance of science in their lives, meet realistic role models, participate in hands-on science activities, and gain confidence in their ability to do science. Teachers meet science experts and gain access to universities. Graduate student volunteers improve their communication skills and teaching ability, as they share their knowledge and love of Science. Currently sponsored

by Petro-Canada, the Partnership Program is offered at several universities across Canada and is available at no cost to educators.

Focus on Youth—This program provides year-round science programs for children ages 3–14. Through in-class, after-school, and summer activities, children experience the excitement of science by participating in hands-on, fun activities that are facilitated in small groups. In-class workshops are linked to the science and technology curriculum and are founded on the constructivist model of learning. Thanks to support from corporate donors, including DuPont Canada and the Imperial Oil Charitable Foundation, these workshops are available to schools for only a small fee. We recognize, however, that some schools may not be able to afford any fee and have recently launched a bursary program, with support from the Royal Bank of Canada Charitable Foundation, to provide a limited number of free in-class workshops to schools that are nominated by their Board of Education.

Science Now!!—This professional development program for elementary school teachers provides conferences, workshops, and summer institutes for educators who are committed to bringing more experiential learning opportunities in science to their classrooms. Based on the constructivist learning theory, these programs are designed to increase a teacher's confidence and ability to teach science effectively. We are confident that, after participating in Science Now!! programs, elementary school teachers will be better prepared to use available resources, equipment, and textbooks more effectively.

We recognize that elementary school teachers must teach many different subjects and we approach science in an integrated and holistic manner. Some of our workshops are ideal for combined grade classrooms as they cover several strands from the Science and Technology curriculum and also provide links to the Mathematics and Language Arts curricula.

A Focus on Research

Let's Talk Science is committed to understanding how people learn science and how our programs and services are used. Research and evaluation findings are used to develop new programs and improve existing programs.

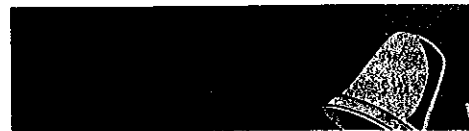
Indeed, our current Science Now!! professional development program portfolio evolved from an intensive two-year evaluation, which was completed in 1998.

According to this research, the majority of elementary school teachers who participate in our programs do not have formal training in science and technology. On self-assessments, science ranked a distant third behind language and mathematics as a favourite subject to teach. Interestingly, on a self-rating scale of 1–10 for their preference for teaching science (10 being high preference), the mean score was 7.2. However, using the same scale to rate their perceived effectiveness as a science teacher, the mean score fell to 5. When taken together, the picture emerges of a large number of teachers who enjoy teaching science but do not perceive themselves to be very effective for a variety of reasons. This finding is contrary to the image of educators as being resistant to teaching science and defines the audience for which we design Let's Talk Science programs and services.

Can a two- to three-hour professional development workshop have a significant and sustainable effect on participants? We have evidence that the answer is yes. A retrospective evaluation which was completed by Science Now!! participants three months after participating in a single workshop indicated that attitudes towards teaching science continued to be significantly improved. Perhaps not surprisingly, our workshops had the greatest sustained impact on teachers who had seven or more years of teaching experience. Teachers who graduated more recently appear to have benefited from the changing curricula at many Faculties of Education, which support more hands-on learning.

An Advocate for Educators

Along with programs and research, a critical component of Let's Talk Science's mission is to advocate for teachers to have the resources, skills and knowledge they require to teach science effectively. Over the years, we have learned that most elementary school teachers have the ability to teach science in an integrated and relevant manner. In fact, they usually use the same strategies when teaching other subjects; however, experiential learning opportunities are often overlooked in Science education. We believe that there are a variety



of reasons for this: a lack of time to prepare integrated lessons and assemble the required materials, a lack of teaching resources, and a lack of familiarity or comfort with scientific content and processes.

With the incredible pace of change occurring in scientific disciplines, teachers can not be expected to be the only source of expertise in the classroom. Let's Talk Science staff and volunteers are eager to work with educators to provide unique, effective and inspiring ways to share the excitement of science and technology with Canadian youth.

Let's Talk Science On-Line

Let's Talk Science has an extensive and growing presence on-line. More information about the organization's philosophy and programs can be found at www.letstalkscience.uwo.ca. Our "Resources for Educators" section includes many hands-on activities and an extensive searchable database with information about other organizations that provide science and technology resources, programs and/or services to educators across Canada. Contact:

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Dr. Bonnie Schmidt is the founder and President of Let's Talk Science. Bonnie began her science outreach activities in 1991 while pursuing a doctoral degree in physiology at the University of Western Ontario. Upon graduation in 1993, she formally launched Let's Talk Science. Since then, the organization has expanded and is now operating through staff, associates and nearly 1,000 volunteers located in six offices and 14 universities across Canada. Bonnie has also been active with many non-profit organizations and has received several awards for her work.