

SCIENCE ON A SHOESTRING

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OVERVIEW

The Science Alberta Foundation is a non-profit organization dedicated to the promotion of science literacy in Alberta. Our mandate is “to inspire Albertans of all ages to explore applications and examine contributions of science and technology to our society, our environment, our quality of life, and our economic future”.

This paper will outline the history of the Foundation, including some comments about our initiation and a brief summary of our 2-year pilot program. This will be followed by a discussion of our current organization and funding issues. The remainder of the paper will highlight individual success stories – case histories demonstrating the impact of Science Alberta on individuals, communities, and the province as a whole.

ACKNOWLEDGEMENTS

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The authors, however, remain responsible for the content of this paper, and for any errors it may contain.

INTRODUCTION

Initiation

In 1989, Mr. Jim Gray, President and Chief Executive Officer of Canadian Hunter Exploration (a Calgary-based oil company), publicly articulated his concern about Alberta's ability to compete in a global economy which is becoming increasingly based on science and technology. To help create public awareness and interest in science and technology, Mr. Gray proposed the concept of *Science Alberta*, a provincial network of science centres.

Albertans embraced the concept, and the governments of Alberta and Canada agreed to fund a feasibility study. In 1990, the Science Alberta Foundation was established. Its first goal was to survey Albertans to find out what they wanted. They told us they actually wanted a bottom-up, grassroots approach. Survey results indicated 94% of Albertans believed that science and technology were very important for Alberta's development. Almost 87% wanted to know more about science, yet only 45% felt that students were receiving an adequate science education.

Additional components of the survey resulted in a very important shift in the philosophy of the Foundation. The emphasis of Science Alberta shifted from creating a *network of science centres* to *creating a network of people, programs and resources*. Individual Albertans were more interested in science programs than more science facilities. Individuals, groups and communities want to create their own science programs, and make use of existing facilities, such as community centres, libraries and schools, rather than fund the development of more "bricks and mortar" institutions, complete with ongoing operating costs.

The key conclusion of the feasibility study was that "the Science Alberta Foundation can be the catalyst to bring about the creation of a science network that enhances existing science education facilities... and links existing and new facilities and programs into a provincial network". We believe this concept of establishing a comprehensive network of people, programs and resources devoted to science and technology over such a wide geographic area is unique.

Pilot Project

In 1991, the Foundation embarked on a two-year, 4-million dollar pilot project, to prove that a “network of centres for science” could be created. Science Alberta followed a two-pronged strategy to attain its goal. First, the Grants and Awards Program was established, to act as the philanthropic arm. Funds would be awarded to individuals, community groups, businesses and organizations, strictly on the basis of merit, to create a science and/or technology-based, education-oriented program. In its first year, 13 projects in eight communities around the province received funding of approximately \$150,000. In the second year, 15 projects received funding in the order of \$250,000.

The second initiative involved special projects to be developed by the Foundation. These programs were undertaken in partnership with existing facilities or organizations with appropriate expertise. The first special project involved the creation of a travelling exhibition, called *The Body in the Library*. This hands-on forensic science exhibition was developed in conjunction with the City of Calgary Police Department, the RCMP and the Medical Examiner’s Office of Alberta. This exhibition will be discussed further in the Science Alberta Programs section of this paper. Suffice it to say, *The Body in the Library* is a tremendous success, touring the province and visiting non-traditional locations such as libraries and community halls, as well as science centres. In all settings, local volunteers are recruited to host the event and to be interpreters during the exhibition’s tour.

The pilot project concluded successfully in 1992, and ongoing funding for Science Alberta was obtained through the Alberta Lottery Fund. Additional sources of funding currently include the corporate sector and the Government of Canada.

One aspect which has become a basic motto of Science Alberta is the “hands-on, minds-on” approach. One of our projects quotes the phrase “I hear and I forget. I see and I remember. I do and I understand!” Participants enjoy having to do things, and become totally involved. People learn something about science without realizing it. *Science is fun* and can be done *on a shoestring*.

SCIENCE ALBERTA PROGRAMS

Overview

The Science Alberta Foundation is organized along functional lines, and consists of 3 units. These programmatically oriented groups are Education, Community Science and Exhibitions. Each unit is responsible for a number of separate programs, and these are outlined below.

Education

The Foundation is not directly involved with the provincial Department of Education or local school boards, but a number of programs which complement those offered by formal education organizations have been developed. Several programs offer teachers the opportunity to become familiar with new and innovative approaches to teaching science, especially involving “hands-on” science.

- Elementary Science Teacher Institutes: These summer institutes are designed to increase the proficiency of elementary teachers in planning, implementing and evaluating a hands-on science program. The Institutes are 7-day professional development courses designed by Science Alberta and offered by the Faculty of Education at the University of Lethbridge. Teachers learn how to plan and implement an activity-based science program, and are also given the opportunity to work with science-related agencies from outside the formal education system. Teachers who successfully complete the course are awarded graduate level credits.
- Teachers in Business: This program gives teachers the opportunity to work in a business related to their field of instruction or interest for 4 to 6 weeks during the summer. This professional development activity allows teachers to gain new skills and knowledge, and to see the relevance of the education curriculum to business practice. A network of contacts is also developed, which can be accessed during the school year. Professionals can be utilized as resource people for unit preparation and are often invited into the classroom as guest speakers. Businesses have the chance to actively demonstrate their support for education, share information about their fields of endeavour, and outline potential future skill requirements and career opportunities.
- Science Under 7: A theme-based program designed to provide educators with exciting ideas for science activities for young children (7 years and under). There

are 10 kits that cover such topics as agriculture, bears, dinosaurs and the Rocky Mountains. Each kit includes a variety of materials such as an activity guide, hands-on material, posters and pamphlets. The activity guides include up to 35 activities allowing for a variety of experiences and accommodating different learning styles. The activities encourage the development of various cognitive skills, thus enabling children to benefit from an enriched learning experience. Scientists and professional educators have been involved in preparing and evaluating the kits to ensure relevancy and accuracy. In-services on how to implement the kits are offered to teachers on request.

- Yellow Box Science: A science contest that “Brings Science Down to Size”. Students are challenged to fit a hands-on science experiment or investigation into a small box (a shoebox for Grades 4 to 6 and a matchbox for Grades 7 to 9). Everything needed to complete the project must be contained in the box, including materials and adequate instructions. Projects are evaluated on the basis of creativity, communication, scientific process, understanding of the scientific principles involved, as well as audience involvement and how much fun the project is. Prizes awarded consist of a 3-day stay at Dinosaur Country Science Camp in Drumheller. Entries have been received from all across the province of Alberta, with many showing the sense of innovation and fun we are looking for. Examples range from magnetism and electricity to a human-powered phonograph and the physics of bungee jumping.

Community Science

The Community Science team is responsible for administering the Grants and Awards program, in addition to other activities. In general, the mandate is to encourage community groups to develop their own science programs.

- Grants and Awards: As previously discussed, this program represents the philanthropic arm of the Foundation. Community groups, organizations, schools or individuals are invited to submit proposals in categories such as *Putting Science to Work*, *Science Tourism*, or *Science Camps*. Projects are evaluated on the basis of merit, degree of community involvement, scientific content of the plan as well as involvement of existing institutions, facilities or organizations. Up to \$50,000 per year can be awarded. Numerous success stories could be told, but only two

specific examples will be outlined here. The first is a *Science Tourism* project called Alberta Underground. This program was designed to introduce Albertans and visitors to speleology – the science and sport of cave exploration. Alberta Underground is a community initiative sponsored by the Alberta Cave and Karst Research Institute of Canmore, Alberta. The program was designed to promote the “eco” or science tourism aspect of caving to tourists. It combines both mental and physical challenges, as participants are given a full day of science and adventure. The culmination of the day is the 5 to 6 hours spent scrambling, crawling, squeezing and climbing through several hundred metres of cave passages and chambers. The time spent underground provides a natural environment for scientific investigations of cave formation, cave fauna and underground ecology.

The second program is in the *Science Camps* category. This is Dinosaur Country Science Camp. The camp is organized by the Drumheller Regional Science Council, and allows students the opportunity to spend 7 days in the Badlands of Alberta. This area includes a UNESCO World Heritage Site and the world-famous Royal Tyrrell Museum of Palaeontology. The camp itself makes excellent use of the resources in the area. Participants can explore archaeological sites, collect fossils, as well as addressing ecological and environmental themes. A special “behind the scenes” tour of the Museum is available, and the emphasis throughout the week is hands-on science.

- Science Hotlines: Science Hotlines are a free service for educators who are looking for answers to science-related questions, or who want to arrange for a scientist to visit the classroom. Science Alberta provides funding to local science councils to organize and run a Science Hotline to serve their area. This community ownership ensures continued interest in the program at the local level, as well as addressing local needs and issues. Three Hotlines currently exist, in Calgary (overseen by the Calgary Science Network), Edmonton (the Edmonton Science and Technology Network), and the Peace Country (Peace Country Science Network Association). All are well received and usage continues to grow. In 1993, over 20,000 students were reached by the program in Alberta. As funds and local interest allows, the program will continue to expand. Science Alberta coordinates the service for the Province of Alberta, and Industry Canada oversees the program on a national level through *Innovators in the Schools*.

Exhibitions

The Exhibitions Team is responsible for developing, coordinating and touring hands-on, travelling science exhibitions. These range from 1,000 to 1,500 square feet for major exhibitions like *The Body in the Library*, to self-contained crates, addressing a single theme and used by a school or classroom for a series of lessons. The team is making science and technology exhibitions accessible to all Albertans. Non-traditional venues such as libraries and schools, as well as more traditional locations such as science centres, have housed the various exhibitions.

- *The Body in the Library*: This was the first exhibition developed by Science Alberta, as outlined previously. The exhibition is designed to combine the intrigue of a murder mystery with the precision of forensic science. It has three components – the forensic lab and two interchangeable programs. The lab creates the impression of a forensic science setting, and combines free-standing canvas paintings of mystery book covers with workstations to conduct the investigations. The first program, *SOS (Save our School)*, is set in a fictitious Alberta school. A series of crimes has been committed – including forgery, break and enter, vandalism and theft. Participants examine evidence and use their skills of detection and the hands-on challenges, to determine who was responsible for the pranks. The program is designed for 9 to 12 year olds, and families.

The second program, *Alibi*, is loosely based on Agatha Christie's novel, *The Body in the Library*. A murder has been committed, and participants act as investigators to solve the crime. Evidence is examined and alibis of suspects evaluated, to determine the identity of the murderer. *Alibi* is designed for teens and adults. The program has been so successful that a new crime was required – the public wanted to continue the forensic challenge – and so *Rigor Mortis in Row 6* is now also available.

The Body in the Library is a unique exhibition in many respects. Above all, it is hands-on and demands that the audience participate directly in solving the crime. Visitors have been known to spend up to one and a half hours studying the evidence; some return two and three times to verify their conclusions. It is also hosted by non-scientists. In all of the locations on its tour, volunteers have been recruited to oversee the exhibition. Science Alberta staff ensures a smooth move to

the location, and provides training and support for the volunteers, but the hosts essentially become the interpreters during the stay. The program has been especially popular with librarians. The theme allows librarians to develop related programming, and encourages the use of books and reference materials, as participants follow up on forensic investigation. This process of spin-off programming is an exciting addition to our touring exhibitions, and will be highlighted in the examples in the Case Studies section of this presentation.

The Body in the Library is also unique in terms of cost; design, fabrication and supervision costs for the exhibition were kept to a minimum. This was achieved, in part, because a large proportion of the research was done by professional scientists acting as volunteers. As previously outlined, the RCMP and the Medical Examiner's Office of Alberta volunteered to assist in the development of the exhibition. Overhead costs are also kept to a minimum, as volunteers continue to be major contributors in the presentation of this program. In the past year, over 11,000 people participated in the exhibition, at an average cost to Science Alberta of about \$2.60 per participant.

- *Beyond the Naked Eye*: This hands-on exhibition was designed to raise public awareness and interest in the modern techniques of medical imaging. Four methods are depicted, and students and the general public are invited to participate in challenges involving X-Rays, CT Scans, MRIs and Nuclear Medicine. Also included are world-class photographic images that were produced using some of the imaging technology featured.

Activities include assembling the skeletal elements of a human hand and foot, learning about the organs of the body using a model torso and experiencing a visit to a hospital emergency room through an interactive computer program.

As with *The Body in the Library*, *Beyond the Naked Eye* was developed with the assistance of specialists – in this case, medical experts were consulted and involved in the development and testing process. The exhibition reached over 11,000 participants in 1993 alone, at a cost of under \$4.00 per person.

- Other Exhibitions: Two other travelling exhibitions are also part of Science Alberta's repertoire. These include one which marries the principles of science and

art in the spirit of Leonardo da Vinci, called *Yo Leonardo*. The second, *Northern Exposure*, addresses survival in an arctic climate, and explores the scientific and technical adaptations needed in order to survive. Both follow the theme of hands-on activities supporting scientific investigation, as discussed in the two preceding exhibitions. Both *Yo Leonardo* and *Northern Exposure* are also very cost effective – cumulatively they reached over 25,000 people in 1993, at an average cost of about \$3.00 per person. The use of volunteers, non-traditional venues, and low overhead combine to make these exhibitions cost effective.

- Science-In-A-Crate: As the name suggests, these are box-size portable science exhibitions. They provide space-limited venues, schools and libraries-among others, with access to theme-based science materials. Each crate contains hands-on exhibits, a program outline with suggested activities and ready-made resources to complete the tasks; essentially, a self-contained science exhibition.

Themes created to date include Geology, Wolves, and Fleece and Fibres, the latter dealing with animal fibres and the textile industry. Each exhibit is simple, durable and provides an effective means to communicate ideas about science to a general audience.

The concept has proven to be extremely successful – the crates obviously address a current need. The concept is also popular with funders, as they can attach their name to a specific, tangible product, dealing with a topic of some relevance to their organization.

Additional crates are being developed, and at a cost in 1993 of under \$4.00 per participant, once again shows that we can do “science on a shoestring”.

FUNDING

Finding sufficient funds to continue operating such a unique organization as Science Alberta is always a challenge. The Foundation has been fortunate in obtaining the support of The Alberta Lottery Fund, from the inception of the 2-year Pilot Project to our current status as an ongoing entity under their provincial license. The partnership has been mutually beneficial, as the funds allow Science Alberta to continue operating, while Alberta Lotteries meets a portion of its

mandate to support community-oriented initiatives. A significant amount of these monies are given out to communities and organizations through the Grants and Awards program, and this ensures continued recognition of Alberta Lotteries at the local level.

Additional sources of funding are sought however, to expand Science Alberta programming. The Federal Government of Canada provided money for the Pilot Project, and Industry Canada continues to provide support for the *Innovators in the Schools* program. By far the greatest source of funds beyond Alberta Lotteries, however, is obtained from the private sector. In such difficult times, this is often a challenge. However, we have been fortunate in receiving significant support from the petroleum sector, which is well-represented in Calgary and Alberta. As outlined earlier in reference to *Science-In-A-Crate*, it is often easier to obtain funds for tangible product-oriented programs, rather than for concept and idea-oriented initiatives.

For your information, our budget for 1993-94 is in the order of 1.3 million dollars, a shoestring compared to that of many science centres and museums.

CASE STUDIES

The preceding has outlined how the Science Alberta Foundation evolved, from an idea to what it is now – a significant contributor to the scientific and education cultures of Alberta. This paper will now document some specific examples of how the Foundation has had an actual impact on individuals and organizations in the province. These will again emphasize the theme of “science on a shoestring” – keeping costs to a minimum while getting the maximum impact.

Grande Prairie

Grande Prairie is a community in the Peace River Country of northwestern Alberta. It has a population of about 30,000. Industries include forestry, agriculture and oil and gas exploration and production. Obviously, there is an interest in science and technology.

The Peace Country Science Network Association has been involved with Science Alberta since our first province-wide conference in 1990. The group submitted a

proposal to develop a science centre for the region – this was at the time that Science Alberta was still considering developing a “network of science centres” rather than the “network of centres for science” which evolved later.

A 1991 Grant was awarded to the Peace Country Archaeological Society for a 3-day activity called *Time Travellers*. This fun, hands-on event involved the general public in the science of archaeology. It allowed participants to explore the application of physics and material properties to ancient tools. They were invited to make and use their own stone tools. The public loved it, and it also encouraged the Peace Country groups to try more. Science Alberta continued to be involved, and in 1992 another grant was awarded to the region. This time, the Peace Country Science Network Association received funding to undertake *Eco-Explorers*. This education-based project involved creating two crates on themes relating to local ecosystems associated with summer and winter. The summer kit contained information and materials such as those needed to lead a field trip and investigate wetland ecosystems, the flora and fauna and how food chains work. These kits have been well accepted by the education system in the Peace Country, and have certainly reached the 9 to 13 year-olds targeted.

In both of the preceding projects, volunteers played a major role in completing the programs. Local experts such as archaeologists and biologists were involved in these successful undertakings. But, non-scientists were also involved. Librarians and city planners took on a major role in *Eco-Explorers*. Science Alberta provided financial support through the Grants and Awards program and some suggestions in the area of program content and presentation, but these projects by and large were proposed, researched, undertaken and implemented by local volunteers. Community ownership was important in the success, and this expertise could now be shared with others in the province, through Science Alberta and the provincial science network which is developing.

However, the Grande Prairie story does not end yet. In 1992, Science Alberta participated in the Grande Prairie Science Week. Three Science Alberta exhibitions were showcased in the area; *The Body in the Library* was hosted by the Grande Prairie Public Library, *Northern Exposure* opened in a daycare centre and *Beyond the Naked Eye* had its Alberta premiere at the Prairie Gallery. Science exhibitions at a

library, a daycare and an art gallery – again, non-traditional venues were used, and volunteers continued to play a major role. The week was a lot of fun for everyone – the librarians had a theatrical opening for the exhibition, and later developed a mock trial to involve the legal system in evaluating the results. The art gallery was thrilled with the new audience that *Beyond the Naked Eye* attracted, and invited medical specialists from the local hospital to be involved.

The entire week focussed on science, but the enthusiasm and involvement did not end there. The Peace Country Science Network Association continues to be involved with Science Alberta. Other exhibitions such as *Yo Leonardo* have visited the region. Grande Prairie Regional College is one of two sites to host our Elementary Science Teacher Institutes. And the latest developments are the Grande Prairie Public Library producing a *Science-In-A-Crate* program dealing with forestry, and the addition of a Science Hotline for the Peace Country. Science Alberta is pleased that the Peace Country represents our first rural hotline, and with success already evident, it will serve as a model for other regions. A science network is certainly developing, and Science Alberta is part of it!

Medical Examiner's Office

A second example of the impact of Science Alberta can be seen in the Medical Examiner's Office of Alberta. This institution is responsible for forensic investigations including pathology, toxicology and histology. The group is not normally associated with the public presentation of science programming, but certainly is involved with a field in which the public is keenly interested.

The Medical Examiner's Office first became involved with Science Alberta as consultants for *The Body in the Library*. The Foundation was keenly interested in scientific authenticity in the program, and who better to consult than the people who do autopsies and criminal investigations on a daily basis? Many professionals became involved in suggesting modifications and fine-tuning for the exhibition. These individuals also recognized that they could do their own science programming!

In 1991, the Medical Examiner's Office was awarded funds to complete a *Science-In-A-Crate* project entitled *Search for Buried Remains*. This stand-alone display

recreated a crime scene – a human skull was partially buried in soil. Participants were asked to study the scene, and determine if a crime had been committed, and if so, what other information could be determined from the “scene of the crime”?

With the success of *Search for Buried Remains*, the group applied for and received a Grant in 1992 for a full-scale exhibition, called *Death in the Gym*. This hands-on exhibition involved the examination of a crime scene (a high school locker room where a dead athlete was found). A thorough investigation yielded numerous clues, and with the help of an interactive computer program, participants could solve the crime. Other highlights of the visit to the Medical Examiner’s Office included a tour, and a focus on science-oriented careers represented at the facility.

Death in the Gym has proven to be very popular with high school students and the general public. Non-scientists are allowed to visit an actual laboratory where forensic investigations occur. The entire process has illustrated that scientists and volunteers who are not familiar with exhibition design, can, with some guidance, produce a tremendously successful hands-on program.

SUMMARY AND CONCLUSIONS

The Science Alberta Foundation is a unique organization dedicated to the promotion of science literacy in the province of Alberta on a shoestring budget. The Foundation, since its inception in 1990, has been successful in developing its own exhibitions in-house, and touring these throughout the province. All exhibitions have incorporated the “hands-on, minds-on” philosophy. They were developed using volunteers, and costs were kept low by doing so. The use of volunteers as hosts and interpreters has also been critical in reducing costs. Non-traditional venues, such as libraries and art galleries, have housed the exhibitions, and in this way attracted a different audience than would normally attend a science-oriented exhibition.

The Foundation has also provided funding to groups to develop their own science programming. The approach has encouraged individuals and organizations who would not ordinarily be expected to develop an exhibition to do just that. A variety of organizations including theatrical groups, teachers, medical experts and television stations have produced educational scientific programs for the public.

Science Alberta is dependent on funding from Alberta Lotteries, Industry Canada and the private sector. In these times of fiscal restraint, fundraising is difficult. Our experience has shown us that corporations are willing to fund programs which produce tangible products and measurable results. The Foundation is able to adapt to these conditions, while maintaining its focus on the creation of a province-wide science network.

Finally, the process is working. Groups from Grande Prairie to Medicine Hat, from Fort McMurray to Pincher Creek are involved with Science Alberta. In increasing numbers, Albertans are becoming interested and involved in science and technology. People in business, industry, education and government are recognizing the importance of science and technology to the province's future.

Since its establishment in 1990, the Science Alberta Foundation has championed the increased awareness of science and technology among Albertans of all ages. It has coordinated, facilitated, supported and promoted science programs across the province, working to link them into a science network for all Alberta. The Foundation cannot take all the credit for bringing science and technology into sharper focus for Albertans, but it certainly is playing a major role. The Foundation is proving it is an effective catalyst, by bringing together a wide diversity of people and programs and working with a variety of funding partners. The organization is also proving it can achieve a remarkable impact on a shoestring budget. Cost of delivery of exhibitions, for example, is usually under \$4.00 per person. In 1993 alone, over 110,000 people participated in Science Alberta activities, events, exhibitions and presentations.

With the continued financial support of the public and private sectors, and with the continued enthusiastic commitment of volunteers across the province, Science Alberta is working toward the achievement of its mission. In its modest but highly visible and effective way, Science Alberta is having an important impact on the future of science and technology in Alberta.